

## G06T

### IMAGE DATA PROCESSING OR GENERATION, IN GENERAL

#### Definition statement

*This place covers:*

- Processor architectures or memory management for general purpose image data processing
- Geometric image transformations
- Image enhancement or restoration
- Image analysis
- Image coding
- Two-dimensional image generation
- Animation
- Three-dimensional image rendering
- Three-dimensional modelling for computer graphics
- Manipulating three-dimensional models or images for computer graphics

#### Relationships with other classification places

[G06T](#) is the functional place for image data processing or generation. Image data processing or generation specially adapted for a particular application is classified in the relevant subclass. Documents which merely mention the general use of image processing or generation without detailing of the underlying details of such, are classified in the application place. Where the essential technical characteristics of an invention relate both to the image processing or generation and to its particular use or special adaptation, classification is made in both [G06T](#) and the application place.

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Apparatus for radiation diagnosis	<a href="#">A61B 6/00</a>
Aspects of games using an electronically generated display having two or more dimensions	<a href="#">A63F 13/00</a>
Measuring, by optical means, length, thickness or similar linear dimensions, angles, areas, irregularities of surfaces or contours	<a href="#">G01B 11/00</a>
Reading or recognising printed or written characters or recognising patterns, e.g. fingerprints	<a href="#">G06F 18/00</a> , <a href="#">G06V</a>
Coding, decoding or code conversion	<a href="#">H03M 13/00</a>
Pictorial communication, television systems	<a href="#">H04N 1/00</a> - <a href="#">H04N 21/00</a>

#### Special rules of classification

Symbols under [G06T 1/00](#) - [G06T 19/20](#) may only be allocated as invention information.

Whenever possible, additional information should be classified using one or more of the Indexing Codes from the range of [G06T](#).

The indexing codes under [G06T 2200/00](#) - [G06T 2219/2024](#) may only be allocated to documents to which a symbol under [G06T 1/00](#) - [G06T 19/20](#) is allocated as invention information as well.

## Special rules of classification

The following list of symbols from the series [G06T 2200/00](#) are for allocation to documents within the whole range of [G06T](#) except [G06T 9/00](#):

<a href="#">G06T 2200/00</a>	Indexing scheme for image data processing or generation, in general - Not used for classification
<a href="#">G06T 2200/04</a>	involving 3D image data - processing of 3D image data, i.e. voxels; relevant for <a href="#">G06T 3/00</a> , <a href="#">G06T 5/00</a> , <a href="#">G06T 7/00</a> or <a href="#">G06T 11/00</a>
<a href="#">G06T 2200/08</a>	involving all processing steps from image acquisition to 3D model generation - complete systems from acquisition to modelling
<a href="#">G06T 2200/12</a>	involving antialiasing - dejagging, staircase effect
<a href="#">G06T 2200/16</a>	involving adaptation to the client's capabilities - adapting the colour or resolution of an image to the client's capabilities
<a href="#">G06T 2200/21</a>	involving computational photography
<a href="#">G06T 2200/24</a>	involving graphical user interfaces [GUIs]
<a href="#">G06T 2200/28</a>	involving image processing hardware - relevant for groups not directly related to hardware; not used in <a href="#">G06T 1/20</a> , <a href="#">G06T 1/60</a> , <a href="#">G06T 15/005</a>
<a href="#">G06T 2200/32</a>	involving image mosaicing - image mosaicing, panoramic images
<a href="#">G06T 2200/36</a>	Review paper; Tutorial; Survey - basic documents describing the state of the art.

There are further series of symbols for [G06T](#) whose use is reserved to particular maingroups or ranges of maingroups and whose full list and description are given in the FCRs of the respective maingroups:

[G06T 2201/00](#) for [G06T 1/0021](#) only

[G06T 2207/00](#) for [G06T 5/00](#) and [G06T 7/00](#) only

[G06T 2219/00](#) for [G06T 9/00](#) only

[G06T 2210/00](#) for [G06T 11/00](#) - [G06T 19/00](#) only; see list below

[G06T 2211/40](#) for [G06T 12/00](#) only

[G06T 2213/00](#) for [G06T 13/00](#) only;

[G06T 2215/00](#) for [G06T 15/00](#) only;

[G06T 2219/00](#) for [G06T 19/00](#) only;

[G06T 2219/20](#) for [G06T 19/20](#) only

Symbols from the series [G06T 2210/00](#) for allocation in the range of [G06T 11/00](#) - [G06T 19/00](#) only:

<a href="#">G06T 2210/00</a>	Indexing scheme for image generation or computer graphics - Not used for classification
<a href="#">G06T 2210/04</a>	architectural design, interior design - interior/garden/facade design, architectural layout plans
<a href="#">G06T 2210/08</a>	bandwidth reduction
<a href="#">G06T 2210/12</a>	bounding box - convex hull for polygons or 3D objects
<a href="#">G06T 2210/16</a>	cloth - animation, rendering or modeling of cloth/garment/textile, virtual dressing rooms

<a href="#">G06T 2210/21</a>	collision detection, intersection - intersection/collision detection of 3D objects
<a href="#">G06T 2210/22</a>	cropping - cropping of image borders
<a href="#">G06T 2210/24</a>	fluid dynamics - animation, rendering or modelling of fluid flows
<a href="#">G06T 2210/28</a>	force feedback - virtual force
<a href="#">G06T 2210/32</a>	image data format - conversion between different image or graphics formats
<a href="#">G06T 2210/36</a>	level of detail - level of detail, also for textures (e.g. mip-mapping)
<a href="#">G06T 2210/41</a>	medical - medical applications concerning e.g. heart, lung, brain, tumors
<a href="#">G06T 2210/44</a>	morphing - morphing or warping
<a href="#">G06T 2210/52</a>	parallel processing
<a href="#">G06T 2210/56</a>	particle system, point based geometry or rendering - rendering and animation of particle systems (e.g. fireworks, dust, clouds), point clouds, splatting
<a href="#">G06T 2210/61</a>	scene description - scene graphs, scene description languages, e.g. VRML
<a href="#">G06T 2210/62</a>	semi-transparency - screen-door effect, change of transparency values
<a href="#">G06T 2210/64</a>	weathering - weathering effects like e.g. aging, corrosion

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

2D	Two-dimensional
3D	Three-dimensional
4D	Four-dimensional, 3D in time
CAD	Computer-Aided Design (in computer graphics); Computer-Aided Detection (in image analysis)
MR	Magnetic Resonance (in image analysis); Mixed Reality (in computer graphics)
Stereo	Treatment of the images of exactly two cameras in a pairwise manner

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

ANN	Artificial Neural Network
AR	Augmented Reality
CT	Computed Tomography
DCE-MRI	Dynamic Contrast-Enhanced Magnetic Resonance Imaging
DCT	Discrete Cosine Transform
DRR	Digitally Reconstructed Radiograph
DTS	Digital Tomosynthesis
GUI	Graphical User Interface
IC	Integrated Circuit
ICP	Iterative Closest Point
LCD	Liquid Crystal Display

MRF	Markov Random Field
MRI	Magnetic Resonance Imaging
PCB	Printed Circuit Board
RGB	Red, Green, Blue
ROI	Region of Interest
SLAM	Simultaneous Localisation And Mapping
SNR	Signal-to-Noise Ratio
SPECT	Single Photon Emission Computed Tomography
US	Ultrasound
VOI	Volume of Interest
VR	Virtual Reality

## **G06T 1/00**

### **General purpose image data processing**

#### **Definition statement**

*This place covers:*

General purpose image data processing systems and methods.

#### **Special rules of classification**

The IPC class **G06T1/40** is not used. The corresponding documents are classified in [G06T 1/20](#).

## **G06T 1/0007**

### **{Image acquisition}**

#### **Definition statement**

*This place covers:*

Capturing or storing images from or to memory

#### **References**

##### **Limiting references**

*This place does not cover:*

Scanning, transmission or reproduction of documents or the like	<a href="#">H04N 1/00</a>
Television cameras	<a href="#">H04N 23/00</a>

## **G06T 1/0014**

### **{Image feed-back for automatic industrial control, e.g. robot with camera (robots [B25J 19/023](#))}**

#### **Definition statement**

*This place covers:*

- Machine vision or tool control

## Definition statement

- Image feedback for robot navigation or walking
- 3D vision systems.

## References

## Limiting references

*This place does not cover:*

Vision controlled manipulators	<a href="#">B25J 9/1697</a>
Accessories fitted to manipulators including video camera means	<a href="#">B25J 19/023</a>
Control of position, course, altitude or attitude of land, water, air or space vehicles using means capturing signals occurring naturally from the environment for determining position or orientation	<a href="#">G05D 1/243</a>

## G06T 1/0021

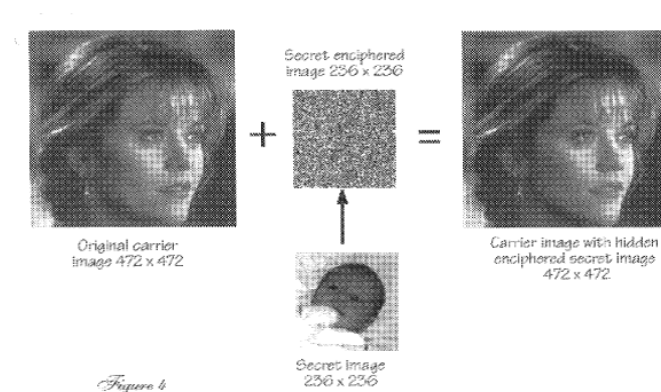
## {Image watermarking}

## Definition statement

*This place covers:*

- Image watermarking in general.
- Applications or software packages for watermarking.

Illustrative example - Hiding a digital image (message) into another digital image (carrier) (US6094483 - UNIV NEW YORK STATE RES FOUND):



## References

## Limiting references

*This place does not cover:*

Testing specially adapted to determine the identity or genuineness of paper currency or similar valuable papers	<a href="#">G07D 7/1205</a>
Audio watermarking	<a href="#">G10L 19/018</a>
Arrangements for secret or secure communication using encryption of data	<a href="#">H04L 9/06</a>
Arrangements for secret or secure communication using electronic signatures	<a href="#">H04L 9/3247</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Security arrangements for protecting computers or computer systems against unauthorised activity	<a href="#">G06F 21/00</a>
Circuits for prevention of unauthorised reproduction or copying	<a href="#">G11B 20/00086</a>
Scanning, transmission or reproduction of documents involving image watermarking	<a href="#">H04N 1/32144</a>

## G06T 1/0028

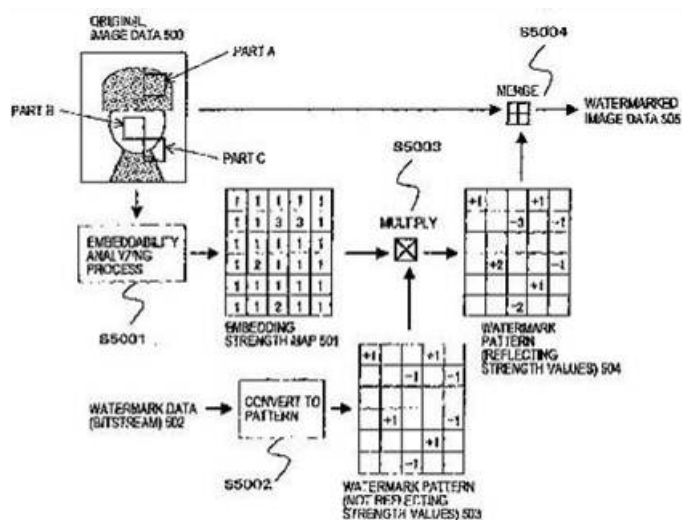
{Adaptive watermarking, e.g. Human Visual System [HVS]-based watermarking}

### Definition statement

This place covers:

- Adaptations based on Human Visual System [HVS].
- Perceptual masking.
- Preservation of image quality; Distortion minimization.
- Methods to measure quality of watermarked images.
- Measuring the balance between quality and robustness, i.e., fixed robustness, adapting quality, or vice versa.

Illustrative example - Changing a portion of an image based on an embedding strength map (EP1170938 - HITACHI LTD):



## G06T 1/0035

{Output size adaptive watermarking}

### Definition statement

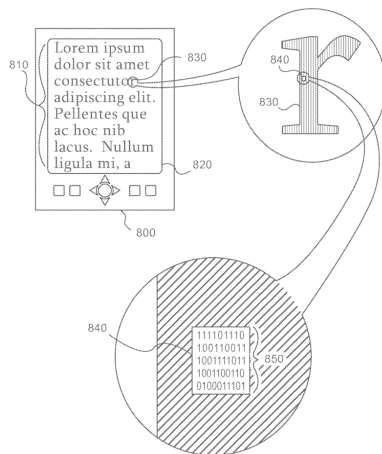
This place covers:

- Embedding without modifying the size of input.
- Embedding or modifying the watermark directly in a coded image or video stream, without decoding first.

**G06T 1/0042****{Fragile watermarking, e.g. so as to detect tampering}****Definition statement***This place covers:*

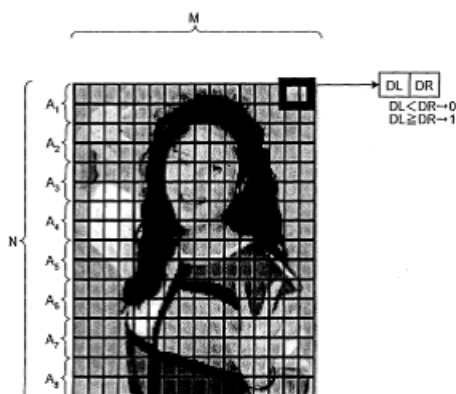
- Birthday attacks.
- Forgery.

Illustrative example - Changing pixels at selected positions according to a replacement table (WO2011021114 - NDS LIMITED):

**G06T 1/005****{Robust watermarking, e.g. average attack or collusion attack resistant}****Definition statement***This place covers:*

- Resistance; Resistance to attacks or distortions; Distortion compensation.
- Strength.
- Collusion attacks; Average attacks; Averaging.
- Reliable detection, e.g. with reduced likelihood of false positive/negative.

Illustrative example - Watermarking an image using the difference of average intensity of two adjacent blocks (EP1927948 - FUJITSU LTD):

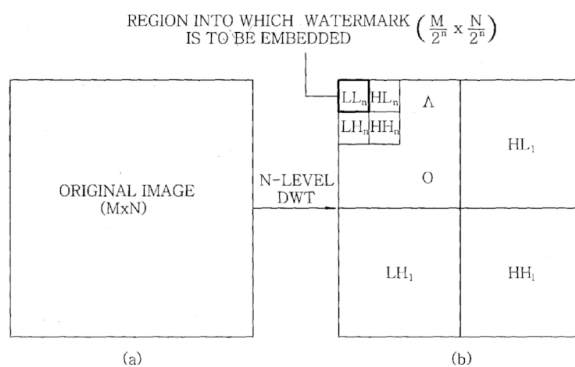


**G06T 1/0057****{Compression invariant watermarking}****Definition statement**

*This place covers:*

Watermarking techniques for JPEG or MPEG or for a wavelet transformed image.

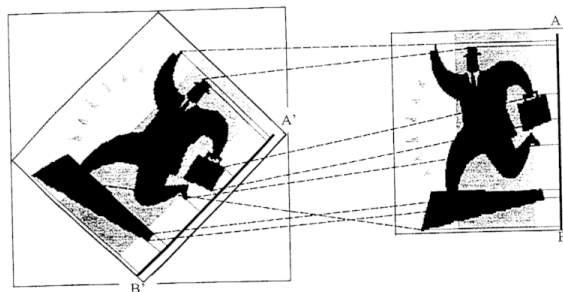
Illustrative example - Embedded a watermark in a DC component region of a wavelet transformed image (US2004047489 - KOREA ELECTRONICS TELECOMM):

**G06T 1/0064****{Geometric transform invariant watermarking, e.g. affine transform invariant}****Definition statement**

*This place covers:*

- Robust against resizing or rotation or cropping, etc.
- Determining the rescaling factor or rotation angle by using the watermarks so as to compensate the image, i.e. as a calibration signal.
- Desynchronization attacks.

Illustrative example - Combining a reference mark with an identification mark and embedding them in image textures to detect the applied transformations (GB2378602 - CENTRAL RESEARCH LAB LTD):





## G06T 1/0071

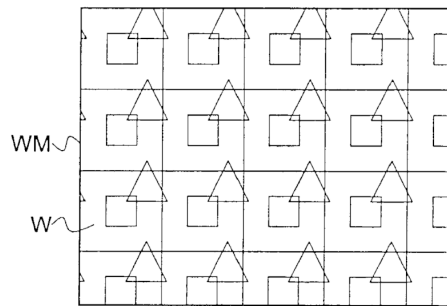
{using multiple or alternating watermarks}

### Definition statement

*This place covers:*

- Many, possibly different, watermarks on the same image, e.g. for copy or distribution control.
- Same watermark repeated on different parts of the image.

Illustrative example - Encoding payload in relative positions and/or polarities of multiple embedded watermarks (WO0111563 - KONINKL PHILIPS ELECTRONICS NV):



## G06T 1/0078

{using multiple thresholds}

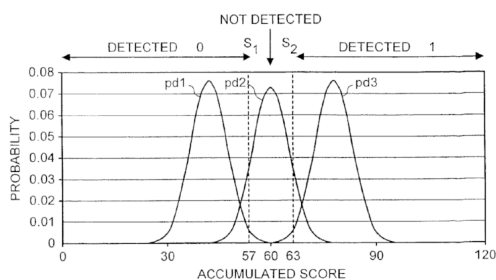
### Definition statement

*This place covers:*

Using thresholds to define ranges of detection probability or ranges of robustness.

Illustrative example - Multiple thresholds for reducing false detection likelihood

(EP1271401 - SONY UK LTD):



## G06T 1/0085

{Time domain based watermarking, e.g. watermarks spread over several images}

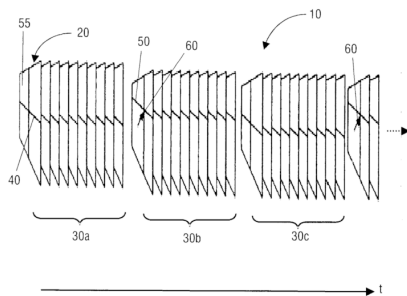
### Definition statement

*This place covers:*

Watermarks spread over several images or frames or a sequence.

## Definition statement

Illustrative example - Alternating watermark patterns (e.g. by translation, mirror, rotation) to improve the reliability of scale factor measurement (WO2005109338 - KONINKL PHILIPS ELECTRONICS NV):



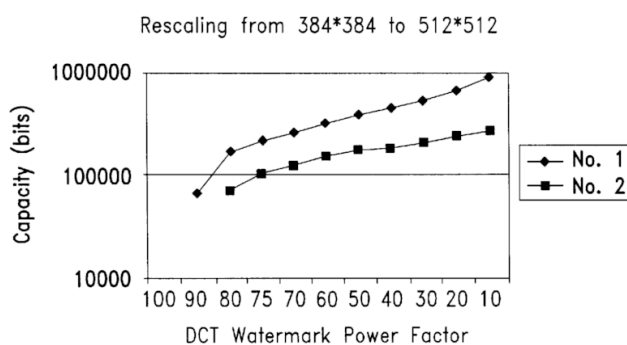
## G06T 1/0092

{Payload characteristic determination in a watermarking scheme, e.g. number of bits to be embedded}

## Definition statement

*This place covers:*

Illustrative example - Calculating capacity of DCT coefficients of a digital image file and selecting the ones apted to embedding, thereby providing robustness (US6724913 - HSU WEN-HSING):



## G06T 1/20

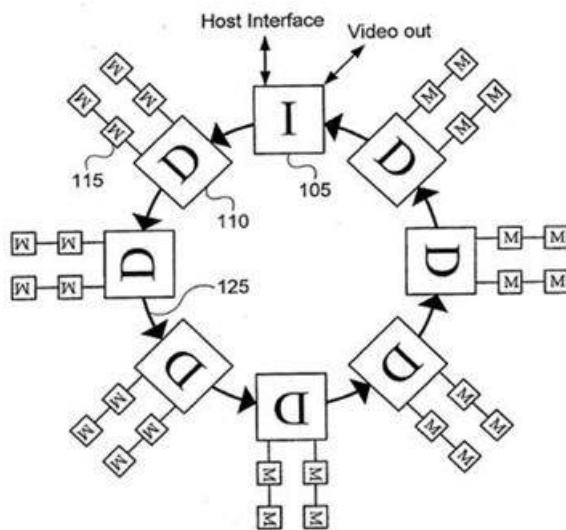
Processor architectures; Processor configuration, e.g. pipelining

## Definition statement

*This place covers:*

- Graphics accelerators; Graphic processing units (GPUs).
- Graphics pipelines.
- Parallel or massively parallel data bus specially adapted for image data processing.
- Architecture or signal processor specially adapted for image data processing.
- VLSI or SIMD or fine-grained machines specially adapted for image data processing.
- Multiprocessor or multicomputer or multi-core specially adapted for image data processing.

Illustrative example - Ring architecture for image data processing:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Architectures of general purpose stored program computers	<a href="#">G06F 15/76</a>
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## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Pipelining	the use of a sequence (pipeline) of image processing stages for execution of instructions in a series of units, arranged so that several units can be used for simultaneously processing appropriate parts of several instructions.
Multiprocessor	processor arrangements comprising a computer system consisting of two or more processors for the simultaneous execution of two or more programs or sequences of instructions.

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

GPU	Graphics Processing Unit
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## G06T 1/60

### Memory management

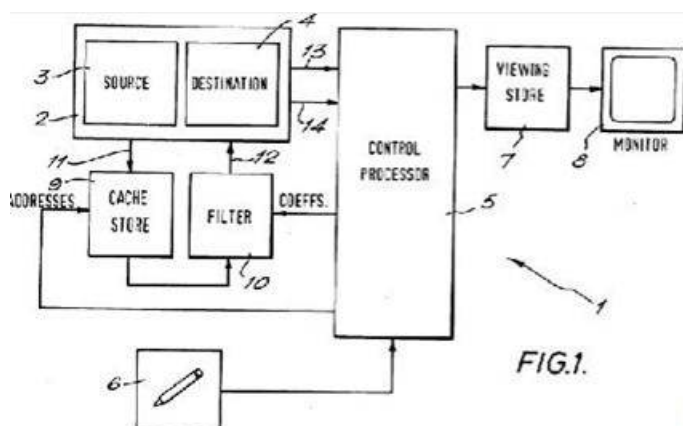
#### Definition statement

This place covers:

- Address generation or addressing circuit or BitBlit for image data processing.
- 3D or virtual or cache memory specially adapted for image data processing.
- Frame or screen or image memory specially adapted for image data processing.

## Definition statement

Illustrative example - Cache memory for image processing (EP0589724 - QUANTEL LTD)



## References

## Limiting references

This place does not cover:

Accessing, addressing or allocating within memory systems or architectures	<a href="#">G06F 12/00</a>
Ping-pong buffers	<a href="#">G09G 5/399</a>
Arrangements for selecting an address in a digital store	<a href="#">G11C 8/00</a>
Digital stores characterised by the use of particular electric or magnetic storage elements	<a href="#">G11C 11/00</a>

## G06T 3/00

## Geometric image transformations in the plane of the image

## Definition statement

This place covers:

Geometric image transformations in the plane of the image.

## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Image enhancement or restoration	<a href="#">G06T 5/00</a>
Image animation	<a href="#">G06T 13/00</a>
Geometric effects for 3D image rendering	<a href="#">G06T 15/10</a>
Perspective computation for 3D image rendering	<a href="#">G06T 15/20</a>
Geographic models in 3D modelling for computer graphics	<a href="#">G06T 17/05</a>
Matrix or vector computation	<a href="#">G06F 17/16</a>
Conversion of standards for television systems	<a href="#">H04N 7/01</a>

## G06T 3/02

**Affine transformations (for image registration [G06T 3/147](#); for image mosaicing [G06T 3/4038](#))**

### Definition statement

*This place covers:*

- Affine transformations not further specified.
- Combinations of affine transformations including rotation, scaling or shear.

### Relationships with other classification places

This place covers the combination of rotation, scaling or shear. When the invention information in the document involves image scaling or image rotation per se, the image scaling should be classified in group [G06T 3/40](#), and the image rotation should be classified in group [G06T 3/60](#).

### References

#### Limiting references

*This place does not cover:*

Transformations for image registration using affine transformations	<a href="#">G06T 3/147</a>
Image mosaicing, e.g. composing plane images from plane sub-images	<a href="#">G06T 3/4038</a>

## G06T 3/04

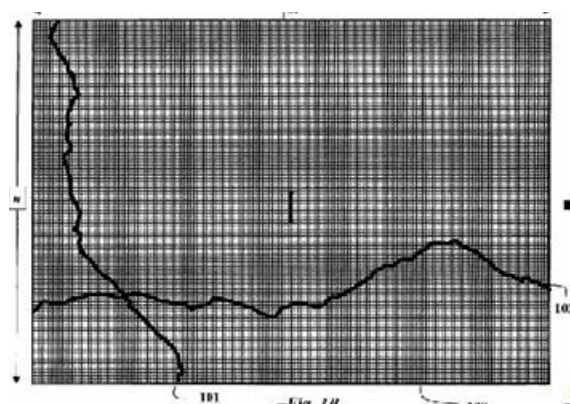
**Context-preserving transformations, e.g. by using an importance map (panospheric to cylindrical image transformations [G06T 3/12](#))**

### Definition statement

*This place covers:*

- Selective warping according to an importance map; Smart image reduction.
- Seam carving; Liquid resizing; Image retargeting.

Illustrative example of subject matter classified in this place:



## References

### Limiting references

*This place does not cover:*

Panospheric to cylindrical image transformation	<a href="#">G06T 3/12</a>
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## G06T 3/047

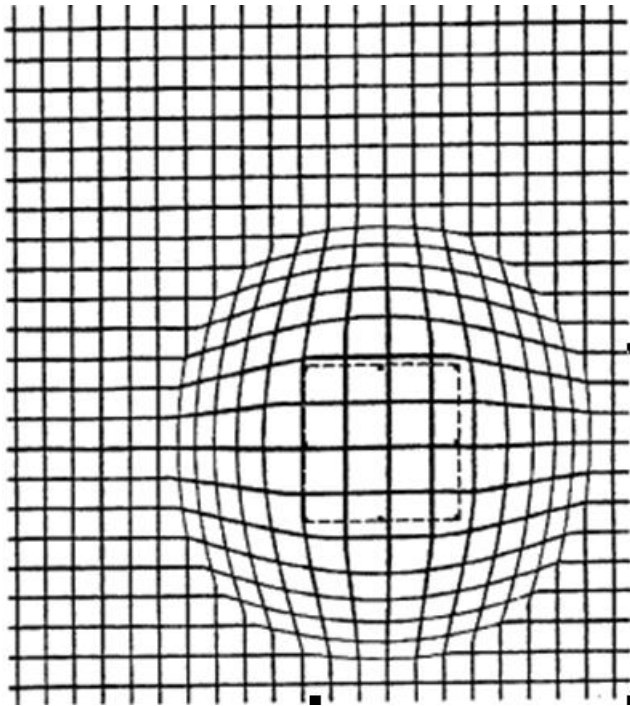
### Fisheye or wide-angle transformations

#### Definition statement

*This place covers:*

Establishing a lens for a region-of-interest.

Illustrative example of subject matter classified in this place:



## G06T 3/053

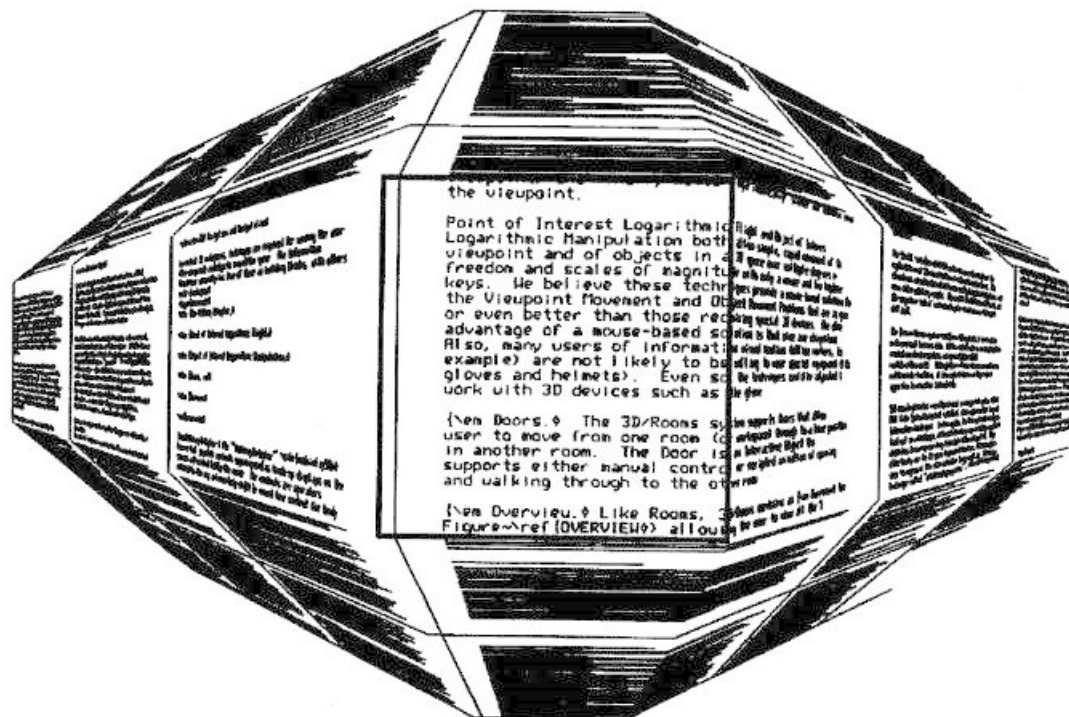
### Detail-in-context presentations (fisheye or wide-angle transformations [G06T 3/047](#))

#### Definition statement

*This place covers:*

- Side or corner panels; Perspective wall.
- Document lens.

Illustrative example of subject matter classified in this place:



## References

### Limiting references

*This place does not cover:*

Fisheye, wide-angle transformation	<a href="#">G06T 3/047</a>
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## G06T 3/06

**Topological mapping of higher dimensional structures onto lower dimensional surfaces**

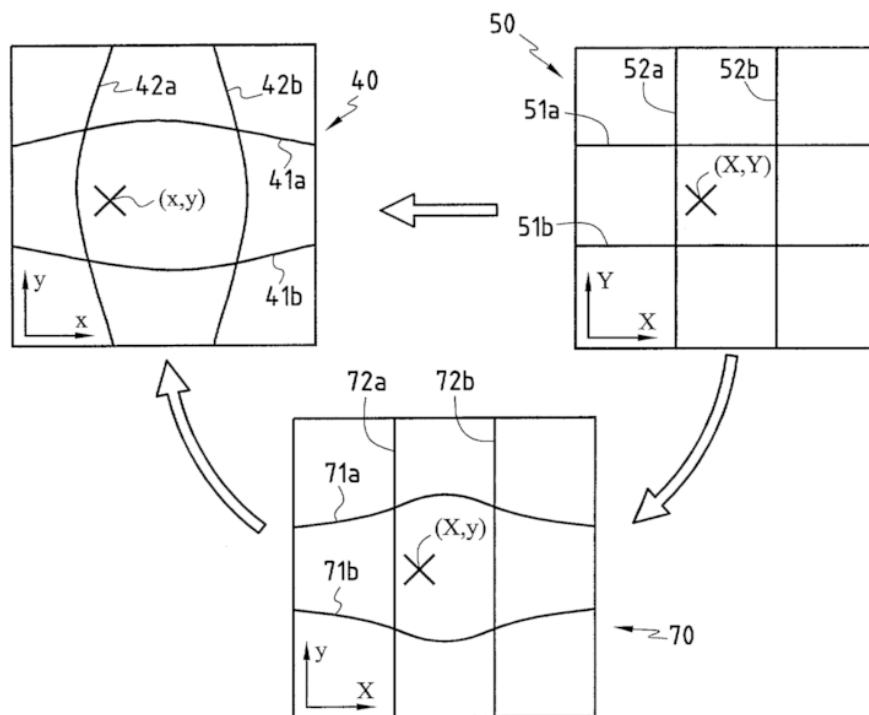
### Definition statement

*This place covers:*

Flattening the scanned image of a bound book.



Illustrative example of subject matter classified in this place:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Panospheric to cylindrical image transformation	<a href="#">G06T 3/12</a>
Texture mapping	<a href="#">G06T 15/04</a>
Manipulating 3D models or images for computer graphics	<a href="#">G06T 19/00</a>

## G06T 3/067

### Reshaping or unfolding three-dimensional [3D] tree structures onto two-dimensional [2D] planes

#### Definition statement

This place covers:

Curved planar reformation [CPR].

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Manipulating 3D models or images for computer graphics	<a href="#">G06T 19/00</a>
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**G06T 3/073**

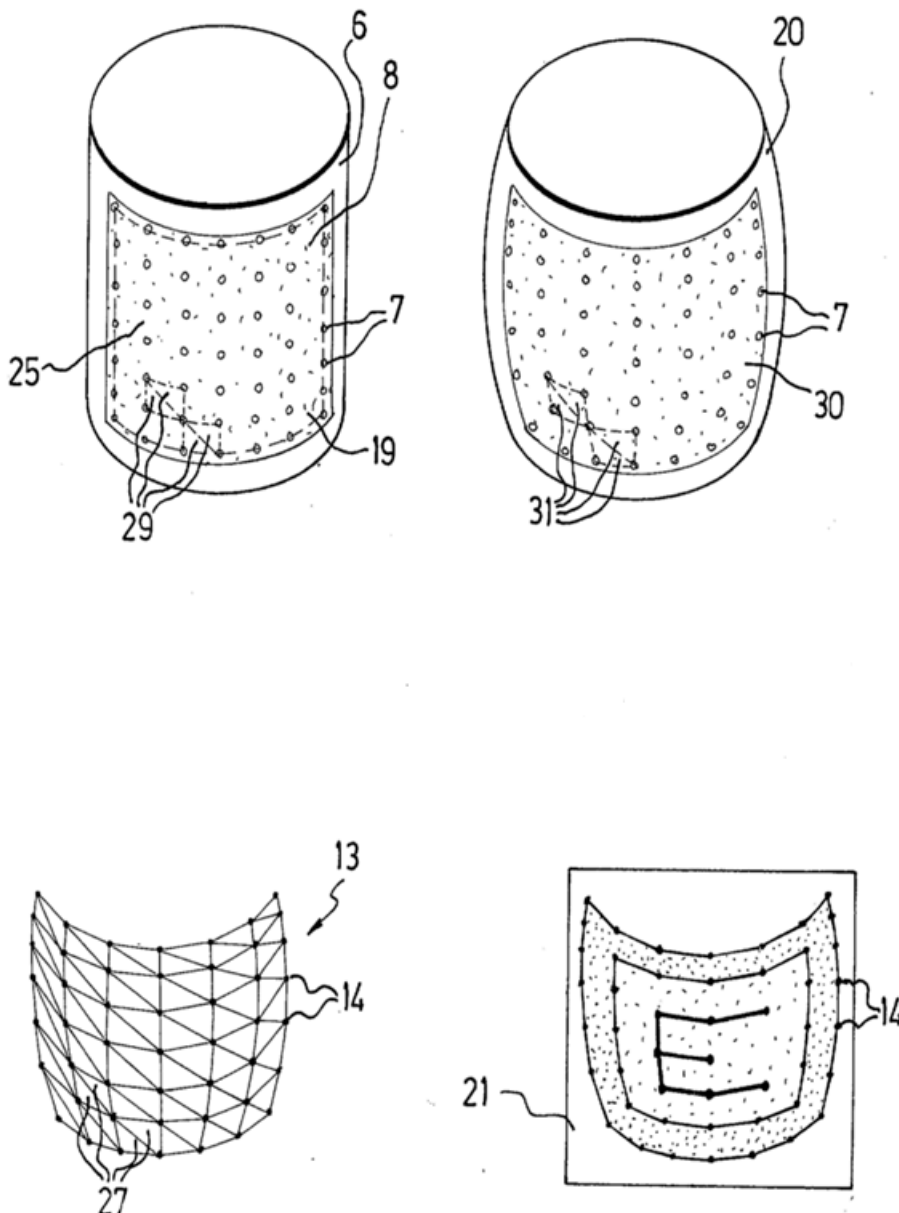
**Transforming surfaces of revolution to planar images, e.g. cylindrical surfaces to planar images**

**Definition statement**

*This place covers:*

Mapping a surface of revolution to a plane, e.g. mapping a pot or a can to a plane.

Illustrative example of subject matter classified in this place:



## G06T 3/08

### Projecting images onto non-planar surfaces, e.g. geodetic screens

#### Definition statement

*This place covers:*

- Geometric image transformation for projecting an image on a multi-projectors system or on a geodetic screen; Dome imaging.
- Geometric image transformation for projecting an image through multi-planar displays.

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Texture mapping	<a href="#">G06T 15/04</a>
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## G06T 3/10

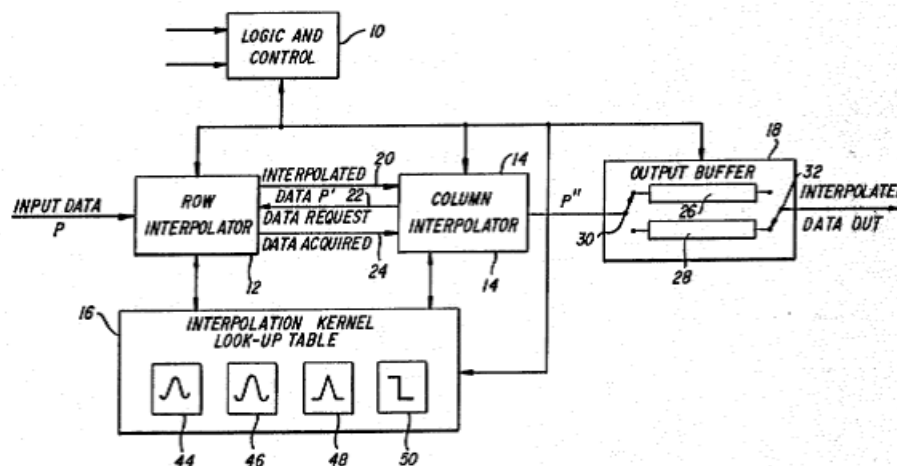
### Selection of transformation methods according to the characteristics of the input images

#### Definition statement

*This place covers:*

- Selecting the interpolation method depending on the scale factor.
- Selecting the interpolation method depending on media type or image appearance characteristics.

Illustrative example of subject matter classified in this place:



## G06T 3/12

### Panospheric to cylindrical image transformations

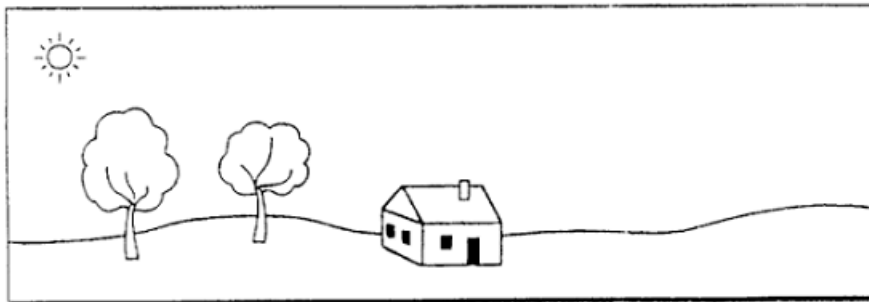
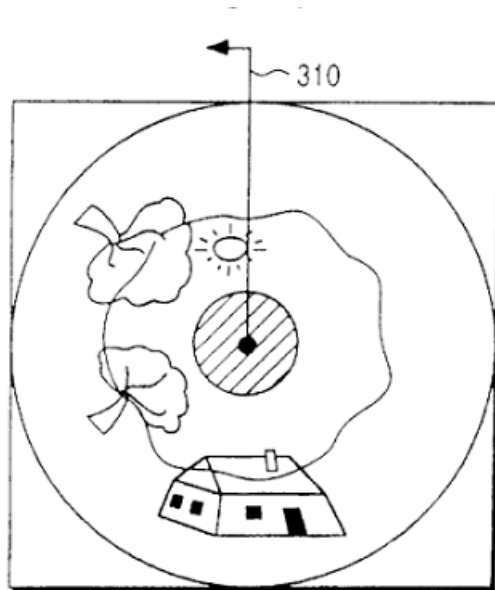
#### Definition statement

*This place covers:*

- Omnidirectional or hyperboloidal to cylindrical image transformation or mapping; Catadioptric transformation, e.g. images from surveillance cameras.

- Panospheric image transformation or mapping by using the output of a multiple cameras system.

Illustrative example of subject matter classified in this place:



## **G06T 3/14**

**Transformations for image registration, e.g. adjusting or mapping for alignment of images**

### **Definition statement**

*This place covers:*

Geometric image transformations:

- for iterative image registration;
- for spline-based image registration;
- for mutual-information-based registration;
- for phase correlation or FFT-based methods;

## Definition statement

- using fiducial points, e.g. landmarks;
- for maximised mutual information-based methods.

## References

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

Determination of transform parameters for the alignment of images, i.e. image registration
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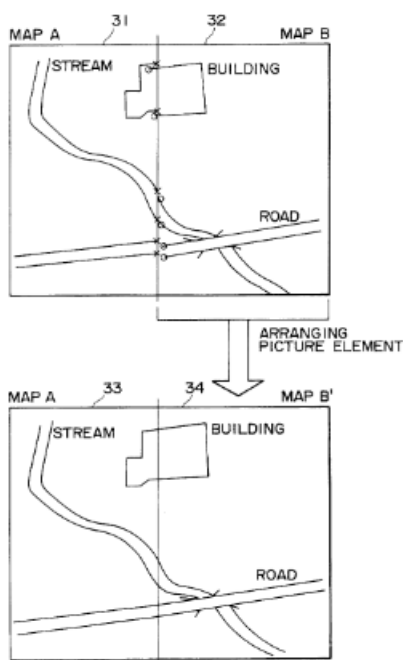
<a href="#">G06T 7/30</a>
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**G06T 3/153****using elastic snapping****Definition statement**

*This place covers:*

- Elastic mapping or snapping or matching; Deformable mapping.
- Diffeomorphic representations of deformations to control the image registration process.

Illustrative example of subject matter classified in this place:

**G06T 3/16****Spatio-temporal transformations, e.g. video cubism****Definition statement**

*This place covers:*

- Video cubism; Video cube.
- Dynamic panoramic video.
- Stylized video cubes.

**G06T 3/18****Image warping, e.g. rearranging pixels individually****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Image animation	<a href="#">G06T 13/00</a>
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**G06T 3/40****Scaling of whole images or parts thereof, e.g. expanding or contracting****Definition statement***This place covers:*

- Resampling; Resolution conversion.
- Zooming or expanding or magnifying or enlarging or upscaling.
- Shrinking or reducing or compressing or downscaling.
- Pyramidal partitions; Storing sub-sampled copies.
- Area based or weighted interpolation; Scaling by surface fitting, e.g. piecewise polynomial surfaces, B-splines or Beta-splines.
- Two-steps image scaling, e.g. by stretching.

**References****Application-oriented references***Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Control of means for changing angle of the field of view, e.g. optical zoom objectives or electronic zooming	<a href="#">H04N 23/69</a>
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**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Polynomial surface description for image modeling	<a href="#">G06T 17/30</a>
Enlarging or reducing for scanning, transmission or reproduction of documents or the like, e.g. facsimile transmission	<a href="#">H04N 1/393</a>
Studio circuits for television systems involving alteration of picture size or orientation	<a href="#">H04N 5/2628</a>
Frame rate conversion; De-interlacing	<a href="#">H04N 7/01</a>
Methods or arrangements for coding, decoding, compressing or decompressing digital video signals using predictive coding involving spatial sub-sampling or interpolation, e.g. alteration of picture size or resolution	<a href="#">H04N 19/59</a>

G06T 3/4007

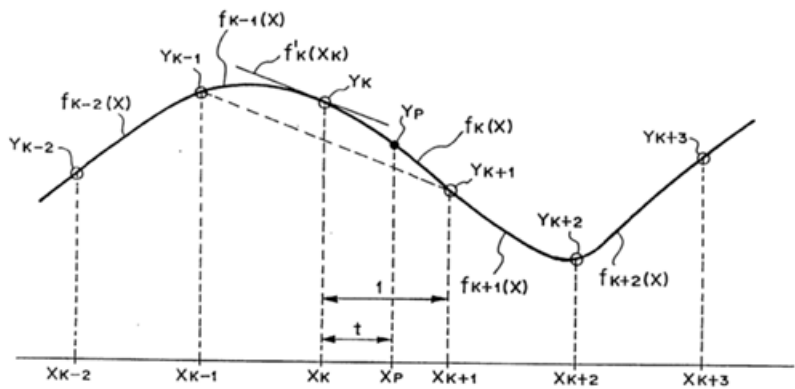
based on interpolation, e.g. bilinear interpolation (image demosaicing [G06T 3/4015](#); edge-driven or edge-based scaling [G06T 3/403](#))

Definition statement

This place covers:

- Linear or bi-linear or tetrahedral or cubic image interpolation.
- Adaptive interpolation, e.g. the coefficients of the interpolation depend on the pattern of the local structure.

Illustrative example of subject matter classified in this place:



References

Limiting references

This place does not cover:

Image demosaicing, e.g. colour filter arrays [CFA] or Bayer patterns	<a href="#">G06T 3/4015</a>
Edge-driven scaling; Edge-based scaling	<a href="#">G06T 3/403</a>

G06T 3/4015

Image demosaicing, e.g. colour filter arrays [CFA] or Bayer patterns

Definition statement

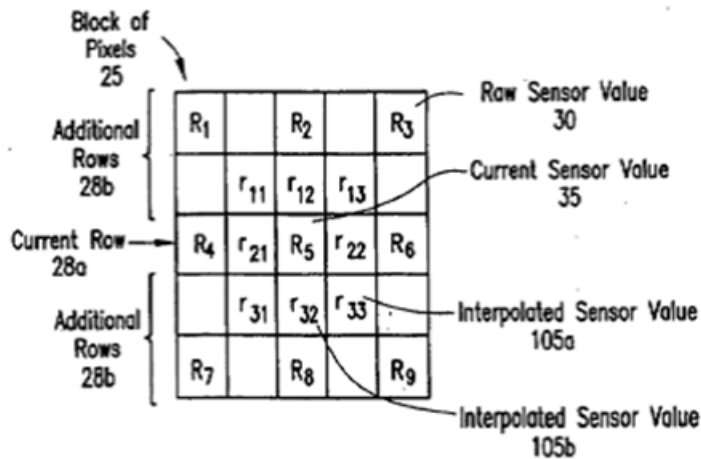
This place covers:

- CFA demosaicing or demosaicking or interpolating.
- Bayer pattern.
- Colour-separated images, i.e. one colour in each image quadrant.

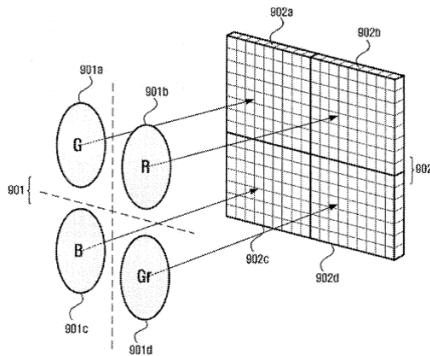
Illustrative examples of subject matter classified in this place:

## Definition statement

## 1. Image demosaicing



## 2. Colour-separated image

**G06T 3/4023**

**based on decimating pixels or lines of pixels; based on inserting pixels or lines of pixels**

**Definition statement**

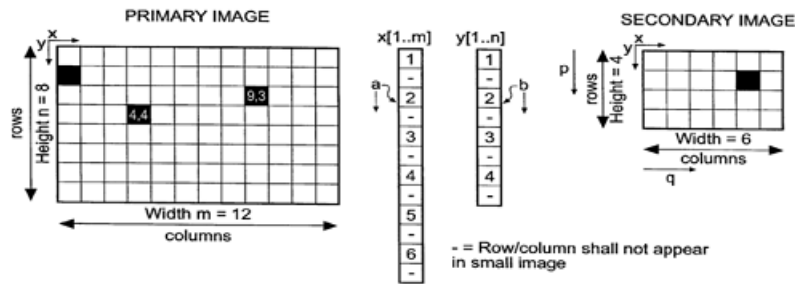
*This place covers:*

- Pixel or row deletion or removal.
- Pixel or row insertion or duplication or replication.
- Decimating FIR filters.
- Array indexes or tables, e.g. LUT.

Illustrative example of subject matter classified in this place:

Definition statement

Decimating by using two arrays of indexes



## G06T 3/403

### Edge-driven scaling; Edge-based scaling

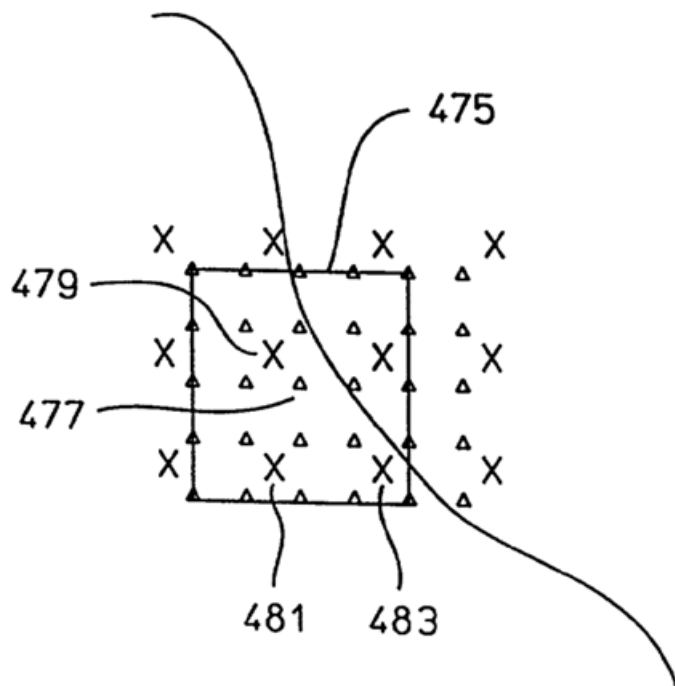
#### Definition statement

This place covers:

- Edge adaptive or directed or dependent or following or preserving interpolation; Edge preservation.
- Edge map injecting or projecting or combining or superimposing.

Illustrative example of subject matter classified in this place:

Correcting for abnormalities next to boundaries





**G06T 3/4038**

**Image mosaicing, e.g. composing plane images from plane sub-images**

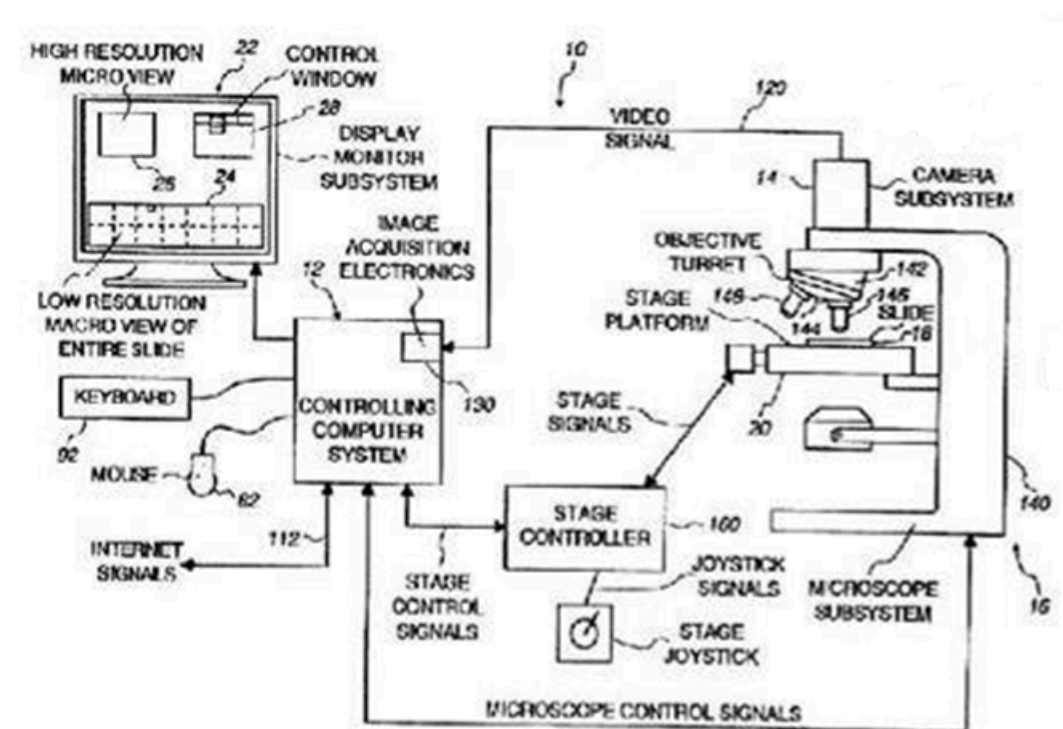
**Definition statement**

*This place covers:*

- Image mosaicing or mosaicing.
- Panorama views.
- Mosaic of video sequences; Salient video still; Video collage or synopsis.

Illustrative example of subject matter classified in this place:

Image mosaicing for microscopy applications

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Image processing arrangements associated with discharge tubes with provision for introducing objects or material to be exposed to the discharge	<a href="#">H01J 37/222</a>
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**G06T 3/4046**

**using neural networks**

**Definition statement**

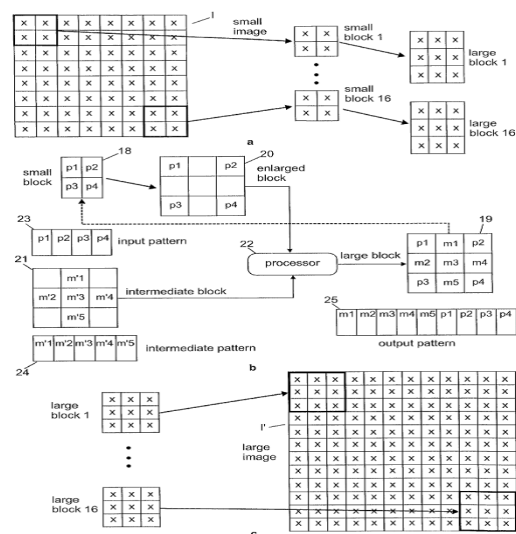
*This place covers:*

- Using neural networks specially adapted for image interpolation.
- Using neural networks specially adapted for interpolation coefficient selection.

## Definition statement

Illustrative example of subject matter classified in this place:

Using a neural network to select the coefficients of a polynomial interpolation



## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Image enhancement or restoration using machine learning, e.g. neural networks	<a href="#">G06T 5/60</a>
Neural networks	<a href="#">G06N 3/02</a>
Machine learning	<a href="#">G06N 20/00</a>
Arrangements for image or video recognition or understanding using pattern recognition or machine learning using neural networks	<a href="#">G06V 10/82</a>

## G06T 3/4053

based on super-resolution, i.e. the output image resolution being higher than the sensor resolution

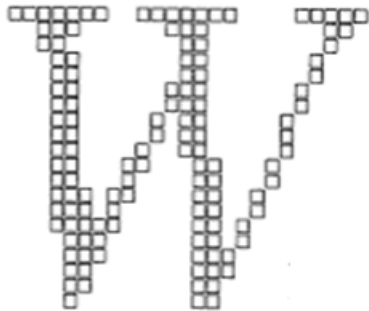
## Definition statement

This place covers:

- Super resolution by fitting the pixel intensity to a mathematical function.
- Super resolution from image sequences; Images or frames addition, coaddition or combination.
- Super resolution by iteratively applying constraints, e.g. energy reduction, on the transform domain and inverse transforming.

Illustrative example of subject matter classified in this place:

Fitting a mathematical function and resampling:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Image enhancement or restoration using two or more images, e.g. averaging or subtraction	<a href="#">G06T 5/50</a>
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## G06T 3/4061

by injecting details from different spectral ranges

### Definition statement

*This place covers:*

Fusion of multi-sensor or multiband images fusion.

## G06T 3/4069

by subpixel displacements

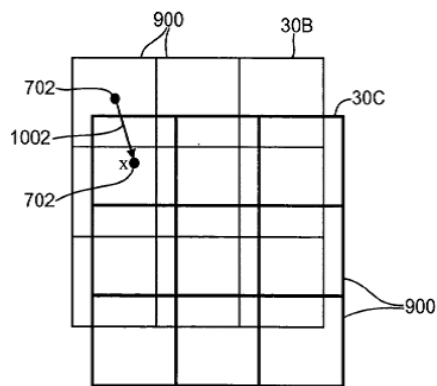
### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this place:

## Definition statement

Displaying sub-frames at spatially offset positions



## G06T 3/4076

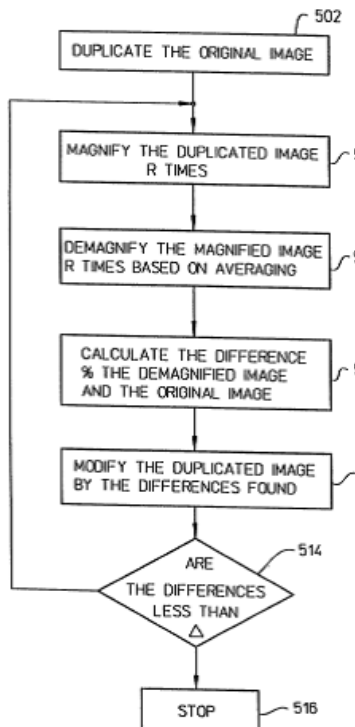
using the original low-resolution images to iteratively correct the high-resolution images

## Definition statement

*This place covers:*

Illustrative example of subject matter classified in this place:

Iterative correction of the high-resolution image:



**G06T 3/4084**

in the transform domain, e.g. fast Fourier transform [FFT] domain scaling

**Definition statement**

*This place covers:*

- DCT coefficients decimation or insertion for image scaling.
- Zero padding DCT coefficients for image scaling.
- Downscaling by selecting a specific wavelet sub-band.

Illustrative example of subject matter classified in this place:

Enlargement/reduction through DCT interpolation/decimation

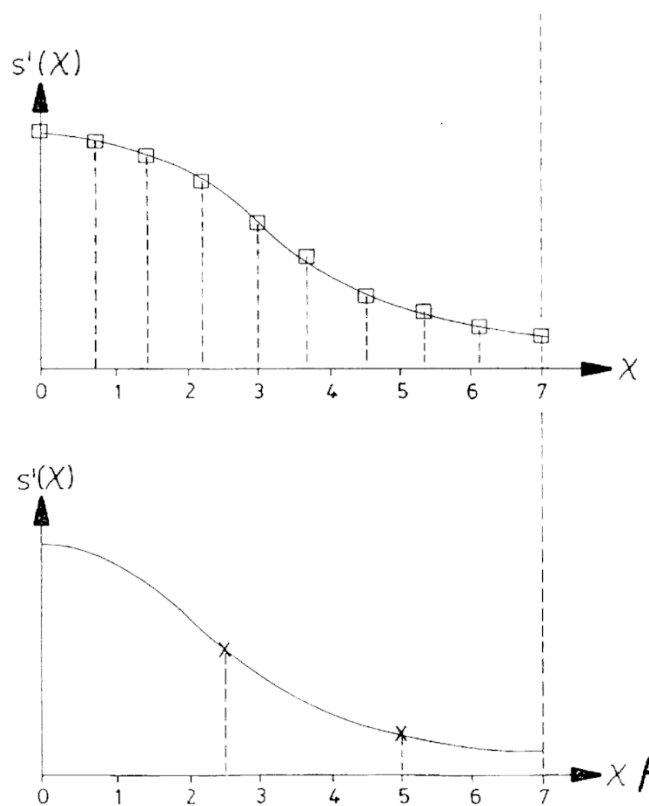
**G06T 3/4092**

Image resolution transcoding, e.g. by using client-server architectures

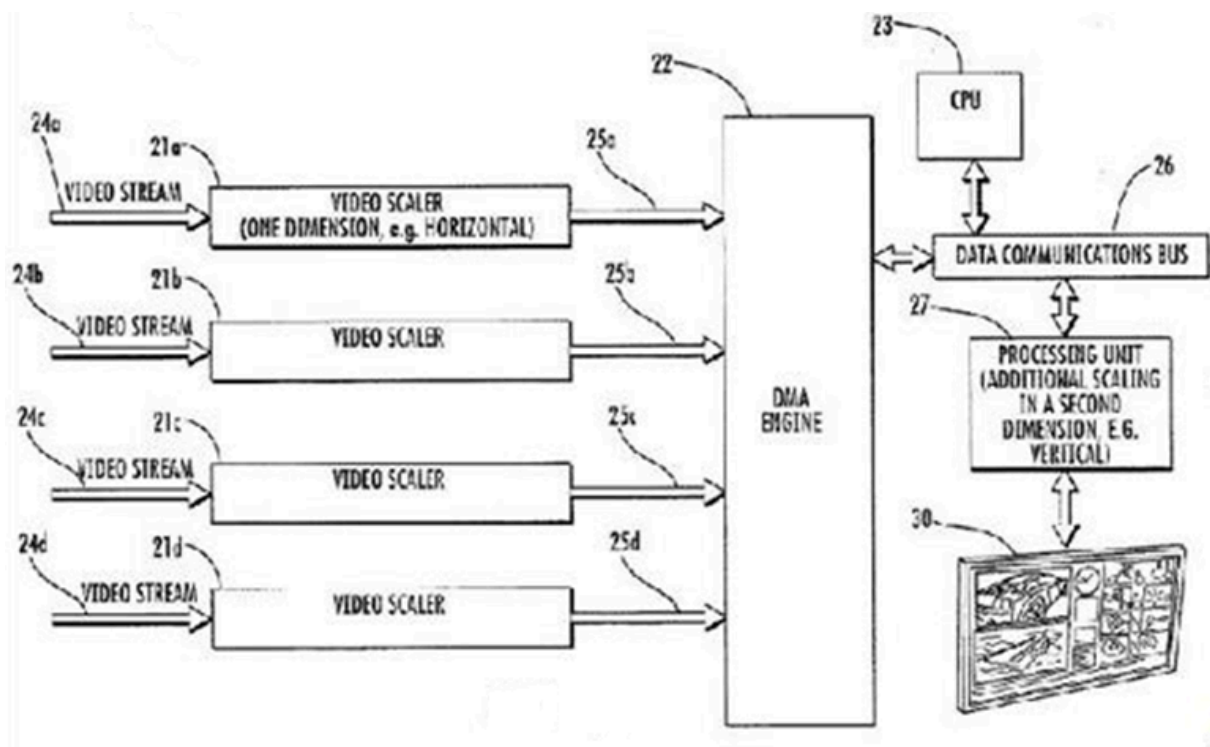
**Definition statement**

*This place covers:*

Adapting the image resolution to the client's capabilities.

## Definition statement

Illustrative example of subject matter classified in this place:



In the figure above, the processing unit is coupled downstream from video cross-point switcher for generating additionally scaled video streams by additional video scaling on initially scaled video stream.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Methods or arrangements for coding, decoding, compressing or decompressing digital video signals using adaptive coding	<a href="#">H04N 19/10</a>
Methods or arrangements for coding, decoding, compressing or decompressing digital video signals using video transcoding, i.e. partial or full decoding of a coded input stream followed by re-encoding of the decoded output stream	<a href="#">H04N 19/40</a>
Server adapted for processing of video elementary streams, involving reformatting operations of video signals for distribution or compliance with end-user requests or end-user device requirements	<a href="#">H04N 21/234363</a>
Selective content distribution in client devices adapted for processing of additional data	<a href="#">H04N 21/4356</a>
Selective content distribution in client devices adapted for processing of video elementary streams involving reformatting operations of video signals for household redistribution, storage or real-time display	<a href="#">H04N 21/440263</a>

G06T 3/60

Rotation of whole images or parts thereof

Definition statement

This place covers:

- Transpose or continuous write-transpose-read.
- Mirror.
- Rung-length (RL) rotation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Scanning, transmission or reproduction of documents involving composing, repositioning or otherwise modifying originals	<a href="#">H04N 1/3877</a>
Studio circuits for television	<a href="#">H04N 5/262</a>

G06T 3/602

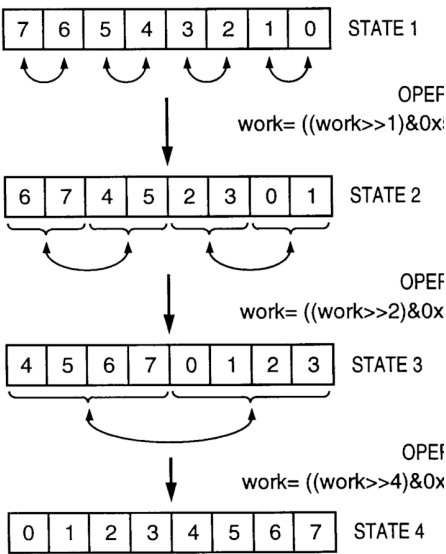
by block rotation, e.g. by recursive reversal or rotation

Definition statement

This place covers:

Illustrative example of subject matter classified in this place:

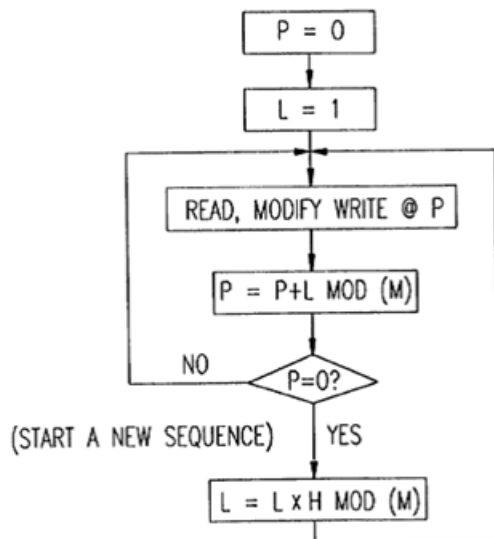
Rotation by recursive reversing



**G06T 3/606****by memory addressing or mapping****Definition statement***This place covers:*

Illustrative example of subject matter classified in this place:

Continuous read-transpose-write

**G06T 3/608****by skew deformation, e.g. two-pass or three-pass rotation****Definition statement***This place covers:*

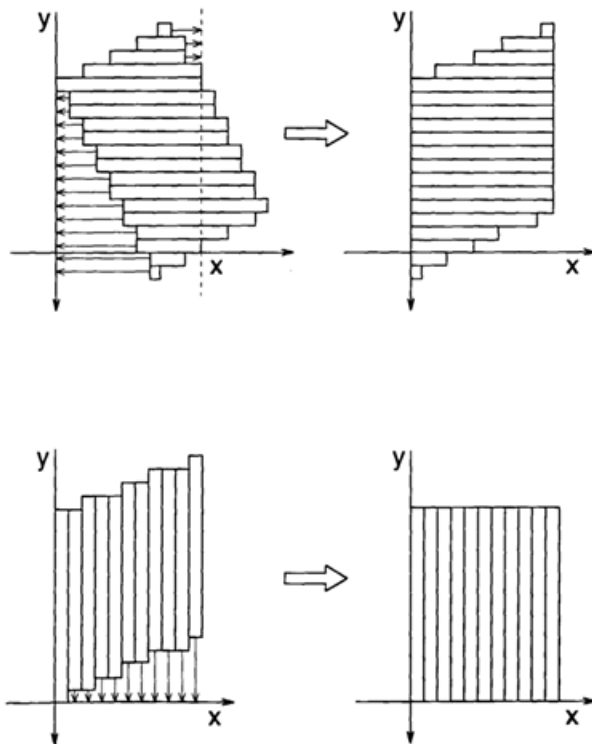
- Shift processing;
- Rotation by shearing.

Illustrative example of subject matter classified in this place:



## Definition statement

Image rotation by two-pass de-skewing



## G06T 5/00

### Image enhancement or restoration

#### Definition statement

*This place covers:*

Image enhancement or restoration:

- using non-spatial domain filtering;
- using local operators;
- using morphological operators, i.e. erosion or dilatation;
- using histogram techniques;
- using two or more images, e.g. averaging or subtraction;
- using machine learning, e.g. neural networks;
- Denoising; Smoothing;
- Deblurring; Sharpening;
- Unsharp masking;
- Retouching; Inpainting; Scratch removal;
- Geometric correction;
- Dynamic range modification of images or parts thereof.

#### Relationships with other classification places

Group [G06T 5/00](#) is the function place for image enhancement or restoration. Image enhancement or restoration specially adapted for a particular application is classified in the relevant application field, e.g. in subclasses [G06V](#) or [H04N](#).

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/70</a>
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/80</a>
Noise processing, e.g. detecting, correcting, reducing or removing noise in circuitry of solid-state image sensors [SSIS]	<a href="#">H04N 25/60</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Neural networks	<a href="#">G06N 3/02</a>
Image preprocessing for image or video recognition or understanding	<a href="#">G06V 10/20</a>
Image processing adapted to be used in scanners, printers, photocopying machines, displays or similar devices, including composing, repositioning or otherwise modifying originals	<a href="#">H04N 1/387</a>
Picture signal circuits adapted to be used in scanners, printers, photocopying machines, displays or similar devices	<a href="#">H04N 1/40</a>
Processing of colour picture signals in scanners, printers, photocopying machines, displays or similar devices	<a href="#">H04N 1/56</a>
Computational photography systems, e.g. light-field imaging systems	<a href="#">H04N 23/95</a>

## Special rules of classification

This group focuses on image processing algorithms. Although such algorithms sometimes need to consider characteristics of the underlying image acquisition apparatus, inventions to the image acquisition apparatus per se are outside the scope of this group.

Whenever possible, additional information should be classified using one or more of the indexing codes from the ranges of [G06T 2200/00](#) (see definitions re. [G06T](#)) or [G06T 2207/00](#) (see definitions re. [G06T 2207/00](#)).

The classification symbol [G06T 5/00](#) should be allocated to documents concerning:

- Interactive / multiple choice image processing, e.g. choosing outputs from multiple enhancement algorithms;
- Image restoration based on properties or models of the human vision system [HVS]

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

HDR	high dynamic range
HDRI	high dynamic range imaging
HMM	hidden Markov model
PSF	point spread function
SDR	standard dynamic range

## G06T 5/10

### using non-spatial domain filtering

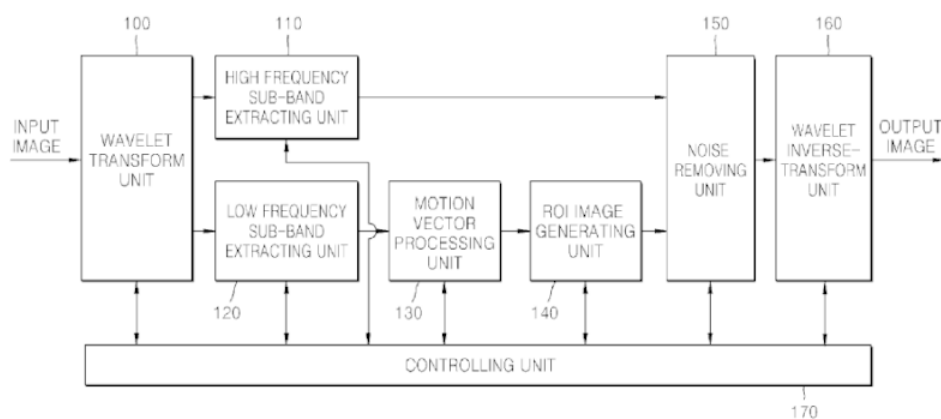
#### Definition statement

*This place covers:*

All transform domain-based enhancement methods, e.g. using:

- Fourier transform, discrete Fourier transform [DFT] or fast Fourier transform [FFT];
- Hadamard transform;
- Discrete cosine transform [DCT];
- Wavelet transform, discrete wavelet transform [DWT].

Illustrative example of subject matter classified in this place:



#### References

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine	<a href="#">H04N 5/253</a>
Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/70</a>
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/80</a>
Noise processing, e.g. detecting, correcting, reducing, or removing noise in circuitry of solid-state image sensors [SSIS]	<a href="#">H04N 25/60</a>

## G06T 5/20

### using local operators

#### Definition statement

*This place covers:*

- Convolution with a mask or kernel in the spatial domain;
- High-pass filter, low-pass filter;
- Gauss filter, Laplace filter;

## Definition statement

- Averaging filter, mean filter, blurring filter;
- Differential filters (e.g. Sobel operator);
- Median filter;
- Bilateral filter;
- Minimum, maximum or and rank filtering;
- Wiener filter;
- Phase-locked loops, detectors, mixers;
- Recursive filter;
- Distance transforms;
- Local image processing architectures.

Illustrative example of subject matter classified in this place:

-1	0	+1
-2	0	+2
-1	0	+1

## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine	<a href="#">H04N 5/253</a>
Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/70</a>
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/80</a>
Noise processing, e.g. detecting, correcting, reducing, or removing noise in circuitry of solid-state image sensors [SSIS]	<a href="#">H04N 25/60</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Applying local operators for during image preprocessing for image or video recognition or understanding	<a href="#">G06V 10/36</a>
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**G06T 5/30****Erosion or dilatation, e.g. thinning****Definition statement**

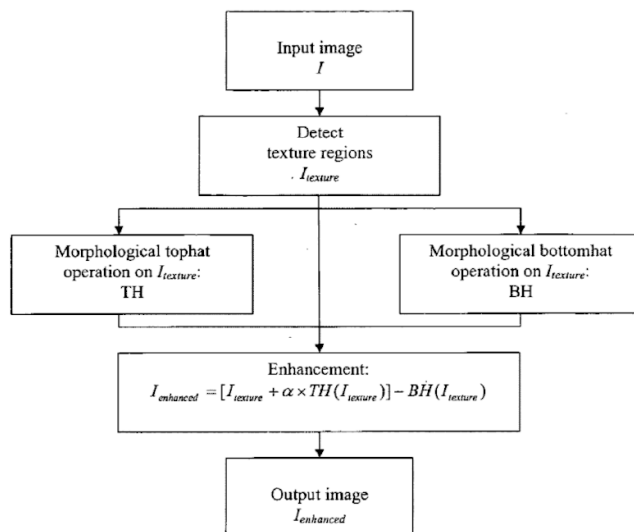
*This place covers:*

All morphology-based operations for image enhancement, e.g. using:

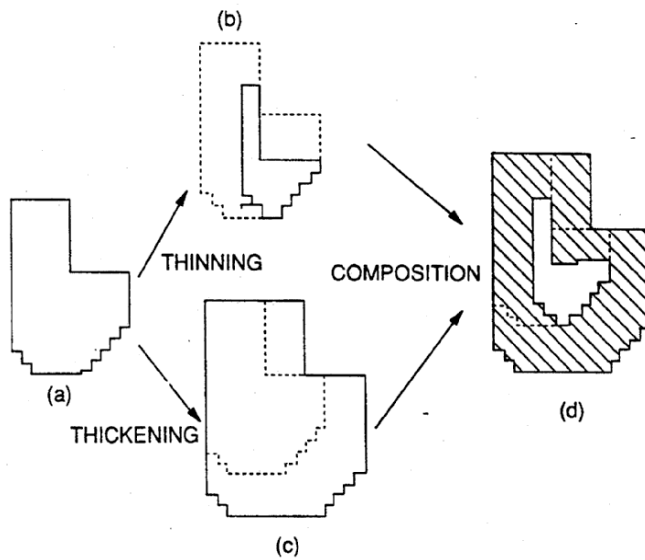
- Thickening, thinning;
- Opening, closing;
- Erosion, dilation;
- Structuring elements;
- Skeletons;
- Geodesic transforms.

Illustrative examples of subject matter classified in this place:

1.



2.



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation or edge detection involving morphological operators	<a href="#">G06T 7/155</a>
Smoothing or thinning of patterns during image preprocessing for image or video recognition or understanding	<a href="#">G06V 10/34</a>

## G06T 5/40

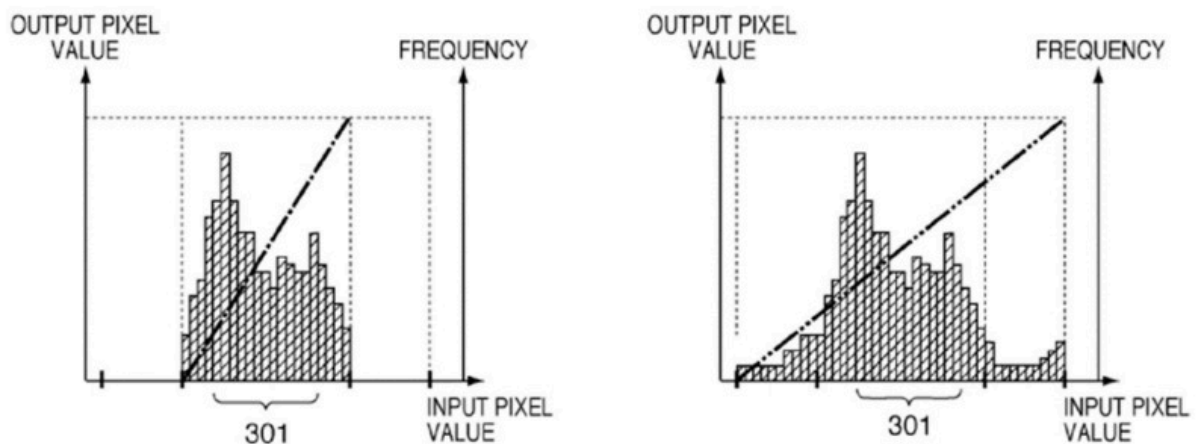
### using histogram techniques

### Definition statement

*This place covers:*

All histogram-based image enhancement methods.

Illustrative example of subject matter classified in this place:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/70</a>
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/80</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Dynamic range modification of images or parts thereof	<a href="#">G06T 5/90</a>
Histogram techniques adapted to be used in scanners, printers, photocopying machines, displays or similar devices	<a href="#">H04N 1/4074</a>
Equalising the characteristics of different image components, e.g. their average brightness or colour balance, in stereoscopic or multi-view video systems	<a href="#">H04N 13/133</a>

## G06T 5/50

using two or more images, e.g. averaging or subtraction

### Definition statement

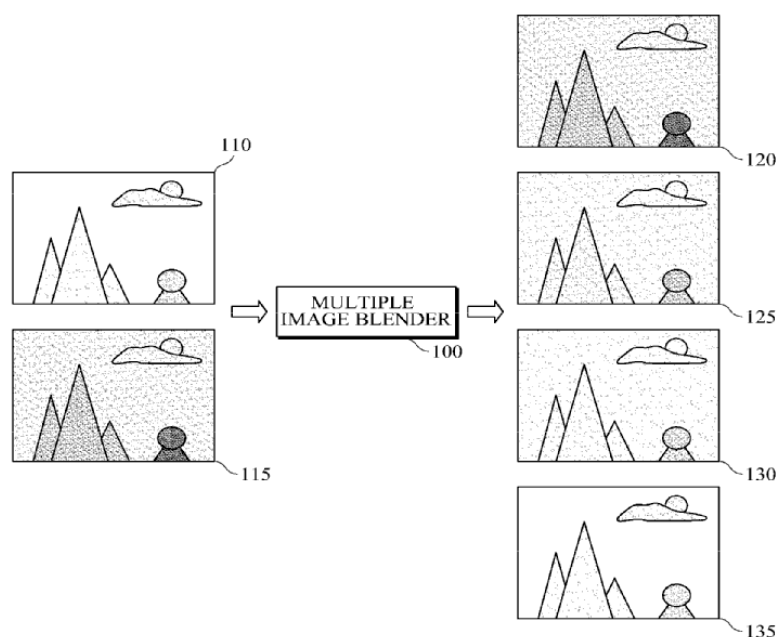
This place covers:

- Image averaging;
- Image fusion, image merging;
- Image subtraction;
- Enhanced final image by combining multiple, e.g. degraded, images, while maintaining the same number of pixels (for increased number of pixels: see [G06T 3/40](#));

## Definition statement

- Full-field focus from multiple of depth-of-field images, e.g. from confocal microscopy;
- Processing of synthetic aperture radar [SAR] images;
- Energy subtraction;
- Bright field, dark field processing;
- Angiography image processing;
- High dynamic range [HDR] image processing;
- Multispectral image processing;
- Computational photography, e.g. coded aperture imaging.

Illustrative example of subject matter classified in this place:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/70</a>
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/80</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Scaling of whole images or parts thereof based on super-resolution	<a href="#">G06T 3/4053</a>
Unsharp masking	<a href="#">G06T 5/75</a>
Radar or analogous systems, specially adapted for mapping or imaging using synthetic aperture techniques	<a href="#">G01S 13/90</a>
Spatial compounding in short-range sonar imaging systems	<a href="#">G01S 15/8995</a>
Confocal scanning microscopes	<a href="#">G02B 21/0024</a>



Computational photography systems, e.g. light-field imaging systems

[H04N 23/95](#)

## G06T 5/60

using machine learning, e.g. neural networks

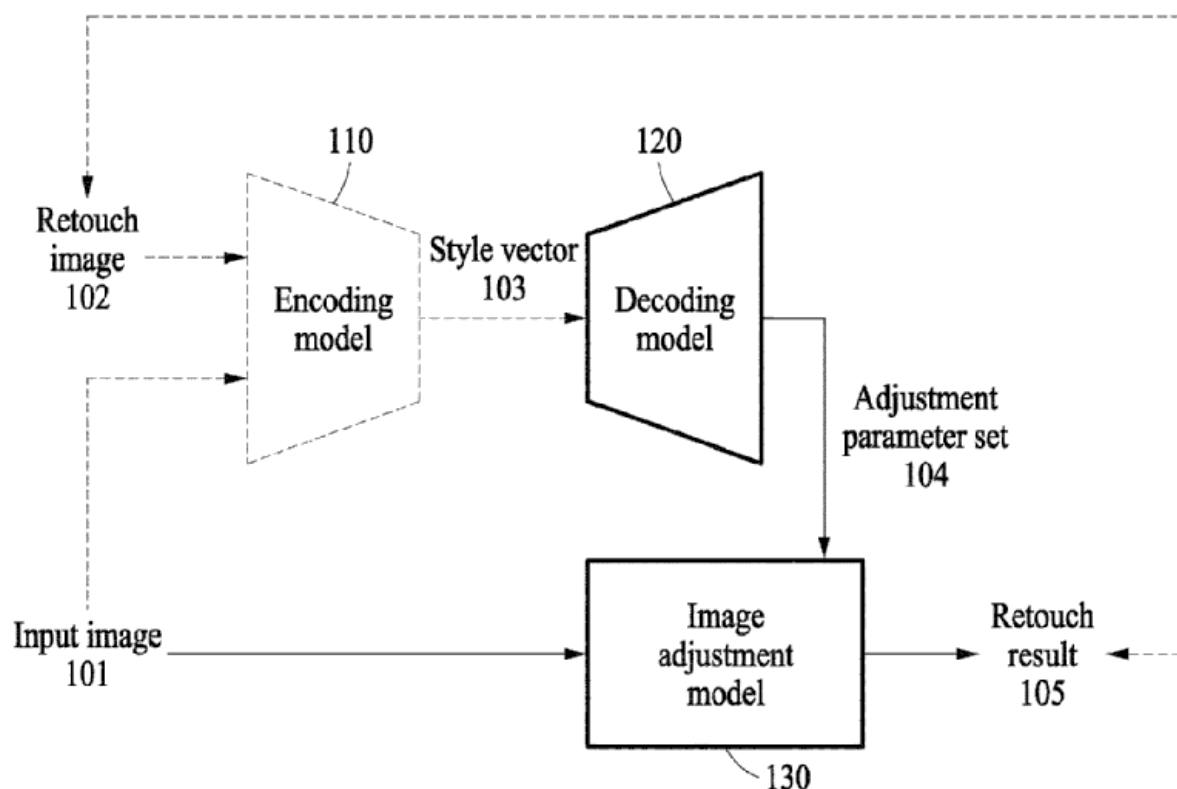
### Definition statement

*This place covers:*

All machine learning-based image enhancement methods, e.g. using:

- artificial neural networks [ANN], convolutional neural networks [CNN], generative adversarial networks [GAN] or deep learning;
- decision trees;
- support-vector machines;
- regression analysis;
- Bayesian networks;
- Gaussian processes;
- genetic algorithms.

Illustrative example of subject matter classified in this place:



### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Neural networks	<a href="#">G06N 3/02</a>
Learning methods	<a href="#">G06N 3/08</a>

Machine learning	<a href="#">G06N 20/00</a>
Arrangements for image or video recognition or understanding using pattern recognition or machine learning using neural networks	<a href="#">G06V 10/82</a>
Arrangements for image or video recognition or understanding using pattern recognition or machine learning using probabilistic graphical models from image or video features, e.g. Markov models or Bayesian networks	<a href="#">G06V 10/84</a>

## **G06T 5/70**

### **Denoising; Smoothing**

#### **Definition statement**

*This place covers:*

- Removing noise from images;
- Temporal denoising, spatio-temporal noise filtering;
- Removing pattern noise from images;
- Image smoothing;
- Image blurring, adding motion blur to images, adding blur to images;
- Edge-adaptive smoothing;
- Smoothing of depth map in stereo or range images;
- Antialiasing by image filtering;
- Denoising or smoothing using singular value decomposition [SVD].

#### **References**

##### **Application-oriented references**

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Camera processing pipelines for suppressing or minimising disturbance in the image signal generation	<a href="#">H04N 23/81</a>
Noise processing in circuitry of solid-state image sensors [SSIS], e.g. detecting, correcting, reducing or removing noise	<a href="#">H04N 25/60</a>

##### **Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Antialiasing during drawing of lines	<a href="#">G06T 11/20</a>
Antialiasing during filling a planar surface by adding surface attributes, e.g. colour or texture	<a href="#">G06T 11/40</a>
Noise filtering in image pre-processing for image or video recognition or understanding	<a href="#">G06V 10/30</a>
Noise or error suppression in colour picture communication systems	<a href="#">H04N 1/58</a>
Processing image signals for flicker reduction in stereoscopic or multi-view video systems	<a href="#">H04N 13/144</a>

### Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/70](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/73

### Deblurring; Sharpening

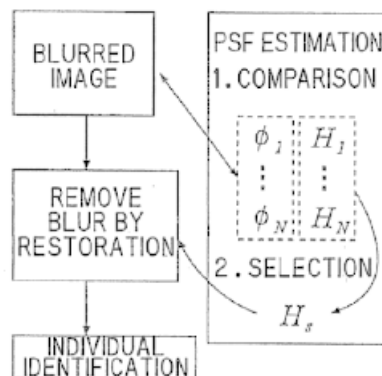
#### Definition statement

*This place covers:*

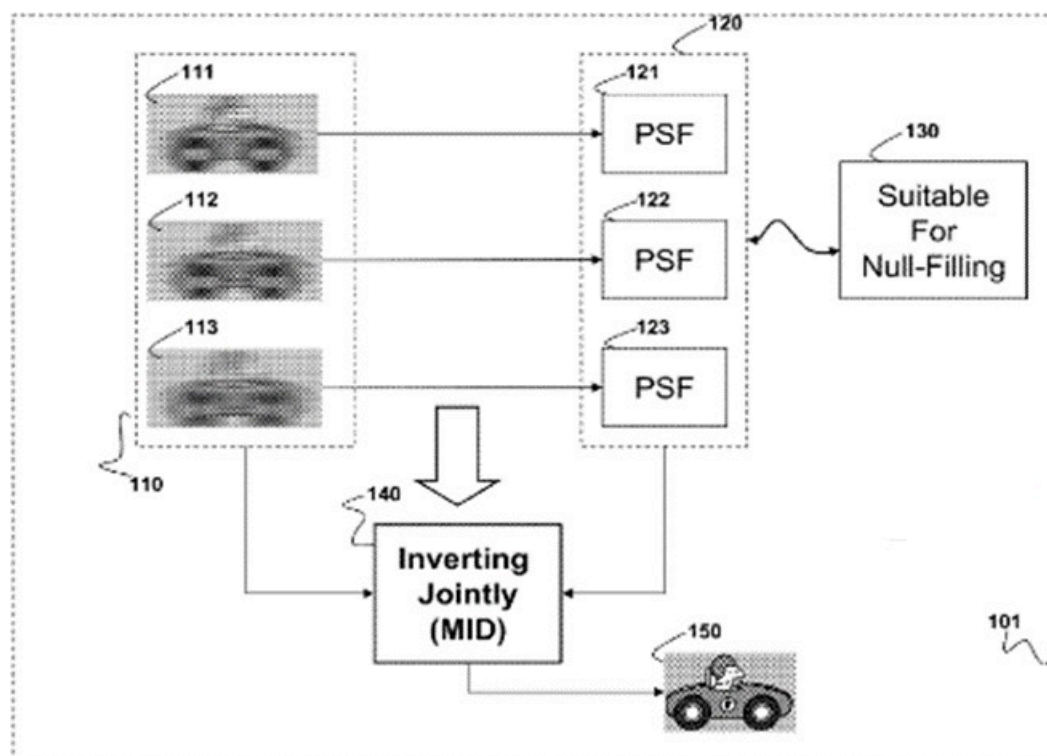
- Deblurring;
- Removing motion blur from images;
- Point-spread function [PSF] model of blurring;
- Deconvolution;
- Modulation transfer function [MTF];
- Sharpening, crispening;
- Edge enhancement, edge boosting.

Illustrative examples of subject matter classified in this place:

1.



2.



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Vibration or motion blur correction for stable pick-up of the scene in cameras or camera modules comprising electronic image sensors	<a href="#">H04N 23/682</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Edge-driven scaling	<a href="#">G06T 3/403</a>
Edge or detail enhancement for scanning, transmission or reproduction of documents or the like, e.g. facsimile transmission	<a href="#">H04N 1/4092</a>
Edge or detail enhancement in colour picture communication systems	<a href="#">H04N 1/58</a>

### Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/73](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/75

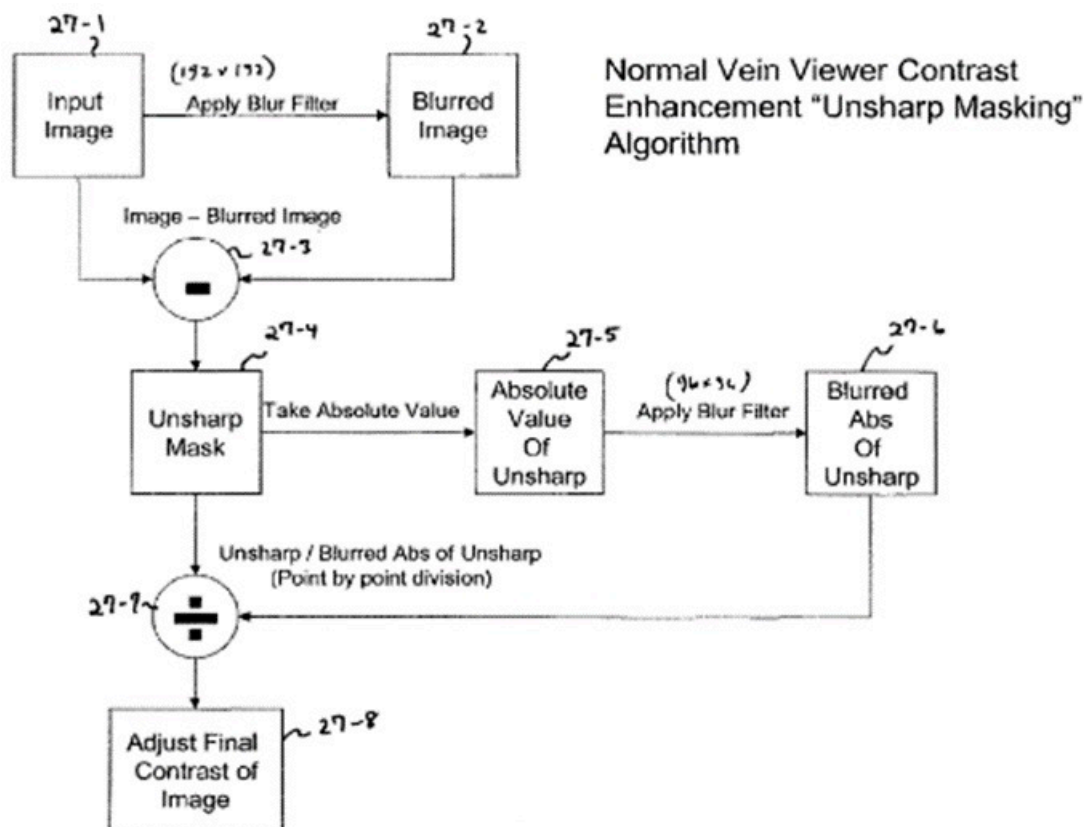
### Unsharp masking

#### Definition statement

This place covers:

- Unsharp masking;
- Adding or subtracting a processed version of an image to or from the image.

Illustrative example of subject matter classified in this place:



#### Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/75](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/77

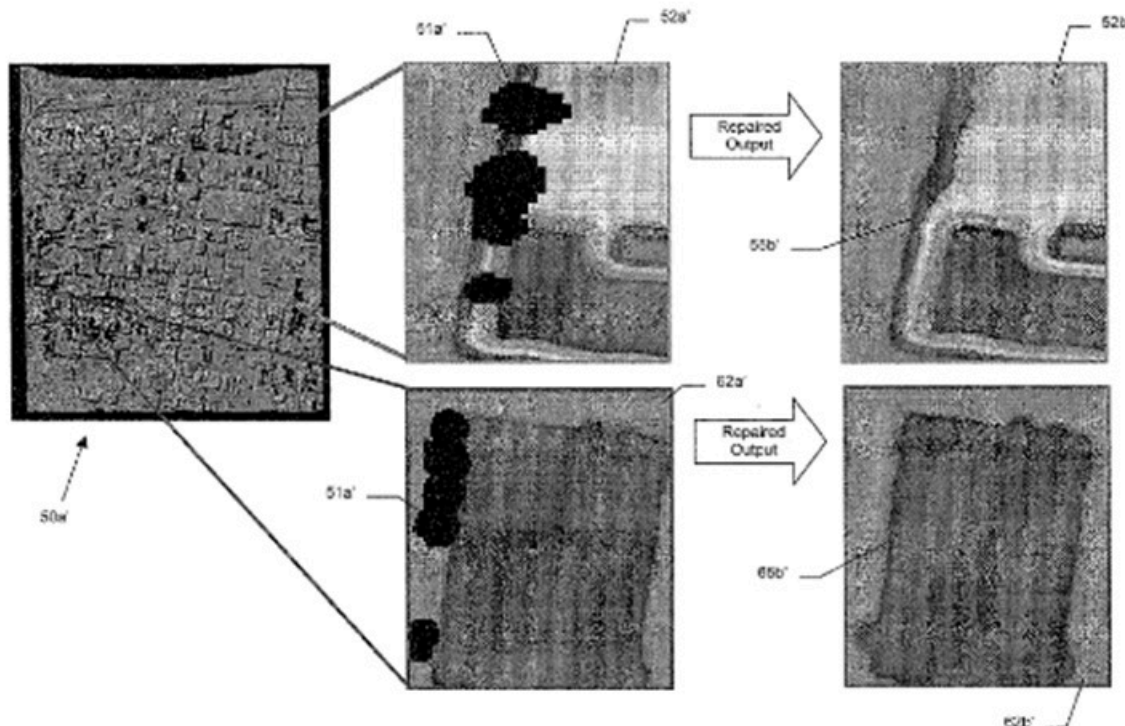
### Retouching; Inpainting; Scratch removal

#### Definition statement

This place covers:

- Concealing defective pixels in images;
- Scratch removal;
- Inpainting by image filtering or by replacing patches within an image using a generated image or texture patch, or a patch retrieved from another source, e.g. image databases or the internet;
- Correcting red-eye defects.

Illustrative example of subject matter classified in this place:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Scratch removal adapted to be used in scanners, printers, photocopying machines, displays or similar devices	<a href="#">H04N 1/4097</a>
Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine	<a href="#">H04N 5/253</a>
Noise processing, e.g. detecting, correcting, reducing or removing noise in circuitry of solid-state image sensors [SSIS]	<a href="#">H04N 25/60</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation or edge detection in image analysis	<a href="#">G06T 7/10</a>
Analysis of geometric attributes in image analysis	<a href="#">G06T 7/60</a>
Determining position or orientation of objects or cameras in image analysis	<a href="#">G06T 7/70</a>
Determination of colour characteristics in image analysis	<a href="#">G06T 7/90</a>
Texture generation as such	<a href="#">G06T 11/10</a>
Recognition of eye characteristics	<a href="#">G06V 40/18</a>
Modification of content of picture, e.g. retouching	<a href="#">H04N 1/40093</a>

Retouching colour images adapted to be used in scanners, printers, photocopying machines, displays or similar devices	<a href="#">H04N 1/62</a>
Red-eye correction adapted to be used in scanners, printers, photocopying machines, displays or similar devices	<a href="#">H04N 1/624</a>

## Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/77](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/80

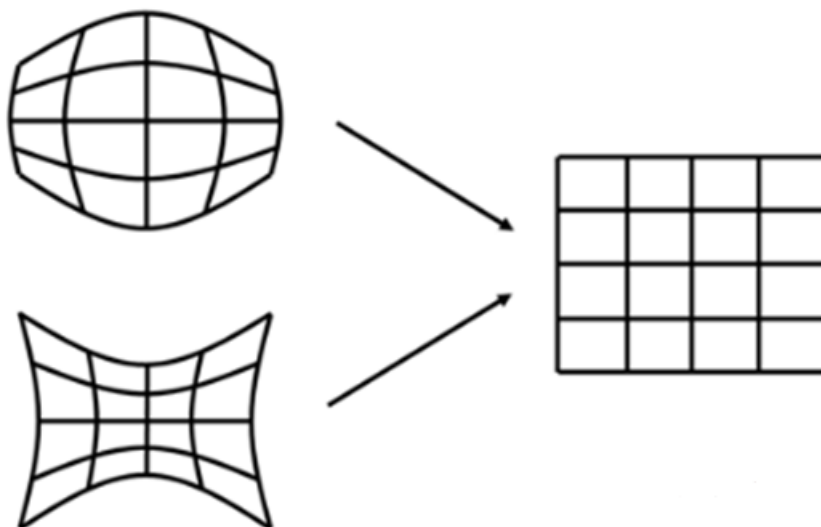
### Geometric correction

#### Definition statement

*This place covers:*

- Correcting lens distortions or aberrations;
- Correcting pincushion, barrel, trapezoidal or fish-eye distortions;
- Calibrating parameters of lens distortion;
- Reference grids, coordinate mapping.

Illustrative example of subject matter classified in this place:



## References

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric image transformations in the plane of the image	<a href="#">G06T 3/00</a>
Analysis of captured images to determine intrinsic or extrinsic camera parameters, i.e. camera calibration	<a href="#">G06T 7/80</a>
Normalisation of the pattern dimension during image preprocessing for image or video recognition	<a href="#">G06V 10/32</a>

## Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/80](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/90

### Dynamic range modification of images or parts thereof

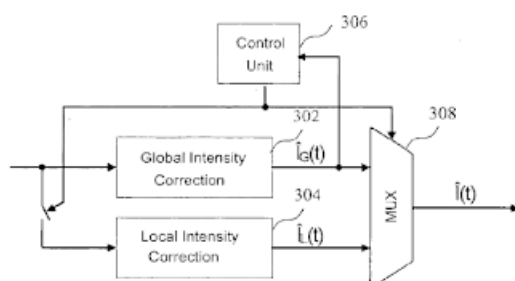
#### Definition statement

*This place covers:*

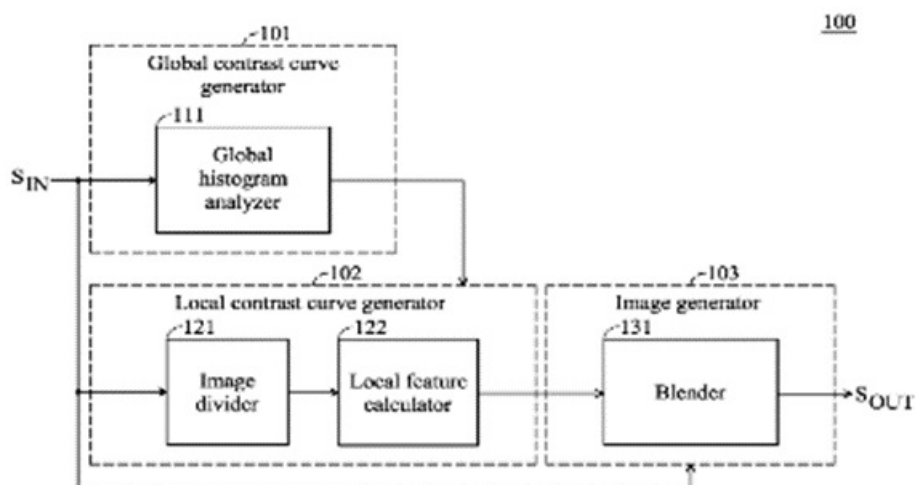
Contrast enhancement based on a combination of local and global properties.

Illustrative examples of subject matter classified in this place:

1.



2.



## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Circuitry for compensating brightness variation in the scene by increasing the dynamic range of the image compared to the dynamic range of the electronic image sensors	<a href="#">H04N 23/741</a>
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Bracketing, i.e. taking a series of images with varying exposure conditions	<a href="#">H04N 23/743</a>
Control of the dynamic range in Circuitry of solid-state image sensors [SSIS]	<a href="#">H04N 25/57</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Equalising the characteristics of different image components of stereoscopic or multi-view image signals, e.g. their average brightness or colour balance	<a href="#">H04N 13/133</a>
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### Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/90](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/92

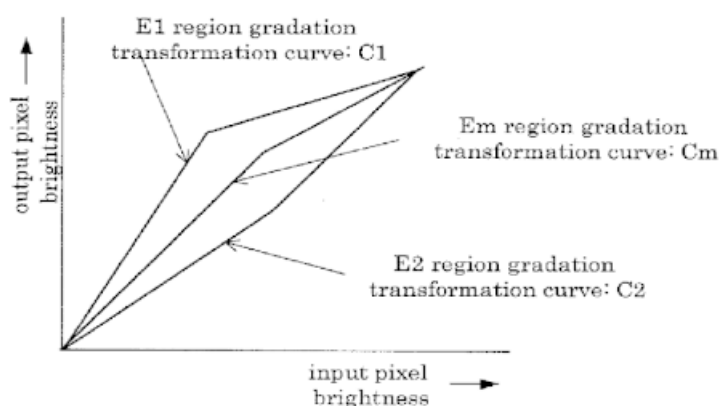
based on global image properties

### Definition statement

This place covers:

- Global contrast enhancement or tone mapping to increase the dynamic range of an image, based on properties of the whole image, e.g. global statistics or histograms;
- Contrast stretching, brightness equalisation;
- Gamma and gradation correction in general;
- Tone mapping for high dynamic range [HDR] imaging;
- Intensity mapping, e.g. using lookup tables [LUT].

Illustrative example of subject matter classified in this place:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Picture signal circuitry for controlling amplitude response in television systems	<a href="#">H04N 5/20</a>
Gamma control in television systems	<a href="#">H04N 5/202</a>
Circuitry for compensating brightness variation in the scene	<a href="#">H04N 23/70</a>
Camera processing pipelines comprising electronic image sensors	<a href="#">H04N 23/80</a>

### Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/92](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 5/94

based on local image properties, e.g. for local contrast enhancement

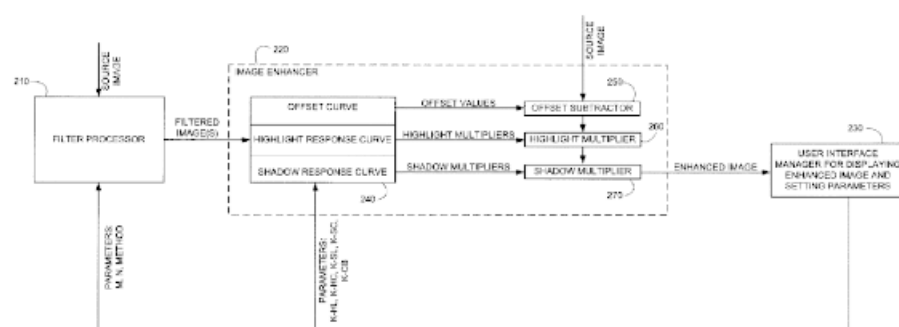
### Definition statement

This place covers:

- Local contrast enhancement, e.g. locally adaptive filtering;
- Retinex processing.

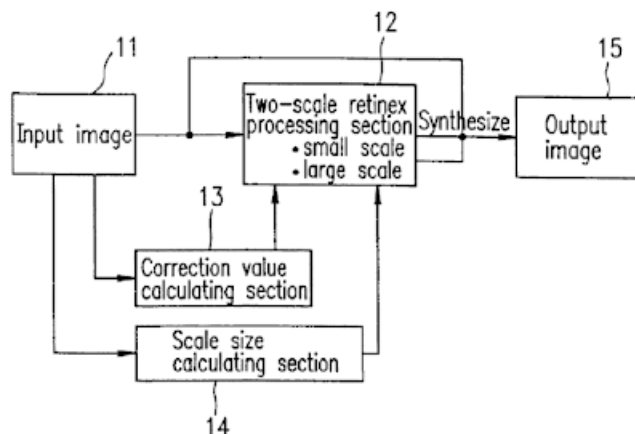
Illustrative examples of subject matter classified in this place:

1.



## Definition statement

2.



## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Unsharp masking	<a href="#">G06T 5/75</a>
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## Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/94](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

## G06T 7/00

## Image analysis

## Definition statement

This place covers:

- Analysis of motion, i.e. determining motion of an image subject, or of the camera having acquired the images; Tracking; Change detection; e.g. by block matching, feature-based methods, gradient-based methods, hierarchical or stochastic approaches, motion estimation from a sequence of stereo images.
- Analysis of texture, i.e. analysis of colour or intensity features which represent a perceived image texture, e.g. based on statistical or structural descriptions.
- Analysis of geometric attributes, e.g. area, perimeter, diameter, volume, convexity, concavity, centre of gravity, moments or symmetry.
- Analysis of captured images to determine intrinsic or extrinsic camera parameters, i.e. camera calibration; Calibration of stereo cameras, e.g. determining the transformation between left and right camera coordinate systems
- Computational analysis of images to determine information, e.g. parameters or characteristics, therefrom
- Inspection-detection on images, e.g. flaw detection; Industrial image inspection using e.g. a design-rule based approach or an image reference. Industrial image inspection checking presence / absence; Biomedical image inspection.
- Segmentation, i.e. partitioning an image into regions, or edge detection, i.e. detection of edge features in an image, e.g. involving probabilistic or graph-based approaches, deformable models, morphological operators, transform domain-based approaches or the use of more than two images.

## Definition statement

- Motion-based segmentation.
- Determination of transform parameters for the alignment of images, i.e. image registration, e.g. by correlation-, feature- or transform domain-based or statistical approaches.
- Depth or shape recovery, i.e. determination of scene depth parameters by consideration of image characteristics; Depth or shape recovery from shading, specularities, texture, perspective effects, e.g. vanishing points, or line drawings; Depth or shape recovery from multiple images involving amongst others contours, focus, motion, multiple light sources, photometric stereo or stereo images.
- Determining the position or orientation of objects, e.g. by feature- or transform domain-based or statistical approaches.
- Determination of image colour characteristics.

## Relationships with other classification places

[G06T 7/00](#) covers the details of image analysis algorithms, insofar as it deals with the related image processing algorithms per se. Documents which merely mention the general use of image analysis, without details of the underlying image analysis algorithms, are classified in the application place. Where the image analysis is functionally linked and restricted to specific image acquisition or display hardware or processes, it is classified in the application place; otherwise, it is classified in [G06T 7/00](#). Where the essential technical characteristics relate both to the image analysis detail and to its particular use or special adaptation, classification is made in both [G06T 7/00](#) and the application place.

## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Computed tomography	<a href="#">A61B 6/03</a>
Signal processing for Nuclear Magnetic Resonance (NMR) imaging systems	<a href="#">G01R 33/54</a>
ICT specially adapted for processing medical images, e.g. editing 30/40	<a href="#">G16H 30/40</a>
Scanning, transmission or reproduction of documents or the like	<a href="#">H04N 1/00</a>
Stereoscopic television systems	<a href="#">H04N 13/00</a>
Methods of arrangements for coding, decoding, compressing or decompressing digital video signals	<a href="#">H04N 19/00</a>
Transforming light or analogous information into electric information using solid-state image sensors	<a href="#">H04N 25/00</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Image Acquisition	<a href="#">G06T 1/0007</a>
Processor architectures; Processor configuration, e.g. pipelining	<a href="#">G06T 1/20</a>
Processing seismic data	<a href="#">G01V 1/28</a>
Methods or arrangements for reading or recognising printed or written characters or for recognising patterns	<a href="#">G06F 18/00</a> , <a href="#">G06V 10/00</a>
Bioinformatics	<a href="#">G16B</a>
Medical informatics	<a href="#">G16H</a>

## Special rules of classification

Where the essential technical characteristics of the invention relate both to the image analysis detail and to its particular use or special adaptation, classification is made in both [G06T 7/00](#) and the relevant application place in other subclasses.

[G06T 7/00](#) focuses on image processing algorithms. Although such algorithms sometimes need to take into account characteristics of the underlying image acquisition apparatus, inventions to the image acquisition apparatus per se are outside the scope of this group.

Additional information should be classified using one or more of the Indexing Codes from the ranges of [G06T 2200/00](#) or [G06T 2207/00](#). Their use is obligatory.

The classification symbol [G06T 7/00](#) is allocated to documents concerning:

- Architectures of image analysis systems, if not provided for elsewhere
- Extraction of MPEG7 descriptors, if not provided for elsewhere

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Stereo	Treatment of two images, e.g. from two cameras or a single camera that is displaced, in a pairwise manner
Feature	a significant image region or pixel with certain characteristics, for example a feature point, landmark, edge, corner or blob, typically determined by image operators.
Image analysis	the extraction of information from images through the use of image processing techniques acting upon image data, such as intensity, colour, motion and spatial frequency characteristics.

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

AAM	Active appearance model
ASM	Active shape model
HMM	Hidden Markov Model
LBP	Local Binary Pattern
LPE	ligne de partage des eaux (French expression for watershed segmentation)
RANSAC	Random Sampling (and) Consensus
CAD	Computer-Aided Detection
SLAM	Simultaneous Localization and Mapping

## G06T 7/0002

**{Inspection of images, e.g. flaw detection}**

### Definition statement

*This place covers:*

- Quality, conformity control
- Defects, abnormality, incompleteness

## Definition statement

- Acceptability determination
- User interface for automated visual inspection
- Database-to-object inspection
- Image quality inspection

## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining position or orientation of objects	<a href="#">G06T 7/70</a>
Validation, performance evaluation or active pattern learning techniques	<a href="#">G06F 18/217</a>
Pattern matching criteria, e.g. proximity measures	<a href="#">G06F 18/22</a>
Clustering techniques for pattern recognition	<a href="#">G06F 18/23</a>
Classification techniques for pattern recognition	<a href="#">G06F 18/24</a>
Image or video pattern matching	<a href="#">G06V 10/74</a>
Pattern recognition or machine learning using clustering within arrangements for image or video recognition or understanding	<a href="#">G06V 10/762</a> , <a href="#">G06V 10/764</a>
Detection or correction of errors in pattern recognition	<a href="#">G06V 10/98</a>
Evaluation of the quality of the acquired pattern in pattern recognition	<a href="#">G06V 10/993</a>

## Special rules of classification

In relation to the remaining, function-oriented groups of [G06T 7/00](#), this subgroup is an application-oriented group. Therefore, documents classified herein should also be classified in a function-oriented group under [G06T 7/00](#), if they contain a considerable contribution on the respective function.

For image quality inspection [G06T 2207/30168](#) (Image quality inspection) should be added.

## G06T 7/0004

## {Industrial image inspection}

## Definition statement

This place covers:

- Quality, conformity control in industrial context
- Defects, abnormality in industrial context
- Acceptability determination in industrial context
- User interfaces for automated visual inspection in industrial context
- "Teaching" (macros for inspection algorithms)
- Database-to-object inspection in industrial context
- Printing quality

## References

## Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Investigating the presence of flaws or contamination on materials	<a href="#">G01N 21/88</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Contactless testing using optical radiation for printed circuits	<a href="#">G01R 31/309</a>
Contactless testing using optical radiation for individual semiconductor devices	<a href="#">G01R 31/311</a>
Photolithography mask inspection	<a href="#">G03F 7/7065</a>
Component placement (in PCB manufacturing)	<a href="#">H05K 3/0008</a>

### Special rules of classification

When classifying in this group, the use of the indexing scheme [G06T 2207/30108](#) - [G06T 2207/30164](#) is mandatory for additional information related to industrial image inspection.

For user interfaces for automated visual inspection in industrial context, Indexing code [G06T 2200/24](#) (involving graphical user interfaces [GUIs]) should be added.

## G06T 7/0006

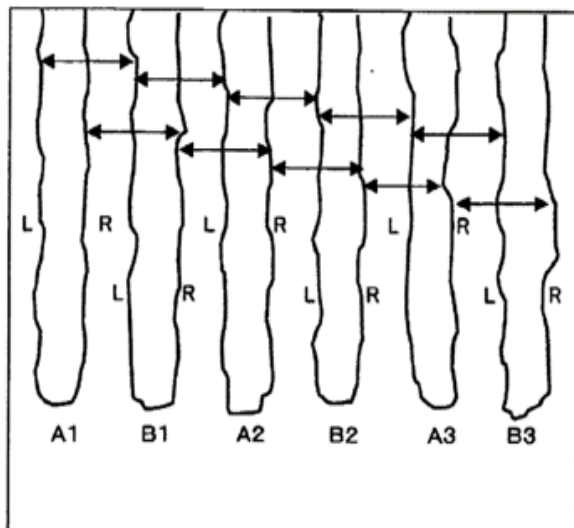
{using a design-rule based approach}

### Definition statement

*This place covers:*

Verifying geometric design rules or known geometric parameters, e.g. width or spacing of structures, repetitive patterns

Illustrative example:



## G06T 7/0008

{checking presence/absence}

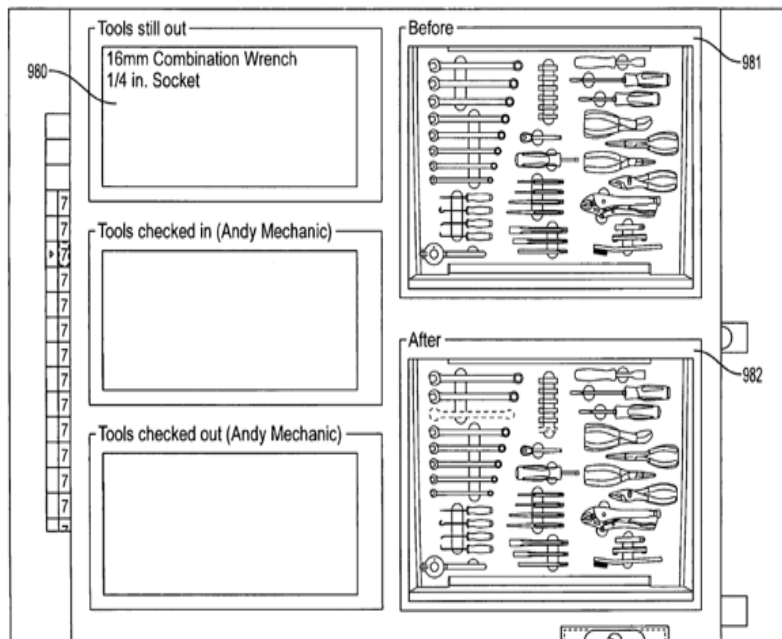
### Definition statement

*This place covers:*

- Detecting the absence of an item that should be there
- Detecting incompleteness

Definition statement

Illustrative examples:



## G06T 7/001

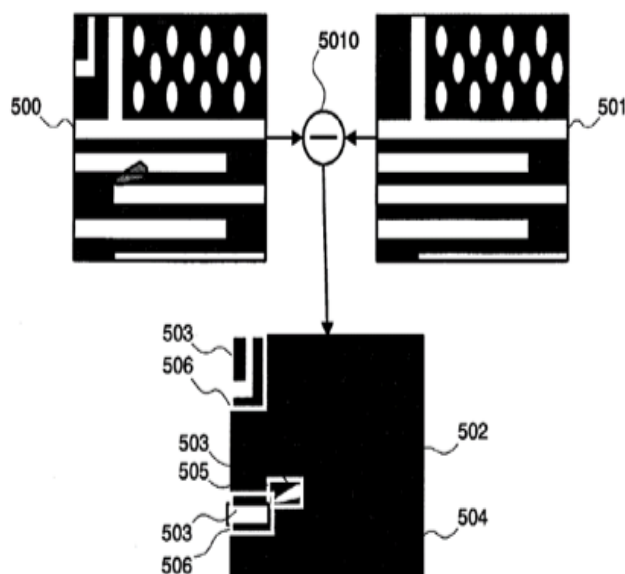
{using an image reference approach}

### Definition statement

*This place covers:*

- Industrial image inspection where an image is compared to a reference image, standard image, ground truth image, gold standard: either by image comparison at image level, e.g. by image correlation, or by comparison of parameters extracted from the images
- Reference images originated from an image acquisition apparatus or derived from computer-aided design data

Illustrative examples:





## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining representative reference patterns or generating dictionaries	<a href="#">G06F 18/28</a>
Determining representative reference patterns or generating dictionaries for image or video recognition or understanding	<a href="#">G06V 10/772</a>

## G06T 7/0012

### {Biomedical image inspection}

#### Definition statement

*This place covers:*

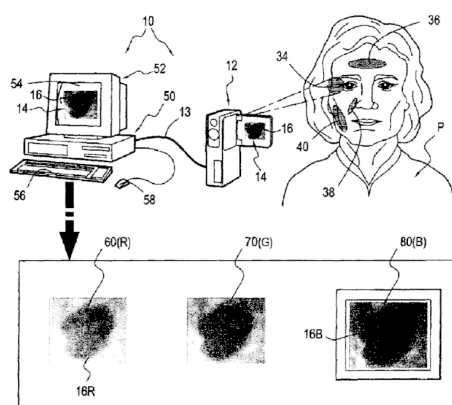
Defects, abnormality in biomedical context

Computer-aided detection [CAD]

Detecting, measuring, scoring, grading of

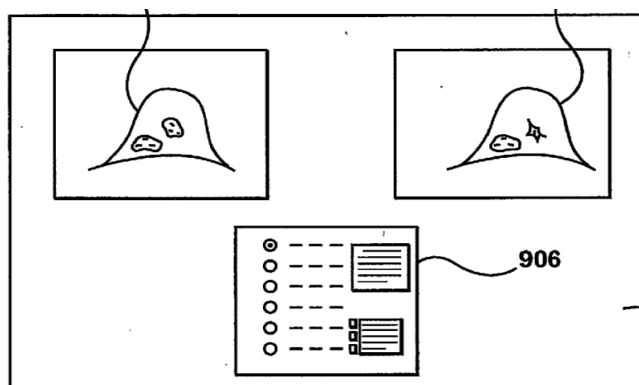
- Disease, pathology, lesions
- Cancer, tumor, tumour, malignancy, nodule
- Emphysema
- Microcalcifications
- Polyps
- Scar, non-viable tissue
- Osteoporosis, fracture risk prediction, Arthritis
- Alzheimer disease
- Scoring wrinkles, ageing
- Tissue abnormalities in microscopic images, e.g. inflammation, deformations
- Grading of living plants

Illustrative examples:



## Definition statement

Characterising skin imperfections



Evaluating spine balance

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Apparatus for radiation diagnostics	<a href="#">A61B 6/00</a>
Diagnosis using ultrasound	<a href="#">A61B 8/00</a>
Signal processing for Nuclear Magnetic Resonance (NMR) imaging systems	<a href="#">G01R 33/54</a>
Ultrasound imaging	<a href="#">G01S 7/52017</a> , <a href="#">G01S 15/8906</a>
ICT specially adapted for processing medical images, e.g. editing	<a href="#">G16H 30/40</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Recognising microscopic objects	<a href="#">G06V 20/69</a>
Bioinformatics	<a href="#">G16B</a>
Medical informatics	<a href="#">G16H</a>

## Special rules of classification

When classifying in this group, the use of the indexing scheme [G06T 2207/30004](#) - [G06T 2207/30104](#) is mandatory for additional information related to biomedical image processing.

## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

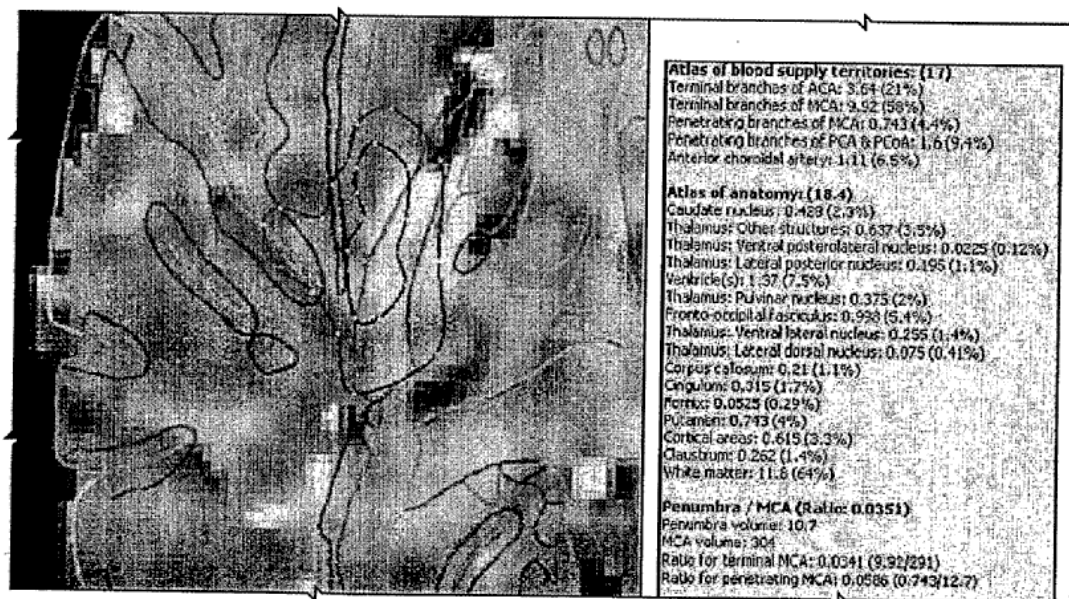
Biomedical	biological or medical
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**G06T 7/0014****{using an image reference approach}****Definition statement***This place covers:*

- Comparison to a reference image, standard image, atlas...
- Reference image taken from different patient or patients, or reference image taken from spatially different anatomical regions of the same patient, e.g. comparison of left and right body parts.

Illustrative examples

Superposition of a perfusion image and the brain atlas images in contour representation

**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Determining representative reference patterns or generating dictionaries	<a href="#">G06F 18/28</a>
Determining representative reference patterns or generating dictionaries for image or video recognition or understanding	<a href="#">G06V 10/772</a>

**G06T 7/0016****{involving temporal comparison}****Definition statement***This place covers:*

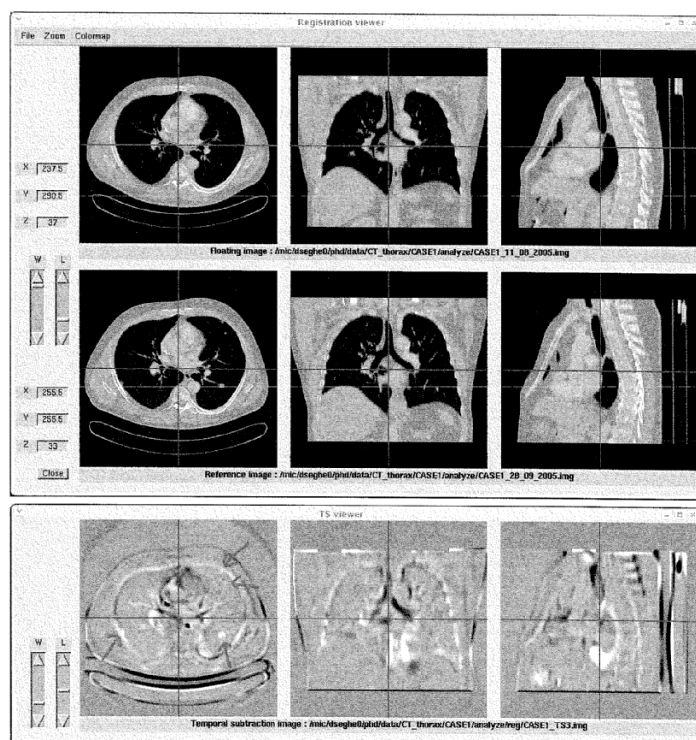
- Follow-up studies, comparison of images from different points of time, temporal difference images, temporal subtraction images, biomedical change detection.
- Reference image taken from the same patient and the same anatomical region.
- Subtraction angiography for abnormality detection.

## Definition statement

- Assessment of dynamic contrast enhancement, wash-in/wash-out for abnormality detection.
- Plethysmography based on image analysis

Illustrative example:

Floating image, reference image and temporal subtraction image



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of motion, e.g. change detection in general	<a href="#">G06T 7/20</a>
Pattern matching criteria, e.g. proximity measures	<a href="#">G06F 18/22</a>
Temporal feature extraction for image or video recognition or understanding	<a href="#">G06V 10/62</a>
Image or video pattern matching	<a href="#">G06V 10/74</a>

### Special rules of classification

For plethysmography based on image analysis, Indexing Code [G06T 2207/30076](#) should be added.

## G06T 7/10

Segmentation; Edge detection (motion-based segmentation [G06T 7/215](#))

### Definition statement

This place covers:

- Segmentation, i.e. partitioning an image into regions
- Edge detection, i.e. detection of edge features in an image

## References

### Limiting references

*This place does not cover:*

Motion-based segmentation	<a href="#">G06T 7/215</a>
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### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Separation of touching or overlapping patterns for pattern recognition, e.g. character segmentation for optical character recognition (OCR)	<a href="#">G06V 10/26</a>
Extraction of image features/characteristics for pattern recognition	<a href="#">G06V 10/40</a>
Detecting partial patterns, e.g. edges or contours, or configurations, e.g. loops, corners, strokes, intersections, for pattern recognition	<a href="#">G06V 10/44</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Analysis of texture	<a href="#">G06T 7/40</a>
Determination of colour characteristics	<a href="#">G06T 7/90</a>
Clustering techniques in pattern recognition	<a href="#">G06F 18/23</a>
Classification techniques in pattern recognition	<a href="#">G06F 18/24</a>
Feature extraction related to colour, for pattern recognition	<a href="#">G06V 10/56</a>
Pattern recognition or machine learning using clustering within arrangements for image or video recognition or understanding	<a href="#">G06V 10/762</a> , <a href="#">G06V 10/764</a>

## G06T 7/11

### Region-based segmentation

#### Definition statement

*This place covers:*

Methods evaluating properties or features of image regions to determine the segmentation result, e.g.:

- Thresholding, fixed threshold binarisation, multiple and histogram-derived thresholds
- Region growing, splitting and merging
- Colour-based segmentation
- Texture-based segmentation

## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Quantising the analogue image signal, e.g. histogram thresholding for discrimination between background and foreground patterns, for pattern recognition	<a href="#">G06V 10/28</a>
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Extraction of features or characteristics of the image related to colour, for pattern recognition	<a href="#">G06V 10/56</a>
Cutting or merging image elements, e.g. region growing, watershed, clustering-based techniques, for pattern recognition	<a href="#">G06V 40/23</a>

### **Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Analysis of texture	<a href="#">G06T 7/40</a>
Determination of colour characteristics	<a href="#">G06T 7/90</a>

## **G06T 7/12**

### **Edge-based segmentation**

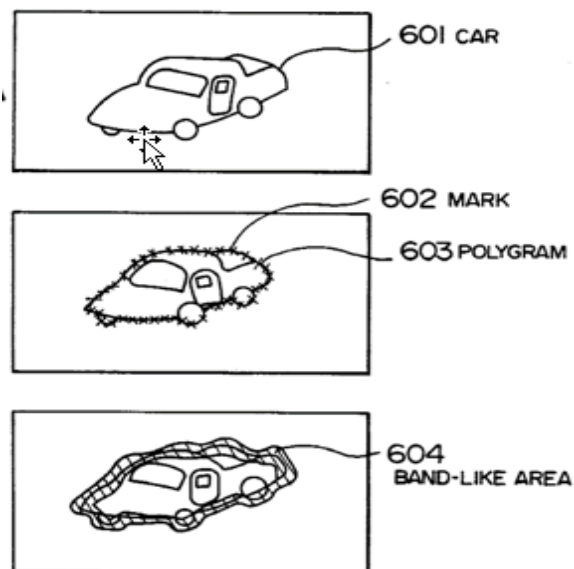
#### **Definition statement**

*This place covers:*

Methods evaluating (closed) contours, edges or outlines of image portions to determine the segmentation result, e.g.:

- Contour-based segmentation
- Detection of straight edge-lines (e.g. buildings or roads from aerial images) which partition an image into regions
- Finding and linking edge candidate points or segments (edgels)

Illustrative example:





## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns, e.g. edges or contours, or configurations, e.g. loops, corners, strokes, intersections, for pattern recognition	<a href="#">G06V 10/44</a>
Extraction of features or characteristics of the image by coding the contour of a pattern, for pattern recognition	<a href="#">G06V 10/46</a>

## G06T 7/13

### Edge detection

#### Definition statement

*This place covers:*

In contrast to [G06T 7/12](#), this group covers documents pertaining purely to edge-detection without partitioning an image into regions, e.g.:

- Derivative methods (first-order or gradient, second order, e.g. Laplacian)
- Zero crossing
- Corner detection

Illustrative example:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns, e.g. edges or contours, or configurations, e.g. loops, corners, strokes, intersections, for pattern recognition	<a href="#">G06V 10/44</a>
Extraction of features or characteristics of the image by coding the contour of a pattern, for pattern recognition	<a href="#">G06V 10/46</a>

**G06T 7/136****involving thresholding****References****Application-oriented references**

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Quantising the analogue image signal, e.g. histogram thresholding for discrimination between background and foreground patterns, for pattern recognition
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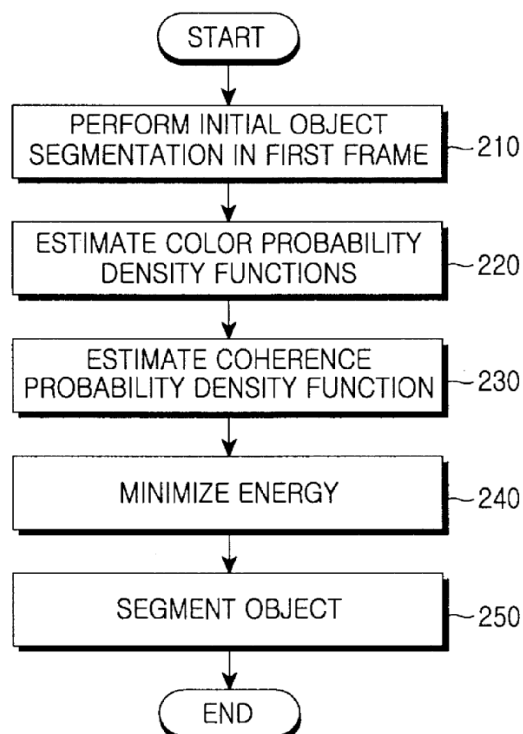
<a href="#">G06V 10/28</a>
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**G06T 7/143****involving probabilistic approaches, e.g. Markov random field [MRF] modelling****Definition statement**

*This place covers:*

- Statistical/Probabilistic methods for segmentation

Illustrative example:





## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Classification techniques based on a parametric (probabilistic) model, for pattern recognition	<a href="#">G06F 18/2415</a>
Markov models or related models, Markov random fields or networks embedding Markov models for pattern recognition	<a href="#">G06F 18/295</a>
Detecting partial patterns or configurations by analysing connectivity relationship of elements of the pattern, for pattern recognition	<a href="#">G06V 10/457</a>
Pattern recognition or machine learning using classification within arrangements for image or video recognition or understanding	<a href="#">G06V 10/764</a>

## G06T 7/149

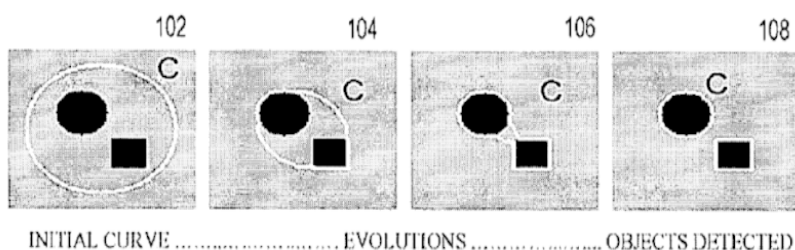
involving deformable models, e.g. active contour models

### Definition statement

This place covers:

- Model-based segmentation (in particular when applied to biomedical images)
- Methods based on active shape models
- Methods based on active appearance models
- Methods based on active contours, active surfaces, snakes or deformable templates

Illustrative example:



Evolution of Image Segmentation

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Pattern recognition techniques involving a deformation of the sample or reference pattern or elastic matching	<a href="#">G06V 10/754</a>
Matching of contours based on a local optimisation criterion, e.g. snakes or active contours, for pattern recognition	<a href="#">G06V 10/755</a>
Matching based on shape statistics, e.g. active shape models, for pattern recognition	<a href="#">G06V 10/7553</a>

Matching based on statistics of image patches, e.g. active appearance models, for pattern recognition
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<a href="#">G06V 10/7557</a>
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### Special rules of classification

For Active shape model [ASM], Indexing Code [G06T 2207/20124](#) should be added.

For Active appearance model [AAM], Indexing Code [G06T 2207/20121](#) should be added.

For Active contour; Active surface; Snakes, Indexing Code [G06T 2207/20116](#) should be added.

## G06T 7/155

### involving morphological operators

#### Definition statement

*This place covers:*

- Morphological methods
- Watersheds
- Toboggan-based methods

Illustrative examples:

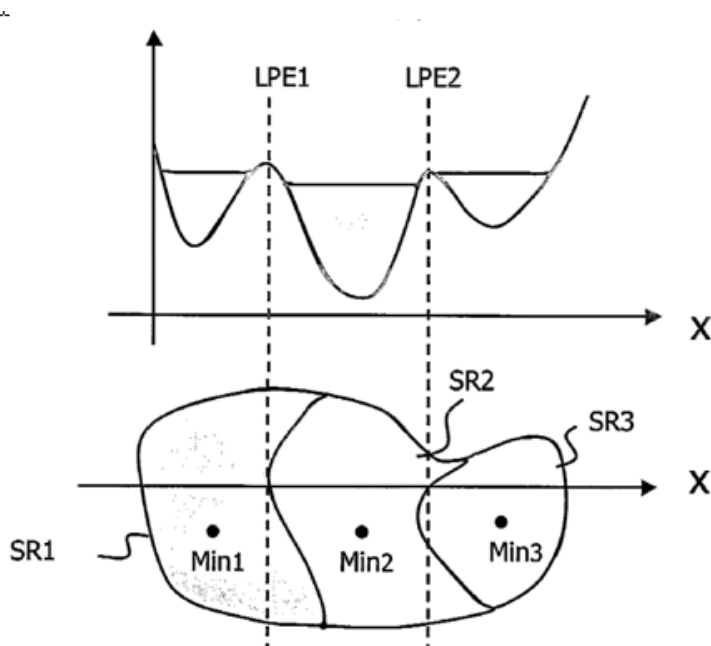


Figure 1. The 1D profile  $I(x)$  representing the intensity of a dark object of interest on a light background, forms three basins which correspond to local minima Min1, Min2 and Min3 of the intensity

## Definition statement

of the segmented region. The three basins give rise to two watershed lines LPE1 and LPE2, which divide the segmented region into three sub-regions SR1, SR2 and SR3.

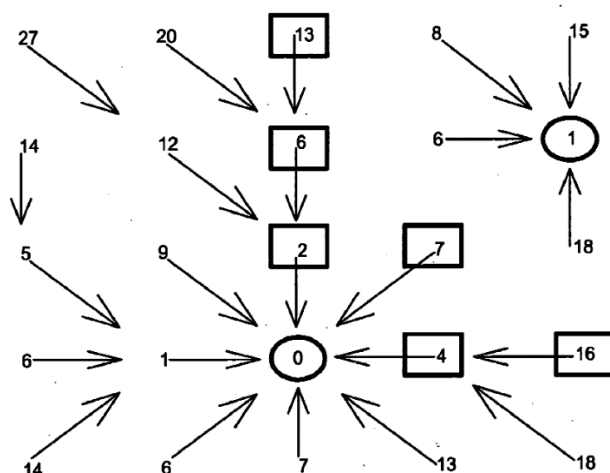


Figure 2. Toboggan-based object segmentation

## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Smoothing or thinning the pattern, e.g. by morphological operators, for pattern recognition	<a href="#">G06V 10/34</a>
Combinations of pre-processing functions using a local operator, for pattern recognition	<a href="#">G06V 10/36</a>
Cutting or merging image elements, e.g. region growing, watershed, for pattern recognition	<a href="#">G06V 40/23</a>

### Special rules of classification

For Morphological image processing, an Indexing Code from the range of [G06T 2207/20036](#) - [G06T 2207/20044](#) should be added.

## G06T 7/162

### involving graph-based methods

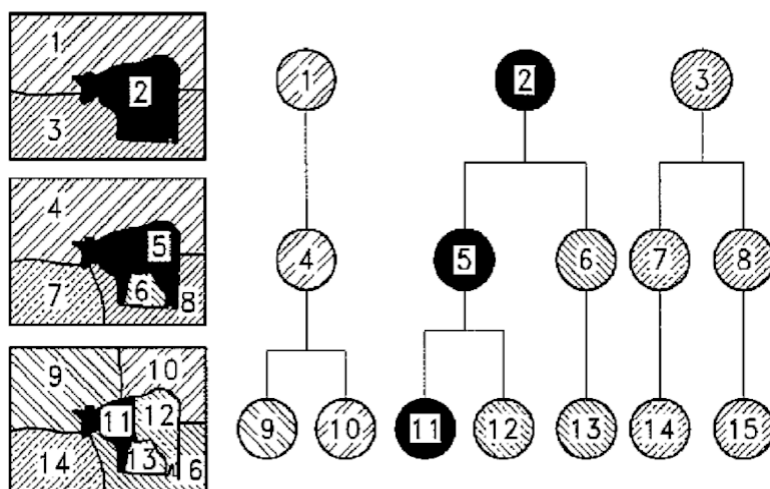
### Definition statement

*This place covers:*

- Graph-cut methods

## Definition statement

Illustrative example:



## References

**Application-oriented references**

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Feature extraction by graphical representation, e.g. directed attributed graphs, for pattern recognition	<a href="#">G06V 10/426</a>
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**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Hierarchical clustering techniques, for pattern recognition	<a href="#">G06F 18/231</a>
Non-hierarchical partitioning techniques based on graph theory, for pattern recognition	<a href="#">G06F 18/2323</a>
Graph matching, for pattern recognition	<a href="#">G06V 30/1988</a>

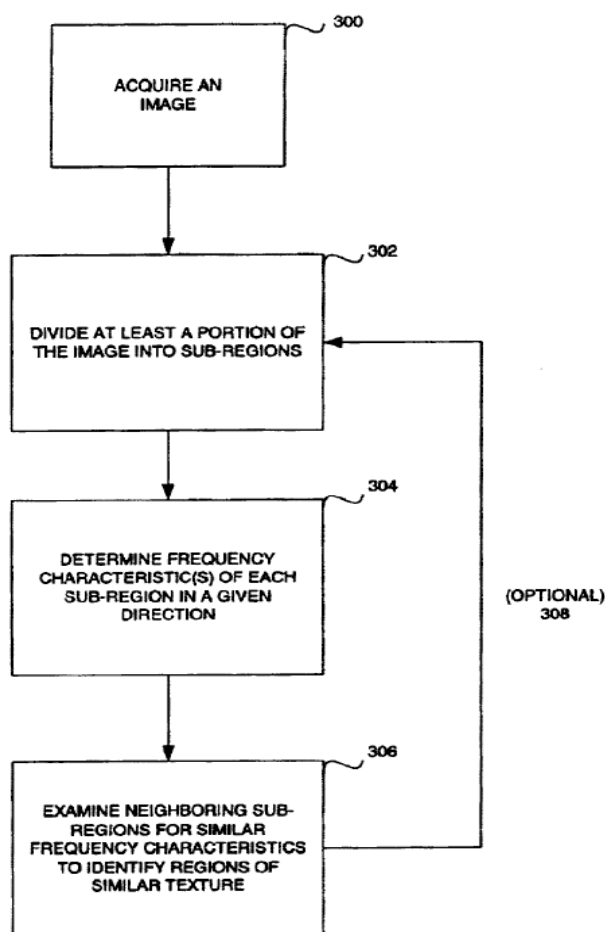
**G06T 7/168****involving transform domain methods****Definition statement**

*This place covers:*

- Fourier-, FFT-, Wavelet-based methods
- Gabor-, Laplace-transform-based methods
- Discrete cosine transform [DCT]-based methods
- Walsh-Hadamard transform [WHT]-based methods
- Hough transform

Definition statement

Illustrative example:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	<a href="#">G06V 10/431</a>
Detecting partial patterns using transforms (e.g. Hough transform), for pattern recognition	<a href="#">G06V 10/48</a>
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	<a href="#">G06V 10/52</a>

### Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

## G06T 7/174

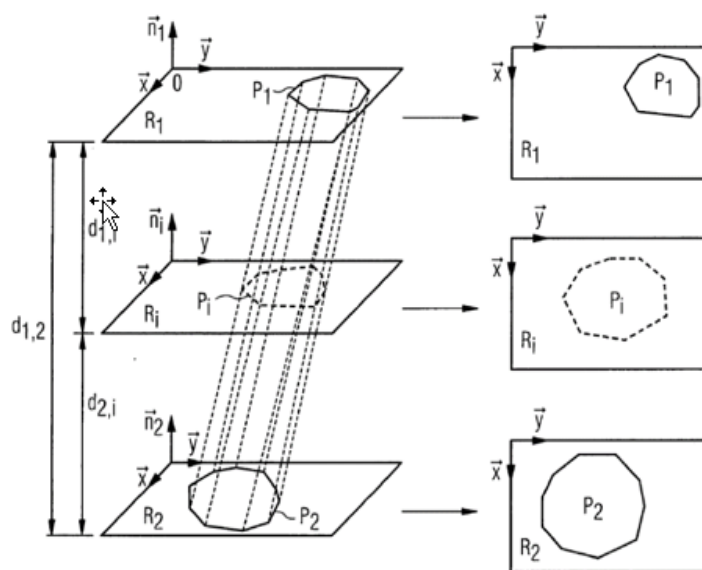
involving the use of two or more images

### Definition statement

*This place covers:*

- Using information from multiple images to determine segmentation result
- Segmentation based on several images taken under varying illumination, focus, exposure, etc.
- Segmentation of a video frame involving several image frames of the video sequence, e.g. neighbouring frames
- Temporal and spatio-temporal segmentation, if not based on motion information
- Segmentation using several (neighbouring) slices of a tomographic data set (CT, MRI, PET, etc.), propagation of segmentation results between neighbouring slices
- Hierarchical segmentation methods (including wavelet-based schemes), if final segmentation result is derived from (partial) results at different resolution levels
- Multispectral image segmentation using information from different spectral bands (beyond the visible spectrum)

Illustrative example:



### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Motion-based segmentation	<a href="#">G06T 7/215</a>
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## G06T 7/181

involving edge growing; involving edge linking

### Definition statement

*This place covers:*

Image segmentation or edge detection methods based on

## Definition statement

- edge growing
- edge linking
- edge following

## References

**Application-oriented references**

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Detecting partial patterns by analysis of the connectivity relationships of elements of the pattern, e.g. by edge linking, connected component or neighbouring slice analysis, for pattern recognition
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<a href="#">G06V 10/457</a>
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**G06T 7/187**

**involving region growing; involving region merging; involving connected component labelling**

**Definition statement**

*This place covers:*

Image segmentation methods based on

- region growing; region merging
- split-and-merge
- connected component labelling

Illustrative example:

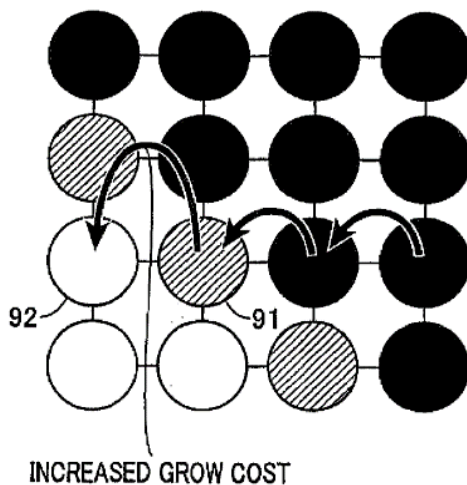


Figure 1. Region growing method which accumulates costs along a pixel path and as soon as the accumulated costs between neighbouring pixels (91, 92) become higher than a threshold, the growing is stopped.

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns by analysis of the connectivity relationships of elements of the pattern, e.g. by edge linking, connected component or neighbouring slice analysis, for pattern recognition	<a href="#">G06V 10/457</a>
Segmentation of touching or overlapping patterns, cutting or merging image elements, e.g. region growing, watersheds, for pattern recognition	<a href="#">G06V 40/23</a>

## G06T 7/194

involving foreground-background segmentation

### Definition statement

*This place covers:*

Image segmentation or edge detection methods based on a separation of foreground, i.e. relevant parts, and background, i.e. non-relevant parts of an image.

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Quantising the analogue image signal, e.g. histogram thresholding for discrimination between background and foreground patterns, for pattern recognition	<a href="#">G06V 10/28</a>
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## G06T 7/20

Analysis of motion (motion estimation for coding, decoding, compressing or decompressing digital video signals [H04N 19/43](#), [H04N 19/51](#))

### Definition statement

*This place covers:*

- Image analysis algorithms for determining motion of an image subject, or of the camera having acquired the images. Determination of scene movement and between image frames, e.g. Change detection
- Tracking
- Motion capture
- Determining camera ego-motion add the Indexing Code [G06T 2207/30244](#): Camera pose
- Medical motion analysis, e.g. of the left ventricle of the heart add the Indexing Code [G06T 2207/30048](#): Heart; Cardiac
- Trajectory representation add the Indexing Code: [G06T 2207/30241](#) Trajectory
- Stabilisation of video sequences (see also [G06T 7/30](#))



## References

### Limiting references

*This place does not cover:*

Motion estimation for coding, decoding, compressing or decompressing digital video signals	<a href="#">H04N 19/43</a> , <a href="#">H04N 19/51</a>
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### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Scene recognition	<a href="#">G06V 20/00</a>
Recognising video content	<a href="#">G06V 20/52</a>
Recognising scenes under surveillance	<a href="#">G06V 20/52</a>
Recognising scenes perceived from a vehicle	<a href="#">G06V 20/56</a>
Recognising scenes inside a vehicle	<a href="#">G06V 20/59</a>
Gesture recognition	<a href="#">G06V 40/20</a>
Burglar, theft or intruder alarms using cameras and image comparison	<a href="#">G08B 13/196</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Determination of transform parameters for the alignment of images, i.e. image registration	<a href="#">G06T 7/30</a>
Depth or shape recovery from motion	<a href="#">G06T 7/579</a>
Determining position or orientation of objects	<a href="#">G06T 7/70</a>
Video games	<a href="#">A63F 13/00</a>
Target following using TV type tracking systems	<a href="#">G01S 3/7864</a>
Light barriers	<a href="#">G01V 8/20</a>
Data indexing of video sequences	<a href="#">G06F 16/50</a>
Surveillance systems using closed-circuit television systems (CCTV)	<a href="#">H04N 7/18</a>

### Special rules of classification

For camera pose, Indexing Code [G06T 2207/30244](#) should be added. For heart, cardiac, Indexing Code [G06T 2207/30048](#) should be added. For trajectory details, Indexing Code [G06T 2207/30241](#) should be added. For sports video, sports image, Indexing Code [G06T 2207/30221](#) should be added.

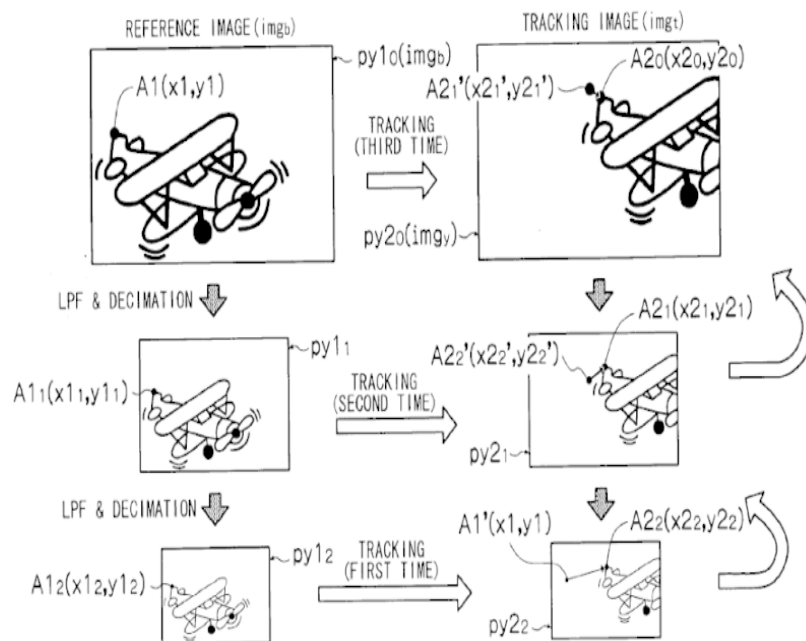
**G06T 7/207**

for motion estimation over a hierarchy of resolutions (multi-resolution motion estimation or hierarchical motion estimation for coding, decoding, compressing or decompressing digital video signals [H04N 19/53](#))

**Definition statement**

*This place covers:*

Illustrative example:

**References****Limiting references**

*This place does not cover:*

Multi-resolution motion estimation or hierarchical motion estimation for coding, decoding, compressing or decompressing digital video signals
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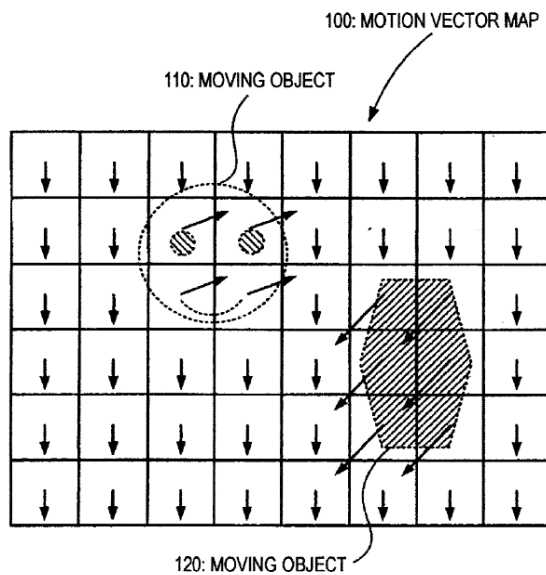
<a href="#">H04N 19/53</a>
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**G06T 7/215****Motion-based segmentation****Definition statement**

*This place covers:*

- Figure-ground segmentation by detection of moving object(s) from dense motion representation
- Partitioning an image into regions of homogenous 2D (apparent) motion
- Based on analysis of motion vector field or motion flow
- Grouping from optical flow

Illustrative example:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Retrieval of video data using motion, e.g. objection motion	<a href="#">G06F 16/786</a>
Segmenting video sequences, e.g. scene change analysis	<a href="#">G06V 20/49</a>
Scene change analysis	<a href="#">H04N 5/147</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation; Edge detection	<a href="#">G06T 7/10</a>
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## G06T 7/223

### using block-matching

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Movement estimation for television pictures	<a href="#">H04N 5/144</a>
Predictive coding in television systems using temporal prediction with motion detection	<a href="#">H04N 19/503</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Image coding using predictors	<a href="#">G06T 9/004</a>
Use of motion vectors for image compression, coding using predictors, video coding	<a href="#">H04N 19/52</a>

**G06T 7/231****using full search****Definition statement**

*This place covers:*

Full, exhaustive, brute force search

Illustrative example:

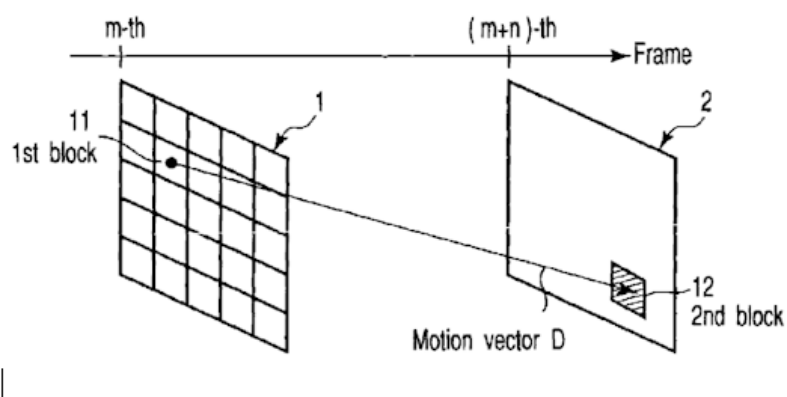


Figure 1. A motion vector between the m-th frame (1) and the (m+n)-th frame (2) is detected. At first, the image data of the m-th frame 1 is divided into a plurality of first blocks 11, and the first blocks 11 are extracted sequentially. The second block 12 of the same size and shape as the extracted first block 11 is extracted from the image data of the (m+n)-th frame 2. The absolute difference value of the corresponding pixels of the extracted first block 11 and the extracted second block 12 is computed every pixel.

**G06T 7/238****using non-full search, e.g. three-step search****Definition statement**

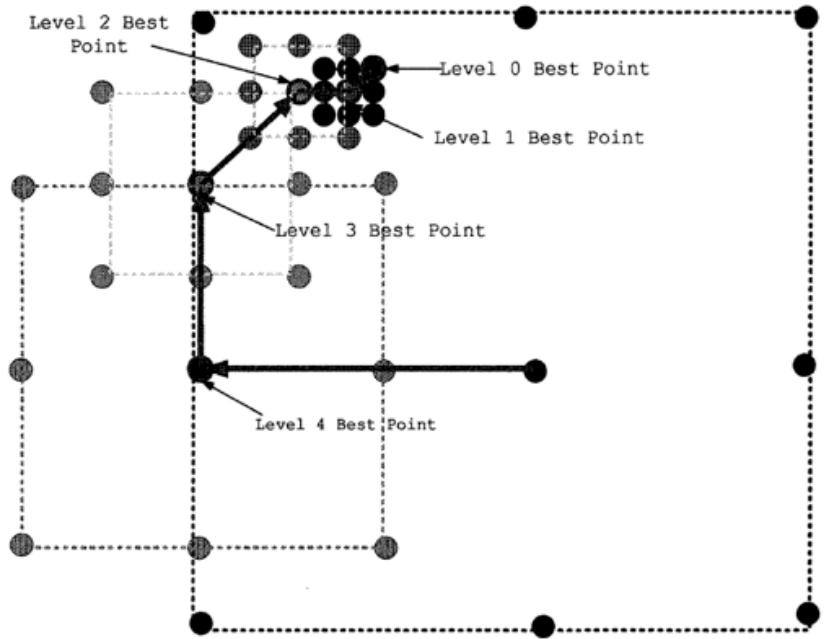
*This place covers:*

- Non-full, layered structure, fast, adaptive, efficient search
- Three-Step, New Three-Step, Four-Step Search
- Simple and Efficient Search
- Binary Search
- Spiral Search
- Two-Dimensional Logarithmic Search
- Cross Search Algorithm
- Adaptive Rood Pattern Search

## Definition statement

- Orthogonal Search
- One-at-a-Time Algorithm
- Diamond Search
- Hierarchical search
- Spatial dependency check

Illustrative example of an hierarchical search:



### Special rules of classification

For Hierarchical, coarse-to-fine, multiscale or multiresolution image processing; Pyramid transform, Indexing Code [G06T 2207/20016](#) should be added.

### G06T 7/246

using feature-based methods, e.g. the tracking of corners or segments

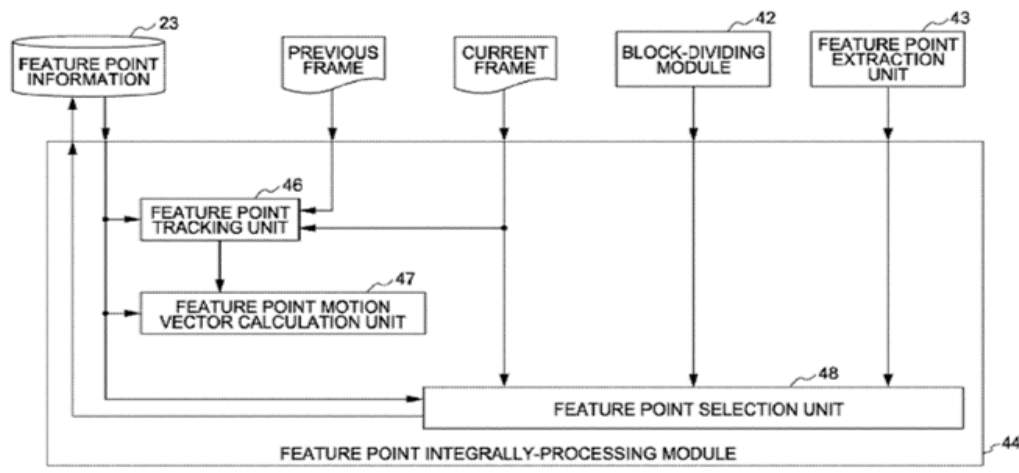
### Definition statement

*This place covers:*

- Feature points, e.g. determined by image operators; also matching of point descriptors, feature vectors; significant segments, blobs
- Feature, landmark, marker, fiducial, edge, corner, etc.

Definition statement

Illustrative example:



## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Feature	a significant image region or pixel with certain characteristics
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## G06T 7/248

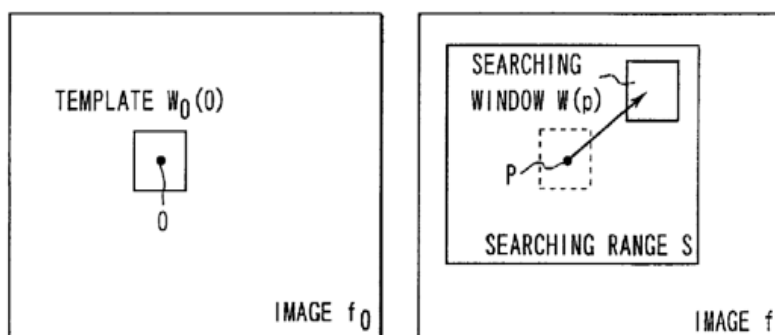
{involving reference images or patches}

## Definition statement

This place covers:

- Involving correlation of "true to reality" image patches, templates, regions of interest
- Correlation used for 1) finding features in each image or for 2) finding regions of interest from one image in the other images

Illustrative example:



## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Face recognition using comparisons between temporally consecutive images	<a href="#">G06V 40/167</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Analysis of motion using block-matching (where blocks are arbitrarily defined by a grid, not as a significant image region)	<a href="#">G06T 7/223</a>
Image matching for pattern recognition or image matching in general	<a href="#">G06V 40/167</a>

## G06T 7/251

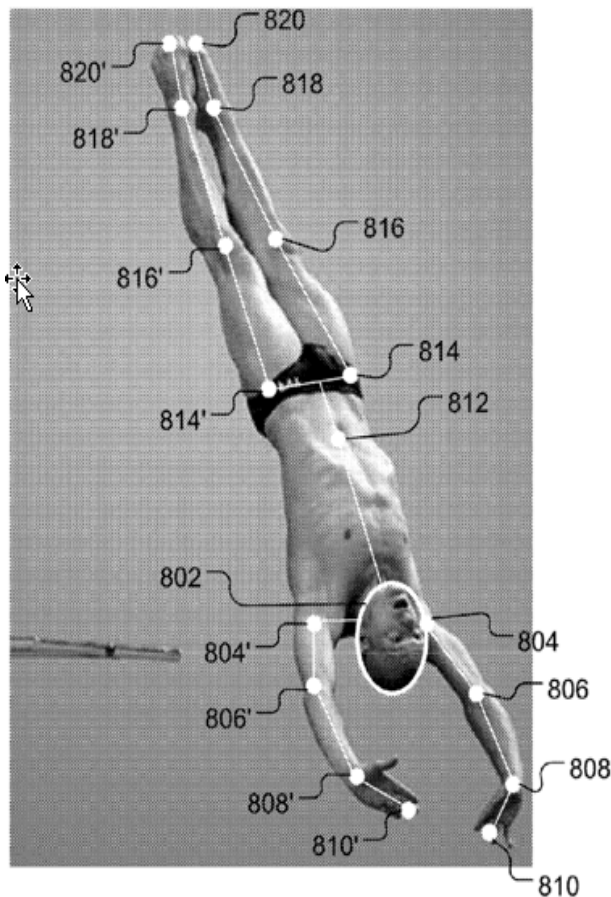
### {involving models}

### Definition statement

*This place covers:*

- Involving matching of intermediary 2D or 3D models extracted from each image before motion analysis, e.g. skeletons, stick models, ellipses, geometric models of all kinds, polygon models, active appearance and shape models, as opposed to reference images or patches
- Model matching used for 1) finding features in each image or for 2) finding structure of interest from one image in the other images

Illustrative example:



For each frame of a captured video sequence, a basic human body model 800 for diving competitions is superimposed on the frame and adjusted to provide an accurate representation of the diver's positioning in that frame, the sequence of adjusted models describing the entire motion sequence of the diver.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Matching of contours in general or matching of contours for pattern recognition	<a href="#">G06V 10/752</a>
Syntactic or structural pattern recognition, e.g. symbolic string recognition	<a href="#">G06V 30/1983</a>

## G06T 7/254

involving subtraction of images

### Definition statement

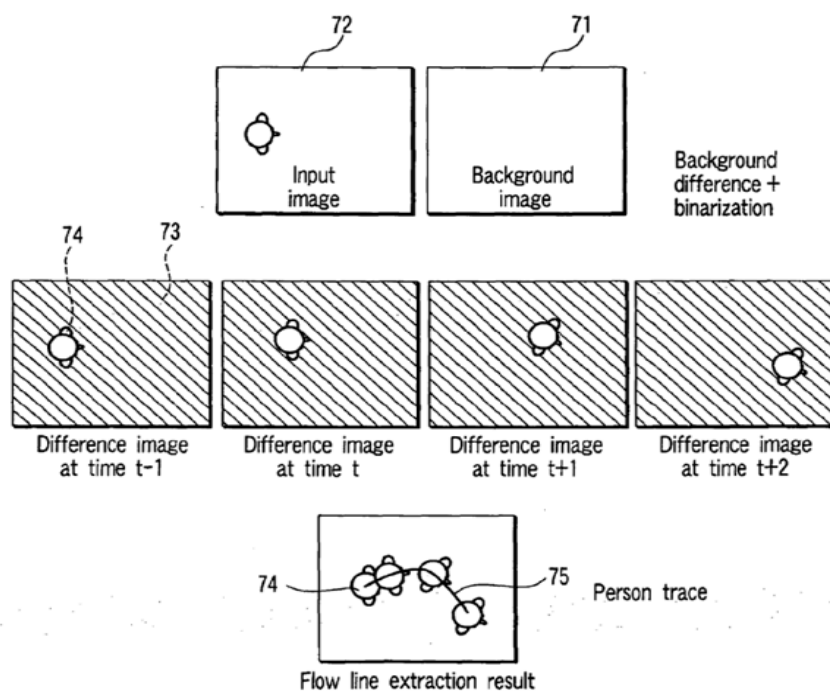
This place covers:

- Subtraction of previous image
- Subtraction of background image, background maintenance, background models therefor
- Also involving ratio or more general comparison of corresponding pixels in successive frames



## Definition statement

Illustrative example:



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Burglar, theft or intruder alarms using cameras and image comparison	<a href="#">G08B 13/196</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Change detection in biomedical image inspection	<a href="#">G06T 7/0014</a>
-------------------------------------------------	-----------------------------

## G06T 7/262

using transform domain methods, e.g. Fourier domain methods

### Definition statement

This place covers:

- Fourier, DCT, Wavelet, Gabor, etc.
- Using phase correlation

Definition statement

Illustrative examples:

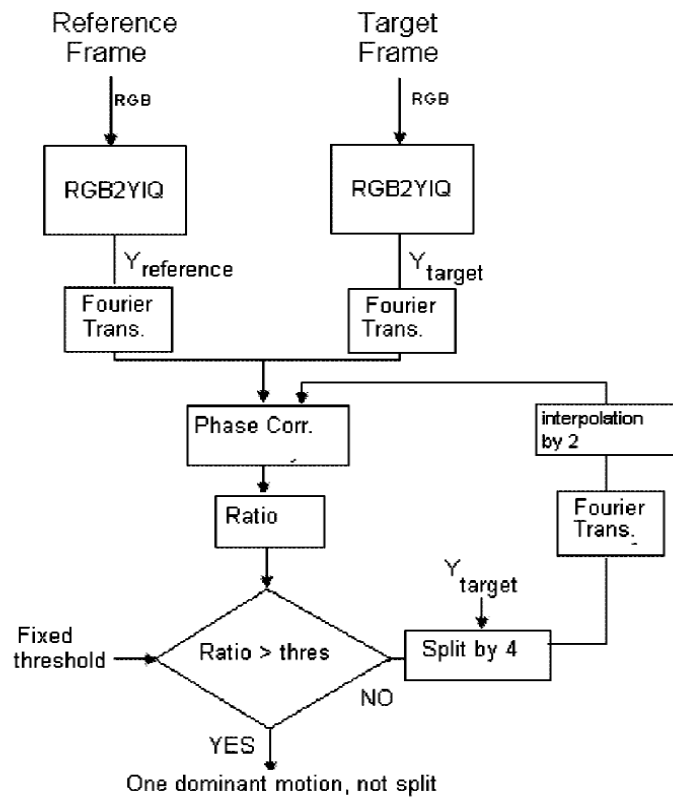


Figure 1.

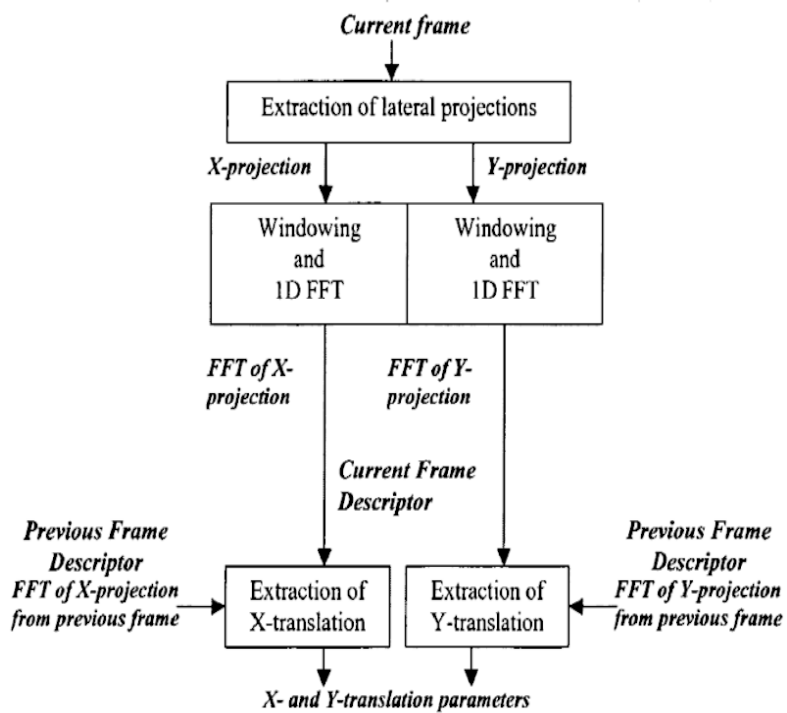


Figure 2.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	<a href="#">G06V 10/431</a>
Detecting partial patterns using Hough transform for pattern recognition	<a href="#">G06V 10/48</a>
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	<a href="#">G06V 10/52</a>

## Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

## G06T 7/269

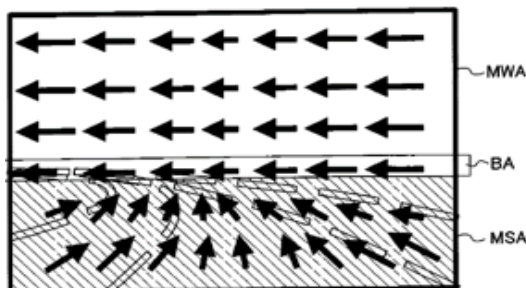
### using gradient-based methods

#### Definition statement

*This place covers:*

Optic (optical) flow involving the calculation of spatial and temporal gradient

Illustrative example:



## G06T 7/277

### involving stochastic approaches, e.g. using Kalman filters

#### Definition statement

*This place covers:*

- Bayesian methods
- HMM
- Particle filtering

Illustrative examples:

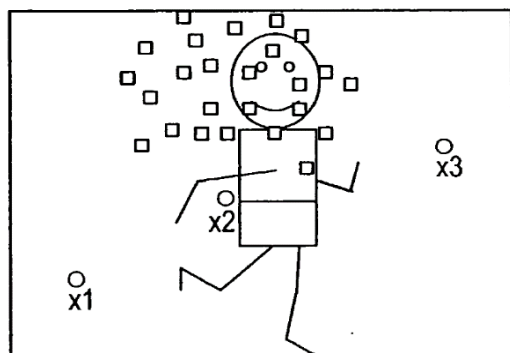


Figure 1.

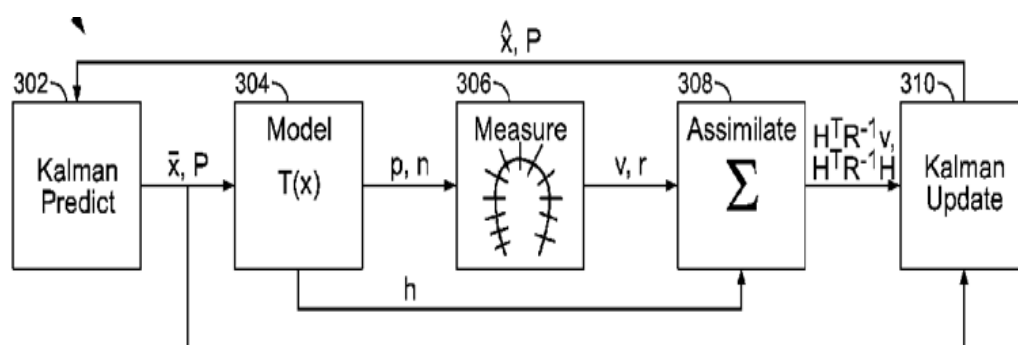


Figure 2. Kalman filter-based tracking of 3D heart model

### Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/20](#).

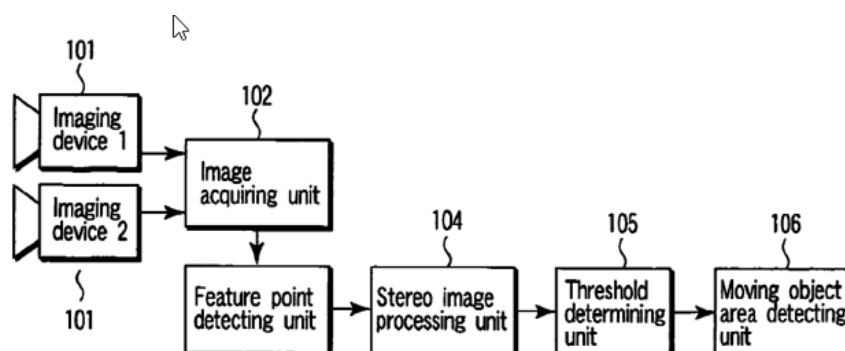
## G06T 7/285

using a sequence of stereo image pairs

### Definition statement

*This place covers:*

Illustrative example:



## G06T 7/292

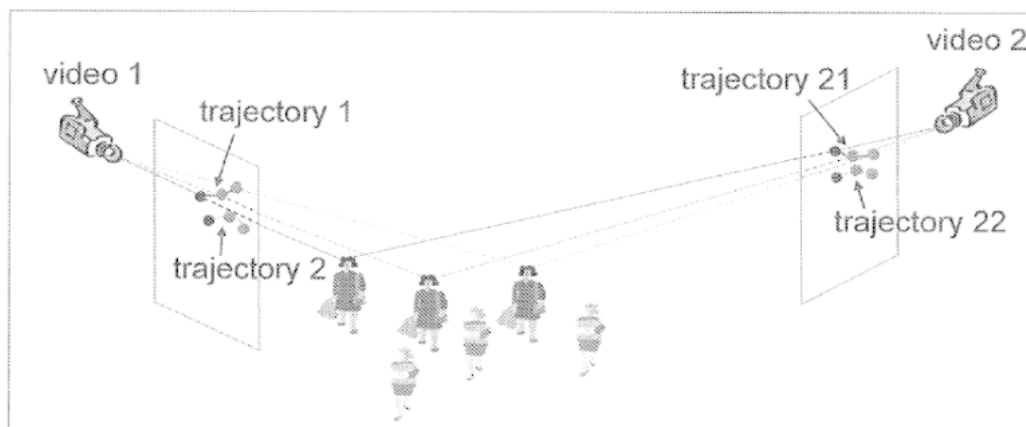
### Multi-camera tracking

#### Definition statement

*This place covers:*

- Algorithms for camera networks
- Interaction, cooperation between trackers
- Multi-view tracking, multi-camera tracking
- The cameras view the same scene (cooperation, e.g. by voting, fusion)
- The cameras view different scenes (cooperation, e.g. by handover, tracklet joining, trajectory joining)

*Illustrative example:*



#### References

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Classification of unknown faces, i.e. recognising the same non-enrolled faces, e.g. recognising the unknown faces across different face tracks	<a href="#">G06V 40/173</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Analysis of motion using a sequence of stereo pairs, e.g. cooperative motion analysis from a single stereo camera pair or motion analysis from at least three views, wherein at least one pair of views is processed as stereo pair	<a href="#">G06T 7/285</a>
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#### Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/20](#).

In particular, in the case of motion analysis from multiple monocular views with subsequent merging or joining of analysis results, details about the respective analysis algorithm per view should be classified in the subgroups of [G06T 7/20](#) as well.

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Multi-camera	Treatment of multiple image sequences, not in a pairwise manner
Stereo	Treatment of two images, e.g. from two cameras or a single camera that is displaced, in a pairwise manner

## G06T 7/30

### Determination of transform parameters for the alignment of images, i.e. image registration

#### Definition statement

*This place covers:*

Image analysis algorithms for determining geometric transformations required to register (i.e. align) separate images. The process involves the estimation of transform parameters. Registration means determining the alignment of images or finding their relative position.

- Registration of image subparts for the construction of mosaics image
- Multi-modal, cross-modal, across-modal registration of medical image data sets
- Registration with medical atlas Registration of pre-operative and intra-operative medical image data sets
- Registration for change detection in biomedical or remote sensing images (change detection see also [G06T 7/20](#))
- Registration of models
- Registration of a model with an image
- Registration of range data, point clouds (ICP algorithm)
- 2D/2D, 2D/3D, 3D/3D registration
- Interactive registration

## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Segmentation involving deformable models	<a href="#">G06T 7/149</a>
Recognising three-dimensional objects, e.g. range data matching for pattern recognition	<a href="#">G06V 20/64</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric image transformation in the plane of the image for image registration	<a href="#">G06T 3/14</a>
Analysis of motion	<a href="#">G06T 7/20</a>
Combining images from different aspect angles, e.g. spatial compounding	<a href="#">G01S 15/8995</a>

Pattern matching criteria, e.g. proximity measures	<a href="#">G06F 18/22</a>
Image or video pattern matching	<a href="#">G06V 10/74</a>
Comparing pixel values or logical combinations thereof, e.g. template matching	<a href="#">G06V 10/751</a>

### Special rules of classification

For registration of medical image data, an Indexing Code from the range of [G06T 2207/30004-G06T 2207/30104](#)(Biomedical image processing) should be added.

For involving image mosaicing, Indexing Code [G06T 2200/32](#) should be added.

For Interactive image processing based on input by user, an Indexing Code from the range of [G06T 2207/20092-G06T 2207/20108](#) should be added.

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used with the meaning indicated:*

Recalage (French)	Registration (English)
-------------------	------------------------

## G06T 7/32

### using correlation-based methods

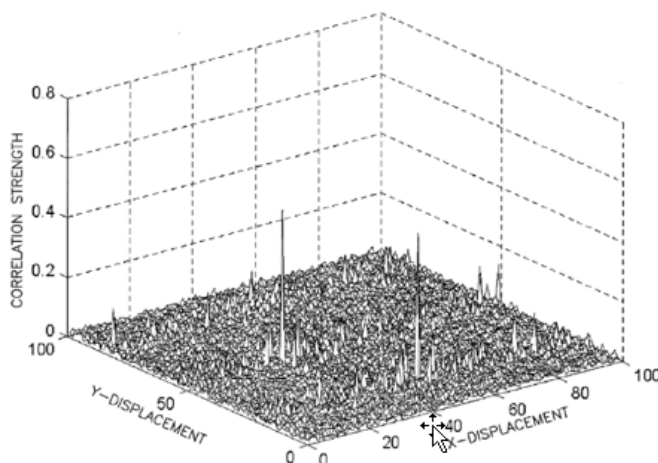
#### Definition statement

*This place covers:*

- Global correlation
- Block-matching like correlation, if not for motion analysis

Illustrative example:

1



### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Analysis of motion using block-matching	<a href="#">G06T 7/223</a>
-----------------------------------------	----------------------------

G06T 7/33

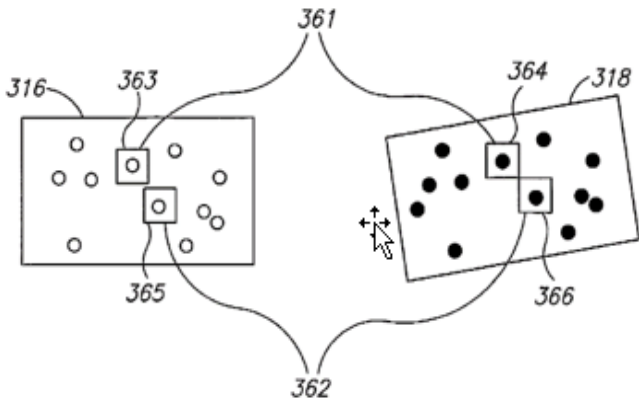
using feature-based methods

Definition statement

This place covers:

- Feature points, e.g. determined by image operators; also matching of point descriptors, feature vectors; significant segments, blobs
- Feature, landmark, marker, fiducial, edge, corner, etc.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Extraction of features or characteristics of the image, for pattern recognition	<a href="#">G06V 10/40</a>
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Feature	significant image region or pixel with certain characteristics
---------	----------------------------------------------------------------

G06T 7/337

{involving reference images or patches}

Definition statement

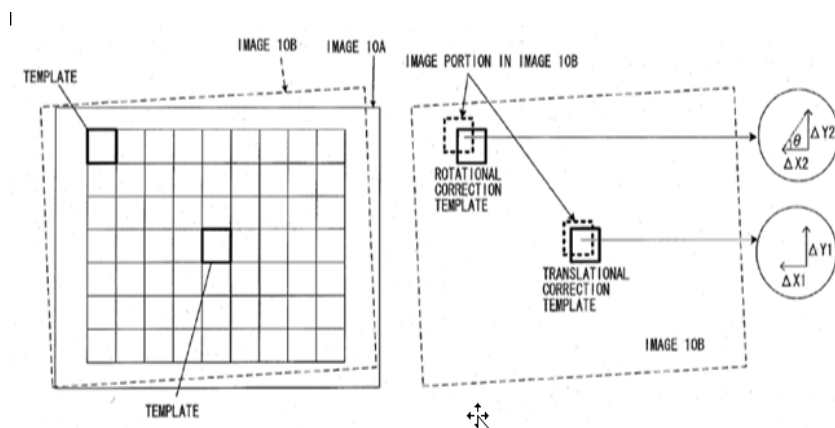
This place covers:

Involving correlation with "true to reality" image patches, templates, regions of interest; correlation used for 1) finding features in each image, or for 2) finding regions of interest from one image in the other image.



## Definition statement

Illustrative example:



## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Image registration using correlation of complete images or block-matching-like registration (where blocks are arbitrarily defined by a grid, not as a significant image region, region of interest)	<a href="#">G06T 7/32</a>
Pattern matching criteria, e.g. proximity measures	<a href="#">G06F 18/22</a>
Image or video pattern matching	<a href="#">G06V 10/74</a>

## G06T 7/344

{involving models}

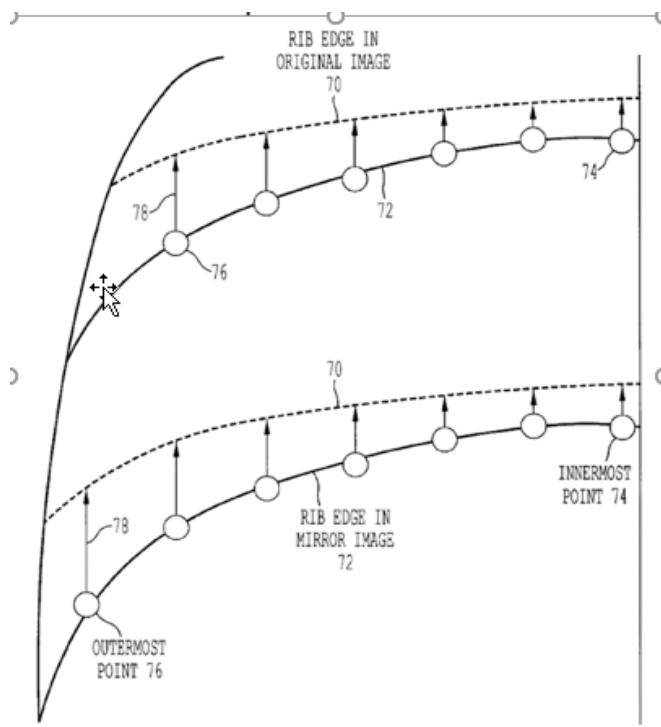
## Definition statement

This place covers:

- Involving matching of intermediary 2D or 3D models extracted from each image before registration, e.g. geometric models of all kinds, polygon models, active appearance and shape models, as opposed to reference images or patches
- Corresponding models are adapted to each image to be registered, respectively, transform parameters between the images are determined from a comparison/matching of the adapted models
- Model matching used for 1) finding features in each image, or for 2) finding structure of interest from one image in the other image

## Definition statement

Illustrative example:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Matching of contours	<a href="#">G06V 10/752</a>
Syntactic or structural pattern recognition, e.g. symbolic string recognition	<a href="#">G06V 30/1983</a>

## G06T 7/35

### using statistical methods

#### Definition statement

This place covers:

- Involving probabilistic feature points, statistical features or reference images / patches, statistical models, statistical matching
- Approaches based on mutual information
- RANSAC

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Matching configurations of points or features for pattern recognition, e.g. using RANSAC	<a href="#">G06V 10/757</a>
Image matching by comparing statistics of regions for pattern recognition	<a href="#">G06V 10/758</a>

## Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/30](#).

## G06T 7/37

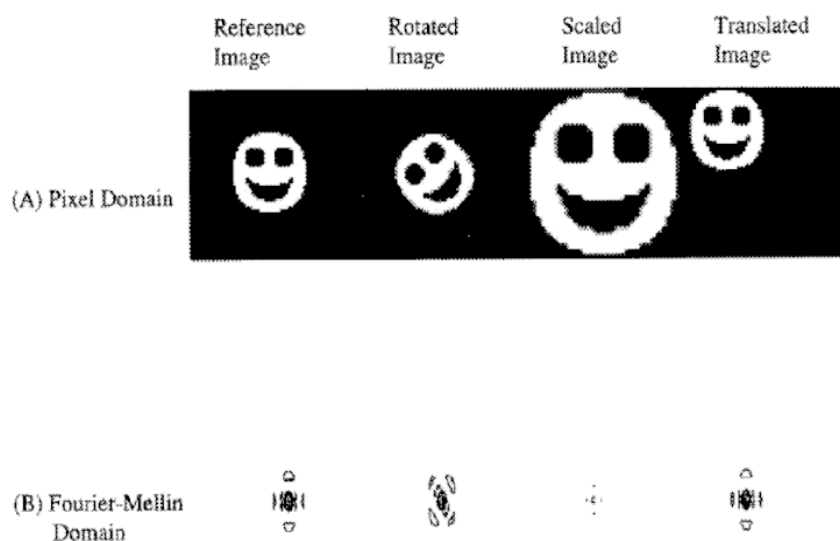
### using transform domain methods

#### Definition statement

*This place covers:*

Fourier, DCT, Wavelet, Gabor, etc.

Illustrative example:



## References

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	<a href="#">G06V 10/431</a>
Detecting partial patterns using transforms (e.g. Hough transform) for pattern recognition	<a href="#">G06V 10/48</a>
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	<a href="#">G06V 10/52</a>

## Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

## G06T 7/38

### Registration of image sequences

#### Definition statement

*This place covers:*

- Aligning one image sequence or image set to the other, i.e. finding spatially or temporally corresponding frames between one image sequence and the other (inter-sequence alignment), as opposed to spatial alignment of image frames within a single image sequence (intra-sequence alignment)
- Temporal alignment = alignment along the t-axis, e.g. alignment of two video sequences
- Spatial alignment = alignment along the z-axis, e.g. alignment of two stacks of CT slices
- Additionally, spatially aligning the temporally or spatially corresponding frames in the x-y-plane (intra-sequence alignment) is possible
- Source sequences can be of any orientation

Illustrative examples:

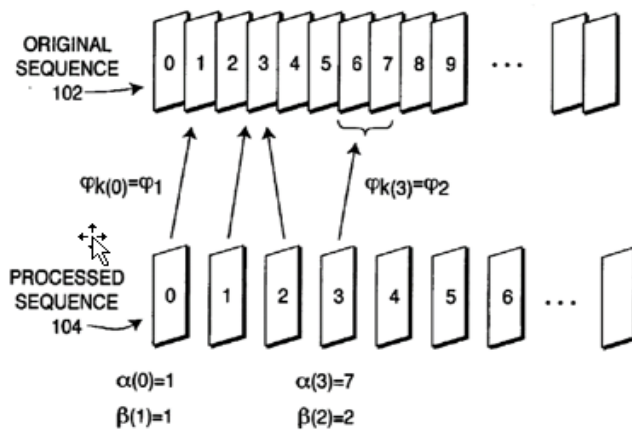


Figure 1. Spatial alignment

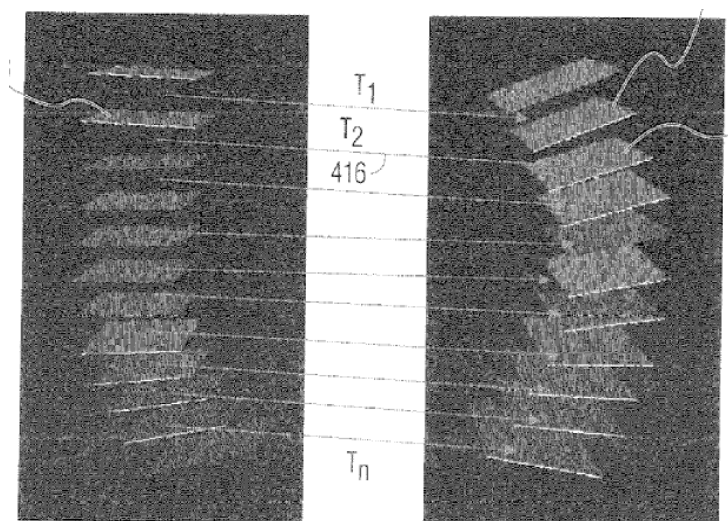


Figure 2.

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Matching video sequences for pattern recognition	<a href="#">G06V 20/48</a>
Document matching for pattern recognition	<a href="#">G06V 30/418</a>

## Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/30](#).

## G06T 7/40

Analysis of texture (depth or shape recovery from texture [G06T 7/529](#))

### Definition statement

*This place covers:*

Analysis of the spatial arrangement of image colour or intensity characteristics representative of a perceived image texture.

## References

### Limiting references

*This place does not cover:*

Depth or shape recovery from texture	<a href="#">G06T 7/529</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation; Edge detection	<a href="#">G06T 7/10</a>
Depth or shape recovery from shading	<a href="#">G06T 7/507</a>
Filling a planar surface by adding texture in 2D image generation	<a href="#">G06T 11/40</a>
Texture mapping in 3D image rendering	<a href="#">G06T 15/04</a>

## G06T 7/41

based on statistical description of texture

### Definition statement

*This place covers:*

Analysis of texture using:

- First-order statistics
- Global histogram-based measures: mean, variance, skewness, kurtosis, energy, entropy
- Autocorrelation
- Run-length based algorithms

## G06T 7/42

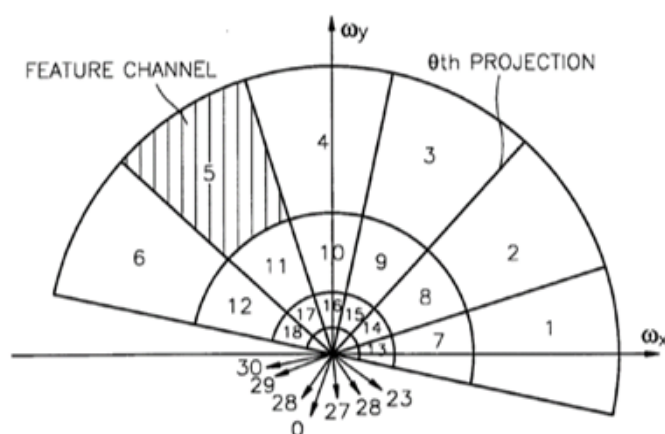
using transform domain methods

### Definition statement

*This place covers:*

Fourier, DCT, Wavelet, Gabor, etc.

Illustrative example:



Texture-based image retrieval method using a Gabor filter in the frequency domain, wherein the frequency domain representation is divided according to a predetermined layout for extracting texture descriptors of respective feature channels.

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	<a href="#">G06V 10/431</a>
Detecting partial patterns using transforms (e.g. Hough transform), for pattern recognition	<a href="#">G06V 10/48</a>
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	<a href="#">G06V 10/52</a>

### Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

## G06T 7/44

using image operators, e.g. filters, edge density metrics or local histograms

### Definition statement

*This place covers:*

- Laws texture energy measure

## Definition statement

- Texture analysis using edge operators
- Texture analysis using difference of Gaussians
- Texture analysis using local linear transforms
- Local Binary Pattern [LBP]
- Grey level difference method
- Local rank order correlation

**G06T 7/45****using co-occurrence matrix computation****Definition statement**

*This place covers:*

- Second-order statistics
- Generalised co-occurrence matrix

**G06T 7/46****using random fields****Definition statement**

*This place covers:*

- Markov Random Fields, Gaussian Random Fields, Gibbs Random Fields
- Autoregressive Model

**G06T 7/48****using fractals****Definition statement**

*This place covers:*

- fractal texture analysis methods
- fractal dimension
- box counting methods

**G06T 7/49****based on structural texture description, e.g. using primitives or placement rules****Definition statement**

*This place covers:*

- Shape chain grammars, graph grammars
- Grouping of primitives in hierarchical textures

## Definition statement

Illustrative example:

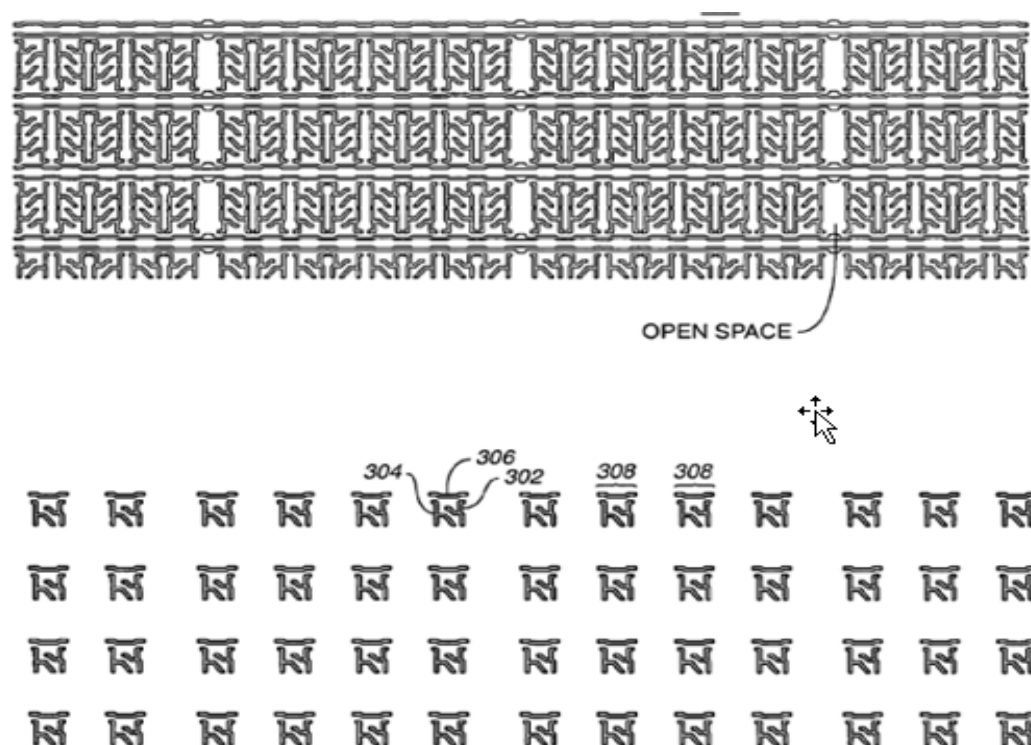


Figure 1 (top) and 2 (bottom). Method for finding periodic structures in a layer of an integrated circuit that have identical optical properties. Fig. 2 illustrates a geometric hierarchy of the periodic elements in the cell layer of Fig. 1.

## G06T 7/50

### Depth or shape recovery

#### Definition statement

*This place covers:*

- Image analysis algorithms for determining scene depth parameters from image characteristics.
- Shape from X
- Depth map determination
- Disparity calculation for shape recovery

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Picture taking arrangements specially adapted for photogrammetry or photographic surveying	<a href="#">G01C 11/02</a>
LIDAR systems for mapping or imaging	<a href="#">G01S 17/89</a>



**G06T 7/507**

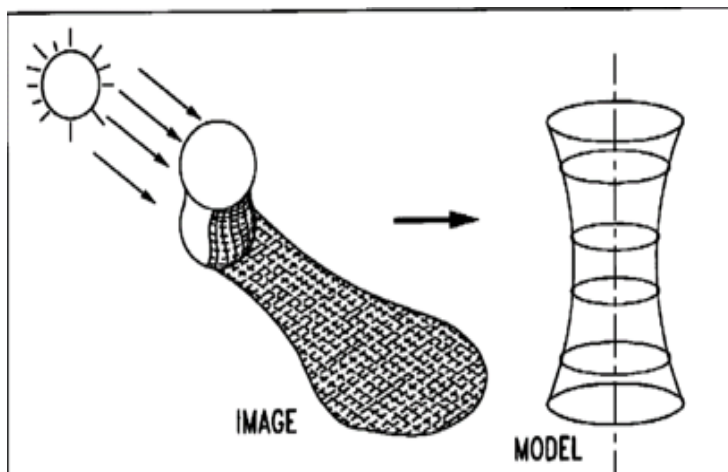
from shading ([G06T 7/586](#) takes precedence)

**Definition statement**

*This place covers:*

Shape from shading or shadows

Illustrative example:

**References****Limiting references**

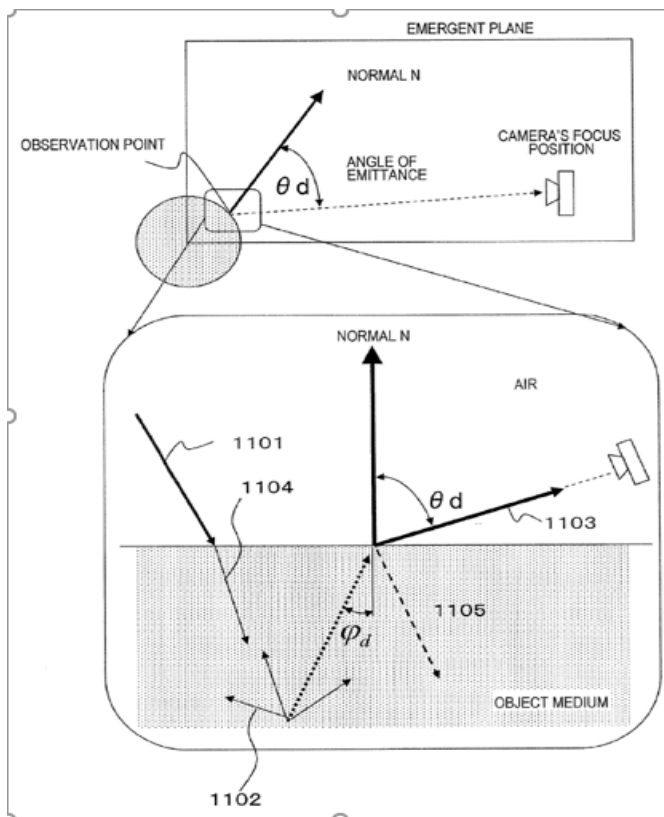
*This place does not cover:*

Depth or shape recovery from multiple light sources, e.g. photometric stereo
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<a href="#">G06T 7/586</a>
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**G06T 7/514****from specularities****Definition statement***This place covers:*

Illustrative example:



**G06T 7/521**

from laser ranging, e.g. using interferometry; from the projection of structured light

**Definition statement**

*This place covers:*

Illustrative example:

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Image acquisition and arrangements for measuring contours or curvatures of an object by projecting a pattern thereupon	<a href="#">G01B 11/25</a>
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**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

Structured	characterises the illumination
------------	--------------------------------

**G06T 7/529**

from texture

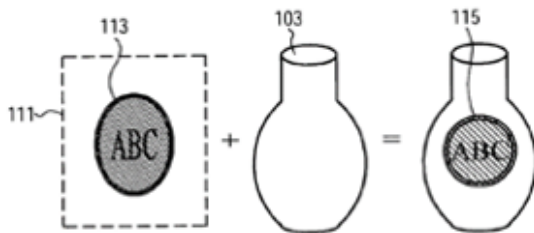
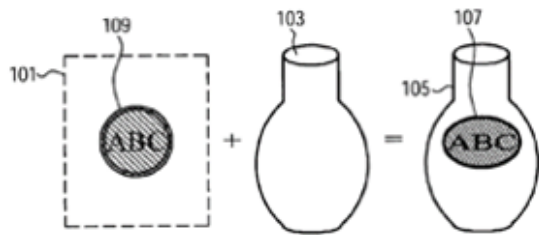
**Definition statement**

*This place covers:*

- shape from texture
- shape from blur in a single image

Definition statement

Illustrative example:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Depth or shape recovery from focus	<a href="#">G06T 7/571</a>
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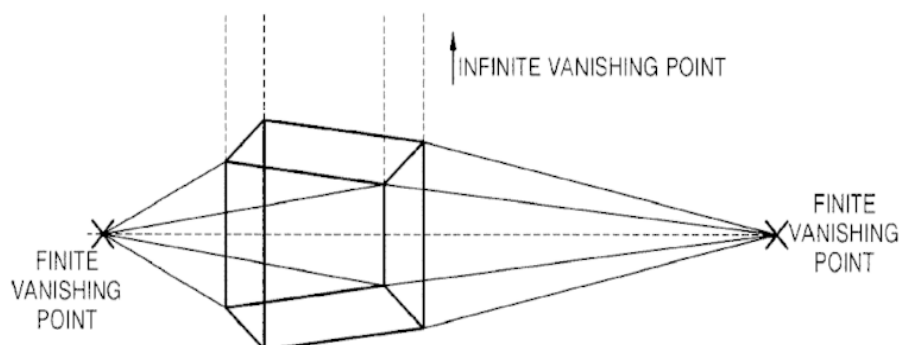
## G06T 7/536

from perspective effects, e.g. by using vanishing points

### Definition statement

This place covers:

Illustrative example:



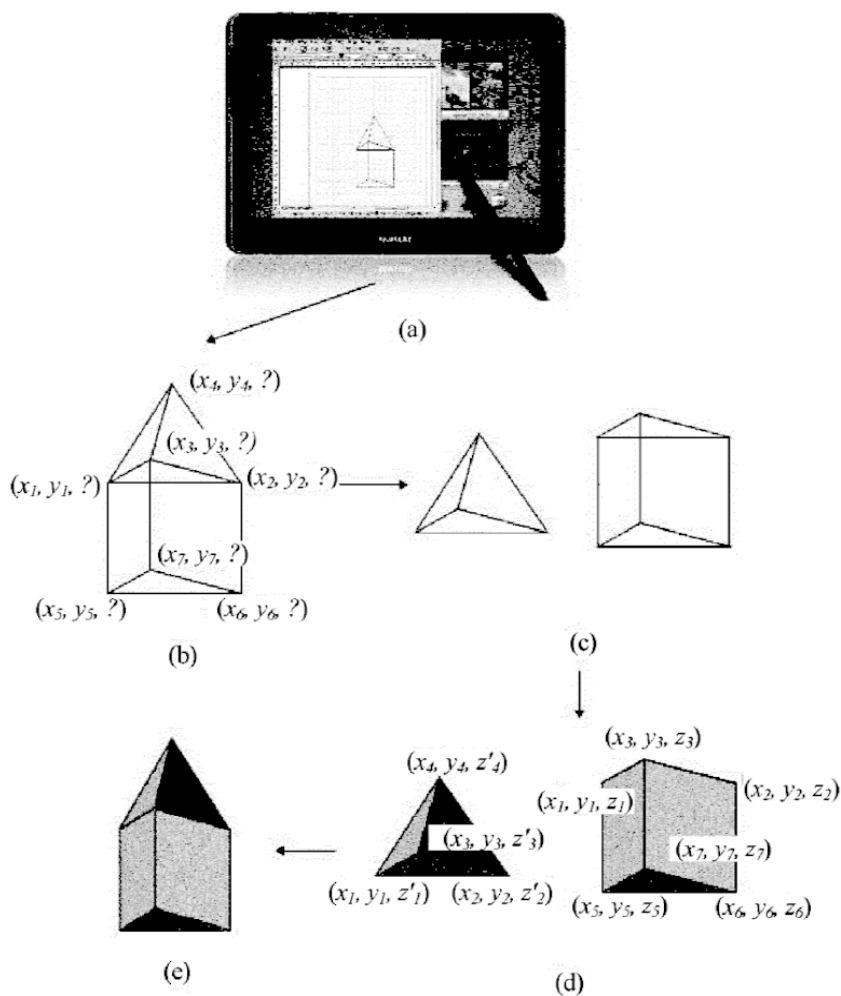
**G06T 7/543**

from line drawings

**Definition statement***This place covers:*

- shape from line drawings
- shape from contours in a single image

Illustrative example:

**G06T 7/55**

from multiple images

**References****Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Volumetric display with depth sampling, i.e. the volume being constructed from a stack or sequence of 2D image planes

[H04N 13/388](#)

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Determining parameters from multiple pictures, e.g. disparity calculation as such	<a href="#">G06T 7/97</a>
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**Special rules of classification**

For documents concerning trilinear computations, trifocal tensor: add the Indexing Code [G06T 2207/20088](#): Trinocular vision calculations; trifocal tensor.

**G06T 7/557**

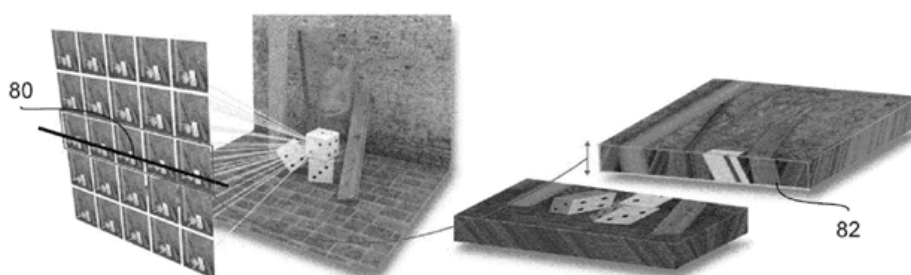
from light fields, e.g. from plenoptic cameras

**Definition statement**

*This place covers:*

Depth reconstruction using, or based on, light field representations, i.e. 5D plenoptic function, 4D light field, lumigraph, ray space; such light field representations may originate, e.g. from plenoptic cameras, light field cameras, cameras with a lenslet array or integral imaging.

Illustrative example:

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Depth using trinocular vision calculations/trifocal tensor	<a href="#">G06T 7/55</a> , <a href="#">G06T 2207/20088</a>
Depth from focus	<a href="#">G06T 7/571</a>
Depth from motion	<a href="#">G06T 7/579</a>
Depth from multiple light sources	<a href="#">G06T 7/586</a>
Depth from stereo images	<a href="#">G06T 7/593</a>

**G06T 7/564**

from contours

**Definition statement**

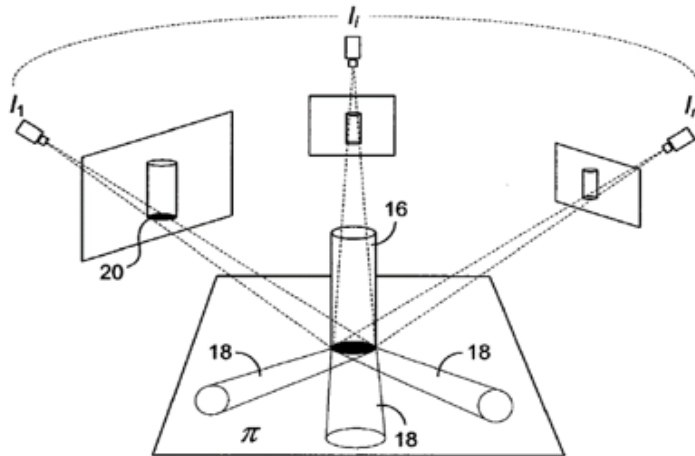
*This place covers:*

- Shape from contours

## Definition statement

- Shape from silhouettes
- Shape from visual hulls

Illustrative example:



## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Depth or shape recovery from line drawings, e.g. shape from contours involving one image only	<a href="#">G06T 7/543</a>
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## G06T 7/571

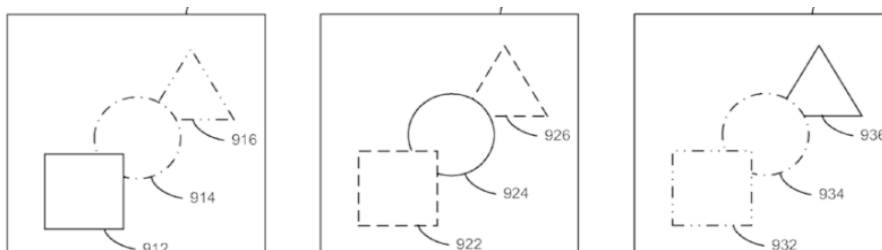
## from focus

## Definition statement

This place covers:

- Shape from focus
- Shape from defocus of multiple images

Illustrative example:



## Definition statement

Figure 1

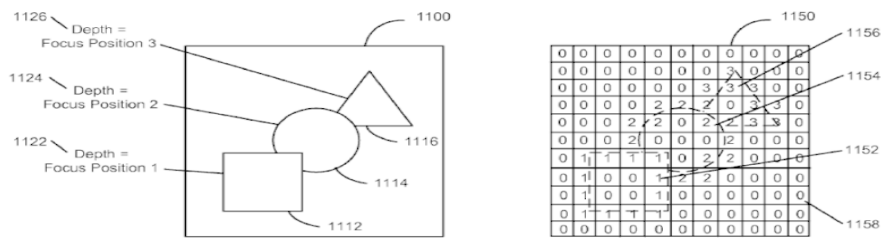


Figure 2

Figure 1 and 2. Input image sequence and resulting depth map

## References

## Informative references

Attention is drawn to the following places, which may be of interest for search:

Shape from texture, e.g. shape from blur in a single image	<a href="#">G06T 7/529</a>
Systems for automatic generation of focusing signals	<a href="#">G02B 7/28</a>
Focusing aids for cameras; Autofocus systems for cameras	<a href="#">G03B 13/00</a>

## G06T 7/579

## from motion

## Definition statement

This place covers:

- Shape from motion, structure from motion
- Extracting the shape of a scene from the spatial and temporal changes occurring in an image sequence (camera or scene moves)
- Simultaneous Localisation and Mapping [SLAM]

Illustrative examples:



Figure 1

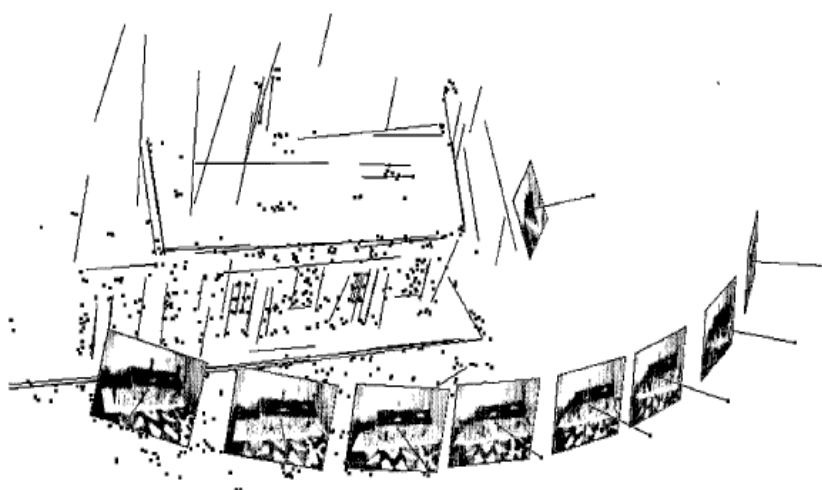
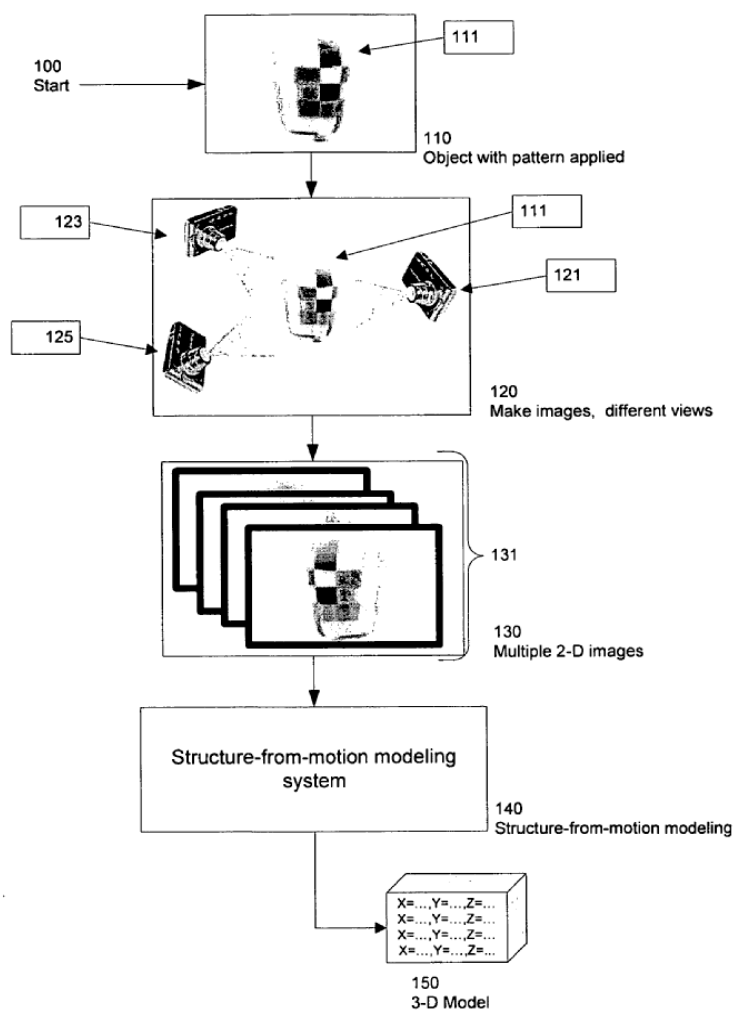


Figure 2. Shape from motion reconstruction

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining position or orientation of objects or cameras	<a href="#">G06T 7/70</a>
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## Special rules of classification

For Camera pose, Indexing Code [G06T 2207/30244](#) should be added.

## G06T 7/586

from multiple light sources, e.g. photometric stereo

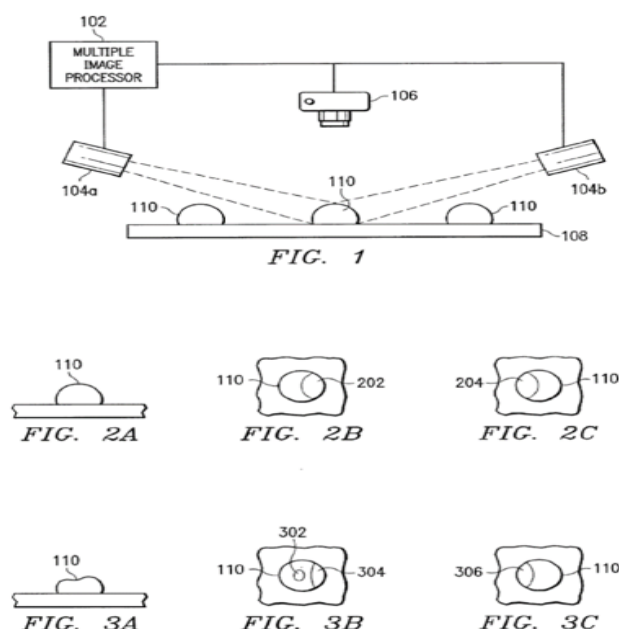
### Definition statement

This place covers:

Algorithms for the determination of scene depth parameters from multiple images for which more than one source of illumination has been used. Typically, different illumination sources are used when capturing each of the multiple images to produce different images of the same scene under the different lighting conditions. The different images are used to determine depth and shape parameters in the scene.

- Different illumination intensities, e.g. ambient and flash
- Different directions of illumination

Illustrative example:



## Glossary of terms

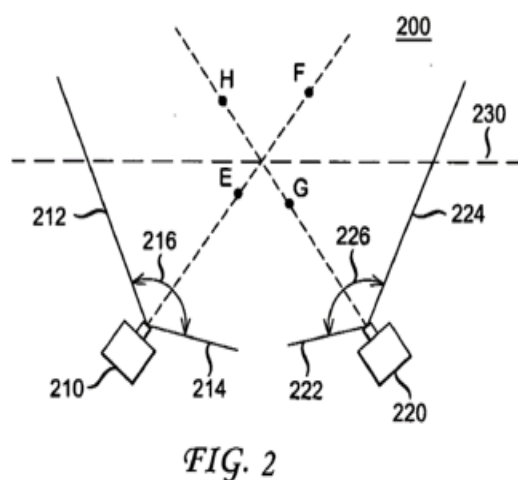
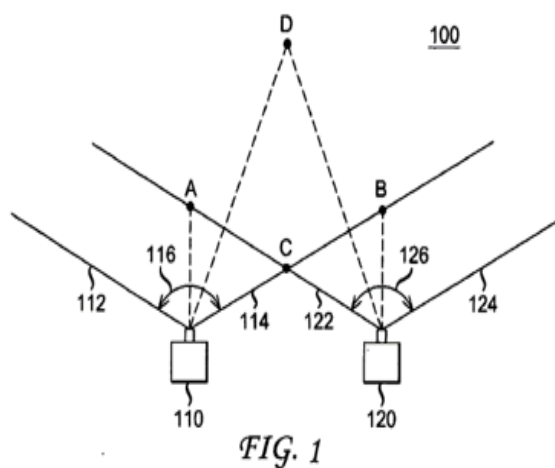
In this place, the following terms or expressions are used with the meaning indicated:

Photometric stereo	a technique for estimating the normal vectors at different points on an object's surface by observing the object under different lighting conditions.
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**G06T 7/593****from stereo images****Definition statement***This place covers:*

Shape from stereo images or sequences of stereo images

Illustrative example:

**References****Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Stereoscopic or multiview image generation wherein the generated image signals comprise depth maps or disparity maps	<a href="#">H04N 13/271</a>
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**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Depth or shape recovery from multiple images using trilinear computations / the trifocal tensor	<a href="#">G06T 7/55</a> and <a href="#">G06T 2207/20088</a>
Depth or shape recovery from multiple images using the quadrifocal tensor	<a href="#">G06T 7/55</a>

**G06T 7/596**

{from three or more stereo images}

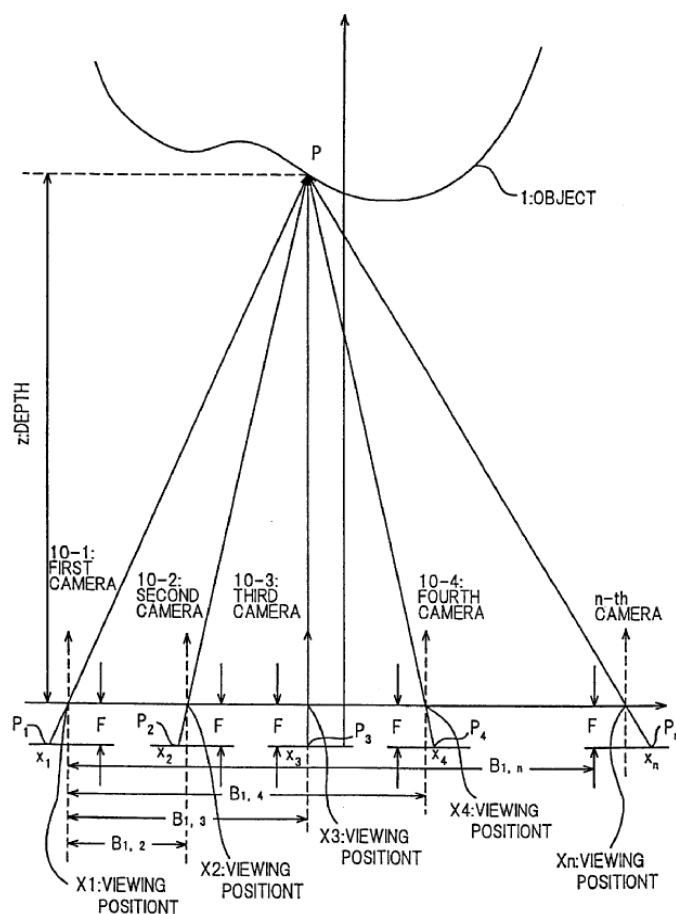
**Definition statement**

This place covers:

Multi-baseline stereo (special case only where

- each view is always treated together with the same reference view and
- the lengths of the respective baselines differ from each other)

Illustrative example:



**G06T 7/60****Analysis of geometric attributes****Definition statement**

*This place covers:*

- Analysis of image subjects to determine geometric attributes thereof, e.g. area, centre of mass, perimeter, diameter or volume.
- Ellipse detection

**References****Application-oriented references**

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Extraction of image features for pattern recognition by deriving geometrical properties of the whole image	<a href="#">G06V 10/42</a>
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**Informative references**

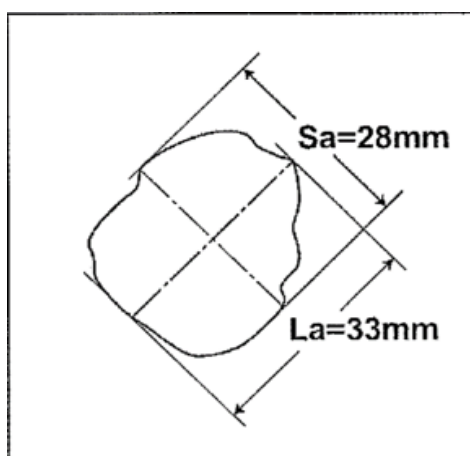
*Attention is drawn to the following places, which may be of interest for search:*

Measuring characterised arrangements by the use of optical means	<a href="#">G01B 11/00</a>
------------------------------------------------------------------	----------------------------

**G06T 7/62****of area, perimeter, diameter or volume****Definition statement**

*This place covers:*

Illustrative example:



**G06T 7/64**  
**of convexity or concavity**

**Definition statement**

*This place covers:*  
Convexity, concavity, curvature, circularity, sphericity, roundness  
*Illustrative examples:*

Figure 1

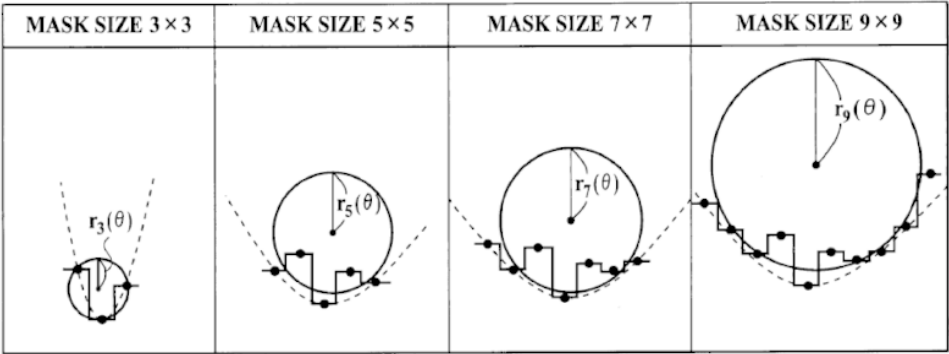
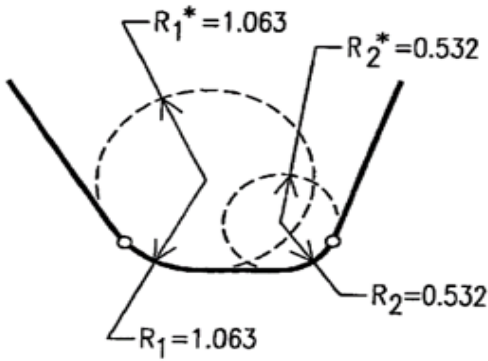


Figure 2



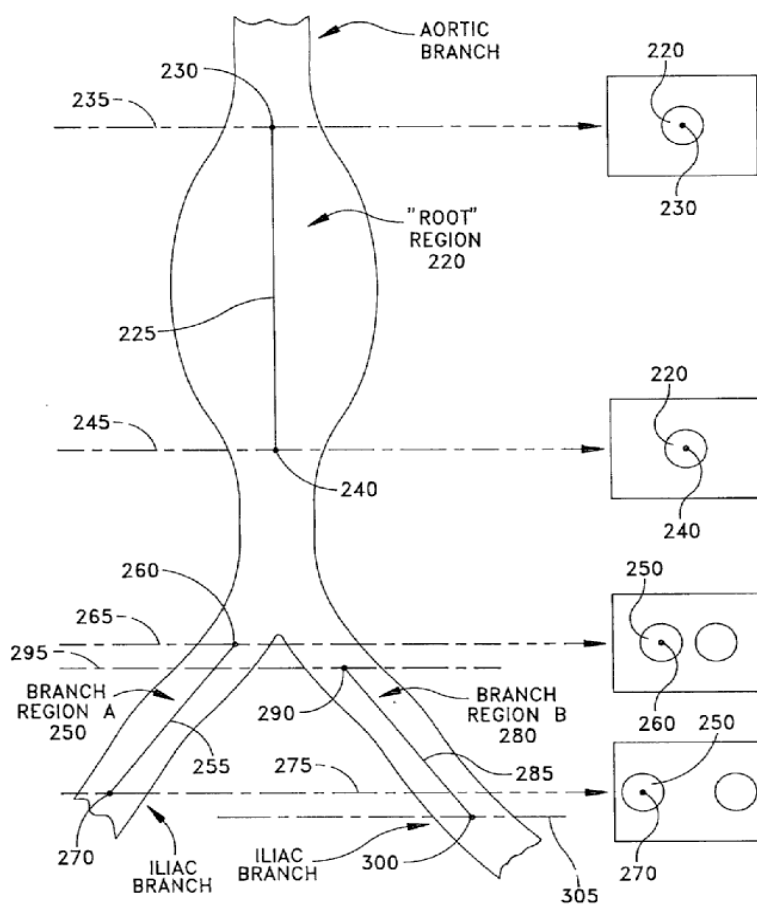
**G06T 7/66**  
**of image moments or centre of gravity**

**Definition statement**

*This place covers:*  
Following centers of gravity of sections along elongated or tubular structure

## Definition statement

Illustrative example:



## References

## Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Computation of moments, for pattern recognition
-------------------------------------------------

<a href="#">G06V 10/435</a>
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## G06T 7/68

## of symmetry

## Definition statement

This place covers:

- Determination of lines of symmetry, midlines
- Measurement of symmetry and asymmetry

Illustrative example:



## G06T 7/70

**Determining position or orientation of objects or cameras (camera calibration [G06T 7/80](#))**

### Definition statement

*This place covers:*

- Image processing algorithms for determining the position or orientation of an image subject, or of the camera having acquired the image
- Position or orientation of the camera
- Estimation of position, pose, posture, attitude in 2D and 3D
- Gaze direction, head pose
- Bin picking

### References

#### Limiting references

*This place does not cover:*

Camera calibration	<a href="#">G06T 7/80</a>
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#### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Orientation detection before recognition	<a href="#">G06V 10/242</a>
Acquiring or recognising human faces, facial parts, facial sketches, facial expressions, eyes	<a href="#">G06V 40/16</a> , <a href="#">G06V 40/18</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Image feed-back for automatic industrial control	<a href="#">G06T 1/0014</a>
Analysis of motion	<a href="#">G06T 7/20</a>



Measuring position in terms of linear or angular dimensions	<a href="#">G01B</a>
Locating or presence-detecting by the use of the reflection or reradiation of radio or other waves	<a href="#">G01S</a>
Pattern matching criteria, e.g. proximity measures	<a href="#">G06F 18/22</a>
Image or video pattern matching	<a href="#">G06V 10/74</a>
Studio circuitry, e.g. for position determination of a camera in a television studio	<a href="#">H04N 5/222</a>
Aligning or positioning of tools relative to the circuit board for manufacturing printed circuits	<a href="#">H05K 3/0008</a>
Mask, wafer positioning, alignment	<a href="#">H10P 72/53</a>

### Special rules of classification

For camera pose, Indexing Code [G06T 2207/30244](#) should be added. For workpiece; machine component, Indexing Code [G06T 2207/30164](#) should be added.

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "Repérage" (in French documents), "location", and "locating"

## G06T 7/73

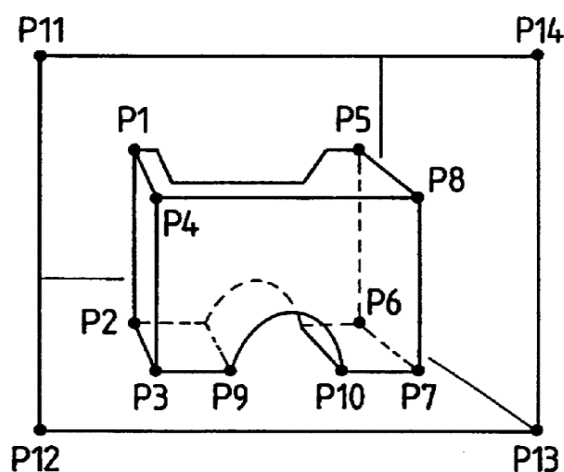
### using feature-based methods

#### Definition statement

*This place covers:*

- Feature points, e.g. determined by image operators; also point descriptors, feature vectors; significant segments, blobs
- Feature, landmark, marker, fiducial, edge, corner, etc.

Illustrative example:



## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Feature	significant image region or pixel with certain characteristics.
---------	-----------------------------------------------------------------

## G06T 7/74

{involving reference images or patches}

### Definition statement

*This place covers:*

Involving correlation with "true to reality" reference images, templates of various poses; for "directly" determining pose; correlation with "true to reality" templates of landmarks, markers, fiducials; for finding features in the image.

Illustrative examples:

Figure 1

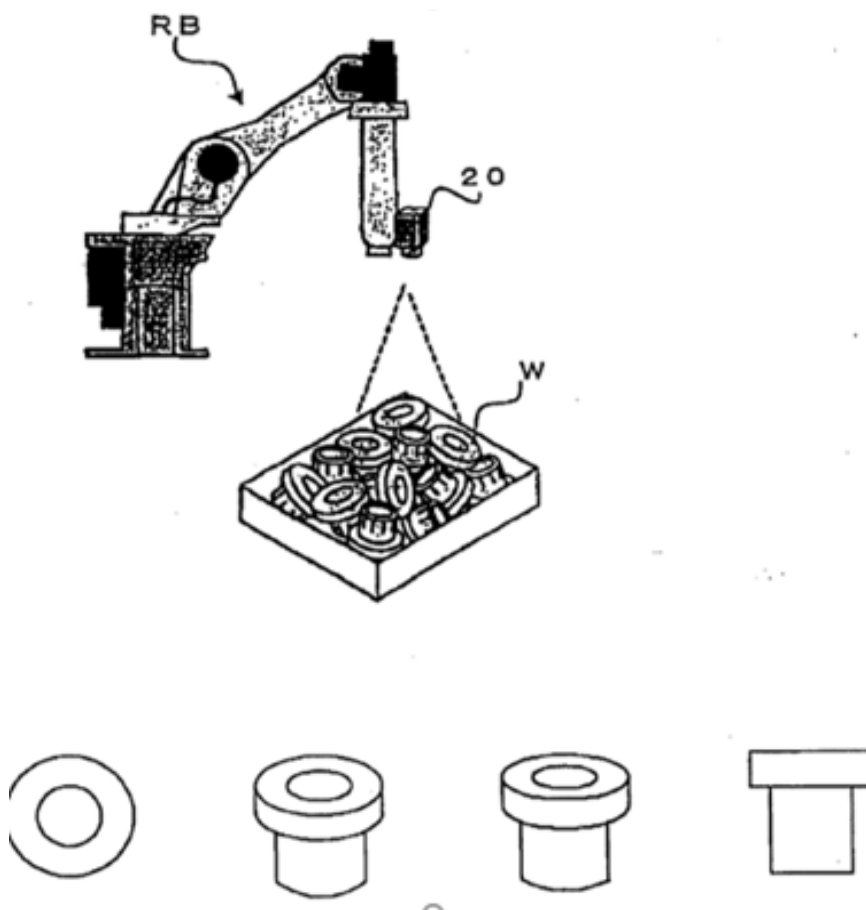
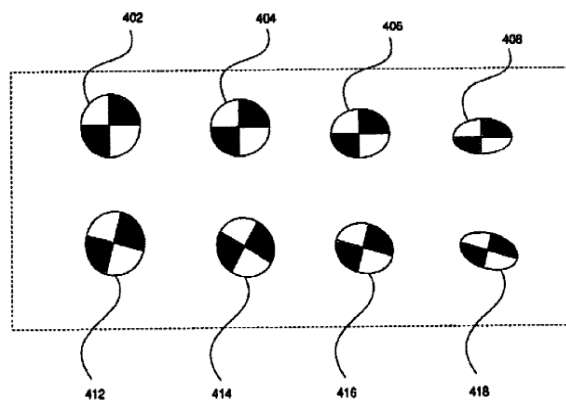


Figure 2



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Pattern matching criteria, e.g. proximity measures	<a href="#">G06F 18/22</a>
Image or video pattern matching	<a href="#">G06V 10/74</a>

## G06T 7/75

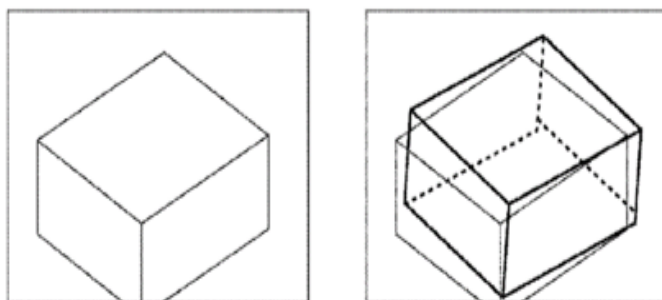
### {involving models}

### Definition statement

This place covers:

- Involving matching to a 2D or 3D model, e.g. geometric models of all kinds, polygon models, active appearance and shape models, also abstract models of landmarks, markers, fiducials with spatial extent, as opposed to reference images or patches
- Matching of a graphical, e.g. polygon model, may involve intermediate rendering of the model
- Model matching used for 1) finding features in each image, or for 2) "directly" determining pose of structure of interest

Illustrative example:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation involving deformable models	<a href="#">G06T 7/149</a>
Analysis of motion involving models	<a href="#">G06T 7/251</a>
Matching of contours	<a href="#">G06V 10/752</a>
Syntactic or structural pattern recognition, e.g. symbolic string recognition	<a href="#">G06V 30/1983</a>

## G06T 7/77

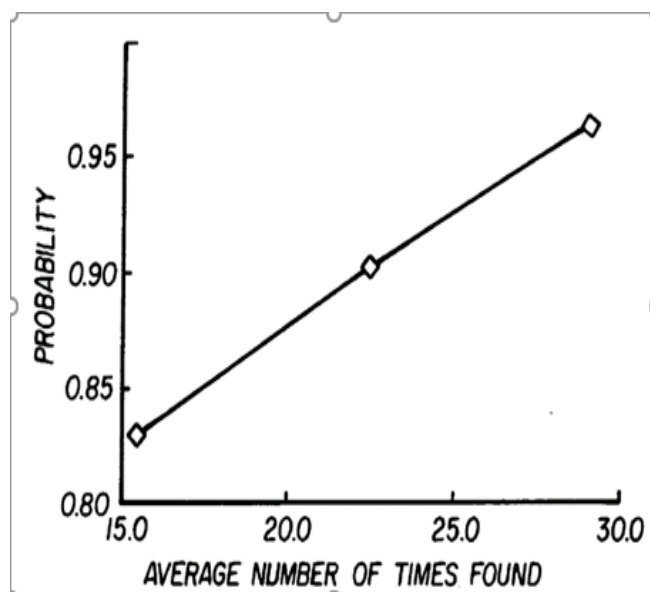
### using statistical methods

#### Definition statement

This place covers:

- Involving probabilistic feature points, statistical models, statistics of positions
- Features, reference images, patches or method itself can be statistical
- RANSAC

Illustrative example:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation or edge detection involving probabilistic approaches	<a href="#">G06T 7/143</a>
Analysis of motion involving a stochastic approach	<a href="#">G06T 7/277</a>
Image matching by comparing statistics of regions for pattern recognition	<a href="#">G06V 10/758</a>

## Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/70](#).

## G06T 7/80

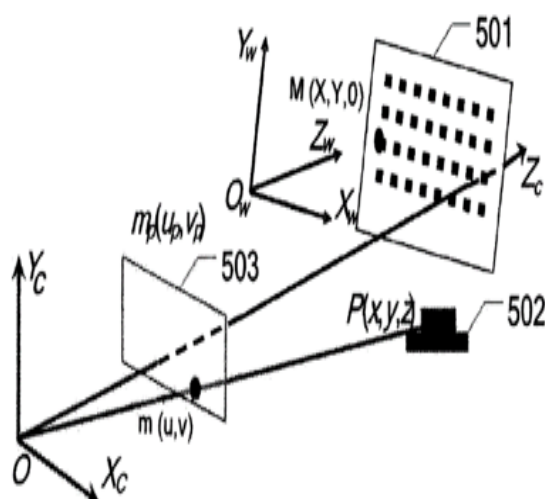
### Analysis of captured images to determine intrinsic or extrinsic camera parameters, i.e. camera calibration

#### Definition statement

*This place covers:*

The use of methods/algorithms to analyse camera images for the determination of intrinsic parameters defining the camera's properties, or for the determination of extrinsic parameters defining the camera's position and orientation. Camera calibration enables pixel positions in a captured 2D image to be mapped to real-world 3D coordinates of the subject represented in the image.

Illustrative example:



## References

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric correction, e.g. of lens distortion	<a href="#">G06T 5/80</a>
Determining position or orientation of objects, e.g. of the camera, without calibration context	<a href="#">G06T 7/70</a> , <a href="#">G06T 2207/30244</a>
Calibration patterns	<a href="#">G01B 21/042</a> , <a href="#">G01C 15/02</a>
Systems for automatic generation of focusing signals	<a href="#">G02B 7/28</a>
Focusing aids for cameras; Autofocus systems for cameras	<a href="#">G03B 13/00</a>
Colour balance, e.g. colour cast correction	<a href="#">H04N 1/6077</a>
Calibration of stereoscopic cameras	<a href="#">H04N 13/246</a>
Picture signal generators using solid state devices, e.g. correction of chromatic aberrations	<a href="#">H04N 23/10</a>

Suppressing or minimising disturbance in picture signal generation	<a href="#">H04N 23/81</a>
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## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Intrinsic parameters	The geometric and optical characteristics of a camera, including effective focal length, a scale factor and the image centre or "principal point".
Extrinsic parameters	The three-dimensional position and orientation of the camera in real-world coordinates.

## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "Camera calibration", "Geometric camera calibration", and "Camera re-sectioning".

## G06T 7/85

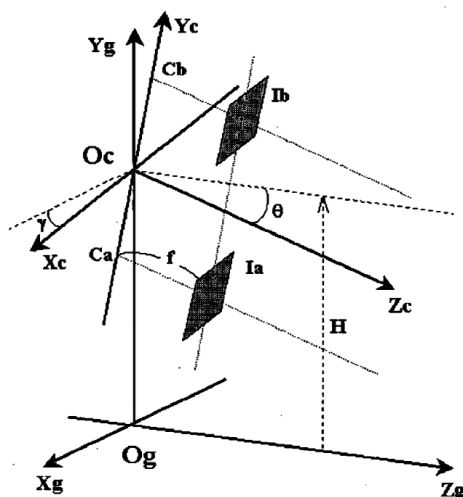
### {Stereo camera calibration}

#### Definition statement

*This place covers:*

Camera calibration for stereoscopic cameras, e.g. for determining the transformation between left camera coordinate system and right camera coordinate system

Illustrative example:



## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Calibration aspects relating to the control of a stereoscopic camera	<a href="#">H04N 13/246</a>
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## G06T 7/90

### Determination of colour characteristics

#### Definition statement

*This place covers:*

- Determining colour characteristics by image analysis
- Redeye detection

#### References

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Colour image segmentation	<a href="#">G06T 7/10</a>
Acquiring or recognising eyes, e.g. iris verification	<a href="#">G06V 40/18</a>
Retouching, i.e. modification of isolated colours only or in isolated picture areas only	<a href="#">H04N 1/62</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Correcting redeye defects by retouching or inpainting	<a href="#">G06T 5/77</a>
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#### Special rules of classification

For redeye defect, Indexing Code [G06T 2207/30216](#) should be added.

## G06T 7/97

**{Determining parameters from multiple pictures (depth or shape recovery from multiple images [G06T 7/55](#); stereo camera calibration [G06T 7/85](#))}**

#### Definition statement

*This place covers:*

- Disparity, correspondence, stereopsis, if not provided for elsewhere
- Disparity calculation for the production of 3D images from 2D images without intermediate modelling

#### References

##### Limiting references

*This place does not cover:*

Depth or shape recovery from multiple images	<a href="#">G06T 7/55</a>
Stereo camera calibration	<a href="#">G06T 7/85</a>

**Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Industrial image inspection using an image reference approach	<a href="#">G06T 7/001</a>
Biomedical image inspection using an image reference approach	<a href="#">G06T 7/0014</a>
Segmentation involving the use of two or more images	<a href="#">G06T 7/174</a>
Computing motion using a sequence of stereo image pairs	<a href="#">G06T 7/285</a>
Determination of transform parameters for the alignment of images, i.e. image registration	<a href="#">G06T 7/30</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Image-based rendering	<a href="#">G06T 15/205</a>
3D from 2D images with intermediate modelling	<a href="#">G06T 17/20</a>

**Special rules of classification**

For Disparity calculation for image-based rendering, Indexing Code [G06T 2207/20228](#) should be added.

**G06T 9/00**

**Image coding (bandwidth or redundancy reduction for static pictures [H04N 1/41](#); coding or decoding of static colour picture signals [H04N 1/64](#); methods or arrangements for coding, decoding, compressing or decompressing digital video signals [H04N 19/00](#))**

**Definition statement**

*This place covers:*

Coding/compression and decoding/decompression of computer graphics(CG) data and computer graphics compression methods applied on natural image/video.

Apparatus/devices of coding/compressing and/or decoding/decompressing of computer graphics data.

Computer graphics data mentioned including:

- object geometry models
- scene models
- 2D/3D vector graphics
- 3D/4D volumetric models
- CAD models
- contour shape data
- elevation data
- CG related metadata/parameters including depth, colour, texture, motion vectors, scene graph, position, connectivity information and similar.



## Relationships with other classification places

This group covers compression/coding/decompression/decoding of CG related data and CG related methods applied on natural image or video. Other compression techniques specific to the natural image/video without using CG related methods are covered by [H04N 19/00](#).

Compression in general is covered by [H03M 1/00](#).

## References

### Limiting references

*This place does not cover:*

Bandwidth or redundancy reduction for static pictures	<a href="#">H04N 1/41</a>
Coding or decoding of static colour picture signals	<a href="#">H04N 1/64</a>
Methods or arrangements for coding, decoding, compressing or decompressing digital video signals	<a href="#">H04N 19/00</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Animation	<a href="#">G06T 13/00</a>
Model based coding	<a href="#">G06T 15/00</a> , <a href="#">G06T 17/00</a>
Model based coding using a 3D model	<a href="#">G06T 15/00</a> , <a href="#">G06T 17/00</a>
Rendering of computer graphics data	<a href="#">G06T 15/00</a>
Modeling of computer graphics data	<a href="#">G06T 17/00</a>
Re-meshing for manipulation, editing purpose	<a href="#">G06T 17/205</a>
Manipulation 3D objects	<a href="#">G06T 19/00</a>
Pattern recognition	<a href="#">G06F 18/00</a>
Computer aided design	<a href="#">G06F 30/00</a>
Image or video recognition or understanding	<a href="#">G06V</a>
Pattern recognition by contour coding	<a href="#">G06V 10/46</a>
Coding or decoding, in general	<a href="#">H03M</a>
Compression in general	<a href="#">H03M 1/00</a>
Transmission of TV signals	<a href="#">H04N 7/24</a>
Selective content distribution	<a href="#">H04N 21/00</a>

## Special rules of classification

In general, consult the g rant before using any sub-groups. This is a provisional document which will be replaced in January , 2012, after completing reorganization in [G06T 9/00](#).

- for classification, the main group [G06T 9/00](#) is assigned always before completing the reorganization.
- The Indexing Code series of symbols is reserved for the use of documents classified in [G06T 9/00](#) and subgroups. They should be allocated to documents in [G06T 9/00](#) and subgroups whenever relevant.
- the sub-groups [G06T 9/004](#), [G06T 9/005](#), [G06T 9/005](#), [G06T 9/008](#) are not used anymore, the content, which is not related with computer graphics data compression/coding, will be transferred to the corresponding classes defined in the group definition statements below.

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

4D volumetric models	Sequences of volumetric images over time
MPEG	Moving Picture Experts Group
SNHC	Synthetic/Natural Hybrid Coding
BIFS	Binary Format for Scene
VRML	Virtual Reality Modeling Language
SVG	Scalable Vector Graphics
NN	Neural Networks
TV	Television

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

CG	Computer graphics
3D	Three dimensional
4D	Four dimensional
CAD	Computer aided design

*In patent documents, the following words/expressions are often used as synonyms:*

- "Compression" and "Coding"
- "Decompression" and "Decoding"
- "Scene graph" and "Scene model"
- "Scene description graph" and "Scene graph"
- "Metadata" and "Parameter"
- "Contour coding" and "Shape coding"
- "Elevation data" and "Height data"
- "Object geometry models" and "Object models"
- "Natural image" and "Raster/Bitmap image"
- "Vector graphics" and "Scalable Vector Graphics"

## G06T 9/001

### {Model-based coding, e.g. wire frame}

#### Definition statement

*This place covers:*

Means or steps for the compression/coding of wire frame models, e.g. polygon meshes.

Documents concerning mesh compression/coding by

- face merging
- incremental decimation
- simplification by remeshing for data reduction purpose are classified here.

## References

### Limiting references

*This place does not cover:*

Animation	<a href="#">G06T 13/00</a>
Rendering of computer graphics data	<a href="#">G06T 15/00</a>
Re-meshing for manipulation, editing	<a href="#">G06T 17/205</a>
Manipulation 3D objects	<a href="#">G06T 19/00</a>

### Special rules of classification

Documents classified in [G06T 9/001](#), [H04N 19/20](#) and [G06T 9/001](#), [G06T 15/00](#), [G06T 17/00](#), [H04N 19/20](#) are transferred to [G06T 9/001](#).

Documents concerning re-meshing for manipulation, editing and similar, i.e. all means not having data reduction purpose are classified in [G06T 17/205](#).

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "wireframe" and "polygon mesh"

## G06T 9/002

### {using neural networks}

#### Definition statement

*This place covers:*

Means or steps for the compression/coding of computer graphics data and natural image/video data using neural networks (NN).

### Special rules of classification

The compression/coding data concerning in this group includes:

- computer graphics data
- natural image/video data.

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

NN	Neural Networks
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## G06T 9/004

### {Predictors, e.g. intraframe, interframe coding}

#### Definition statement

*This place covers:*

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, are transferred to [H04N 19/105](#), [H04N 19/103](#) or [H04N 19/107](#).

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Coding or prediction mode selection	<a href="#">H04N 19/103</a>
Predictor	<a href="#">H04N 19/105</a>
Intracode mode selection	<a href="#">H04N 19/107</a>

## G06T 9/005

{Statistical coding, e.g. Huffman, run length coding}

### Definition statement

This place covers:

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, will be transferred to [H04N 19/13](#), [H04N 19/91](#).

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Variable length coding (VLC) or entropy coding	<a href="#">H04N 19/13</a> , <a href="#">H04N 19/91</a>
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## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

VLC	Variable length coding
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## G06T 9/007

{Transform coding, e.g. discrete cosine transform}

### Definition statement

This place covers:

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, will be transferred to [H04N 19/60](#).

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Transform coding	<a href="#">H04N 19/60</a>
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## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

DCT	Discrete cosine transform
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## G06T 9/008

### {Vector quantisation}

#### Definition statement

*This place covers:*

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, will be transferred to [H04N 19/94](#).

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Vector coding	<a href="#">H04N 19/94</a>
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#### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "vector coding" and "vector quantization"

## G06T 9/20

### Contour coding, e.g. using detection of edges

#### Definition statement

*This place covers:*

Means or steps for the compression/coding of computer graphics data using contour/shape coding method, e.g. by detection of edges.

#### Special rules of classification

Documents classified in [G06T 9/20](#), [H04N 19/20](#) are transferred to [G06T 9/20](#).

The compression/coding data concerning in this sub-group includes:

- computer graphics data, e.g. vector graphics data
- natural image/video data.

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

SVG	Scalable Vector Graphics
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#### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "contour coding" and "shape coding"
- "vector graphics" and "scalable vector graphics"

## G06T 9/40

### Tree coding, e.g. quadtree, octree

#### Definition statement

*This place covers:*

Means or steps for the compression/coding of computer graphics data by using a tree hierarchy, e.g. quadtree, octree, and similar.

The documents concerning compression/coding of:

- computer graphics object models, scene models and related metadata, e.g. depth data,

are classified here.

#### References

##### Limiting references

*This place does not cover:*

Modelling by tree structure	<a href="#">G06T 17/005</a>
Natural image/video tree coding	<a href="#">H04N 19/96</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Tree description	<a href="#">G06T 17/005</a>
Tree coding	<a href="#">H04N 19/96</a>

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Bintree or binary tree	tree structure in which each node has at most two child nodes
Quadtree or quad tree	tree structure in which each node has at most four child nodes
K-tree	tree structure in which each node has at most K child nodes
Hextree	tree structure in which each node has at most six child nodes
Volume octree	tree structure in which each voxel is subdivided into at most 8 subvoxels
Surface octree	Volume octree with incorporated surface information
Multi tree	directed acyclic graph in which the set of nodes reachable from any node forms a tree

#### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "scene graph", "scene description graph" and "scene model"

## G06T 11/00

### Two-dimensional [2D] image generation

#### Definition statement

*This place covers:*

- Generation of a 2D image or texture in general. To a large extent, but not exclusively, [G06T 11/00](#) covers image generation "from a description to a bit-mapped image" in general;
- Software packages or systems for image generation
- Caricaturing or identikit
- Fusion of images with different objects, e.g. fusion of real and virtual images or labelling of 2D images
- Clipping of 2D images
- Device independent techniques of image generation

General idea for [G06T 11/00](#) (steps for generating an image):

- First, select a colour ([G06T 11/10](#))
- Then, draw a line ([G06T 11/23](#))
- Fill a rectangle, circle or any other closed shape ([G06T 11/40](#))
- Edit your work ([G06T 11/60](#))

#### References

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Image processing specially adapted for radiation diagnosis	<a href="#">A61B 6/52</a>
Map generation for navigation systems	<a href="#">G01C 21/00</a>
Producing output data for printers	<a href="#">G06K 15/02</a>
Controller for display circuits, e.g. for LCDs, Plasma, OLEDs	<a href="#">G09G 5/00</a>
Image generation for scanner, fax-machines, copy machines	<a href="#">H04N 1/00</a>
Studio circuits for video generation, mixing, special effects, blue/green screens	<a href="#">H04N 5/262</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Generating of panoramic or mosaic images	<a href="#">G06T 3/4038</a>
Generating high dynamic range images (HDR)	<a href="#">G06T 5/92</a>
Non-photorealistic rendering in 3D	<a href="#">G06T 15/02</a>
Input arrangements or combined input and output interaction between user and computer (user interfaces)	<a href="#">G06F 3/01</a>
Video editing	<a href="#">G11B 27/00</a>

## G06T 11/10

**Texturing; Colouring; Generation of textures or colours (retouching, inpainting or scratch removal [G06T 5/77](#))**

### Definition statement

*This place covers:*

Texture generation:

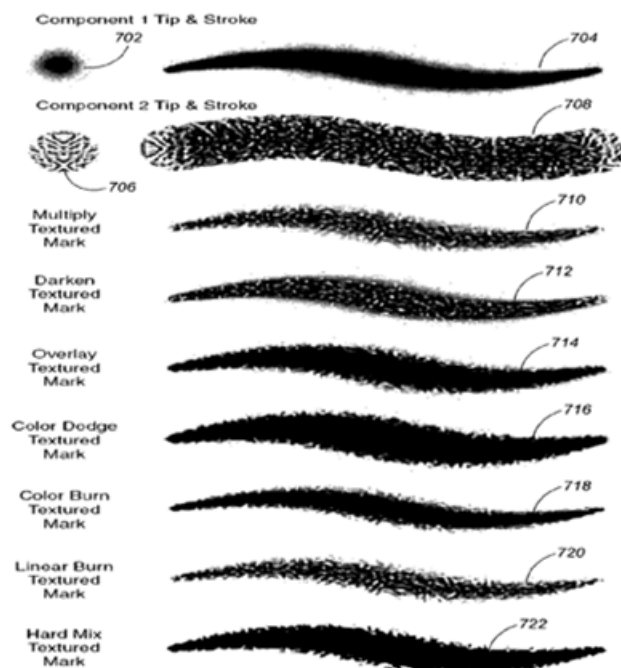
- Textures; endless, periodic pattern
- Texture synthesis, procedural textures
- Neural style transfers
- Brush strokes
- Fractals; Julia sets; Koch curves

Colour generation, changing of selected colours:

- Colour palettes, schemes; colour LUT; CLUT
- False colours
- Simulation of watercolour, oil paint, airbrush

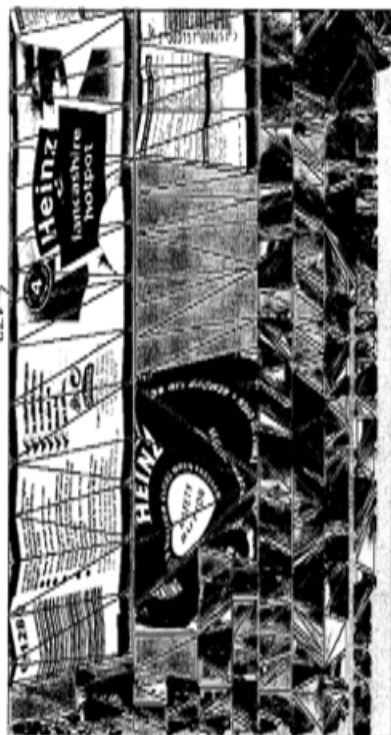
Illustrative examples of subject matter classified in this place:

1.





2.



## References

### Limiting references

*This place does not cover:*

Inpainting	<a href="#">G06T 5/77</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Texture mapping	<a href="#">G06T 15/04</a>
Colour palettes, CLUTs for displays	<a href="#">G09G 5/00</a>
Colour space manipulation	<a href="#">H04N 1/60</a>

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

LUT	look-up table
CLUT	colour look-up table

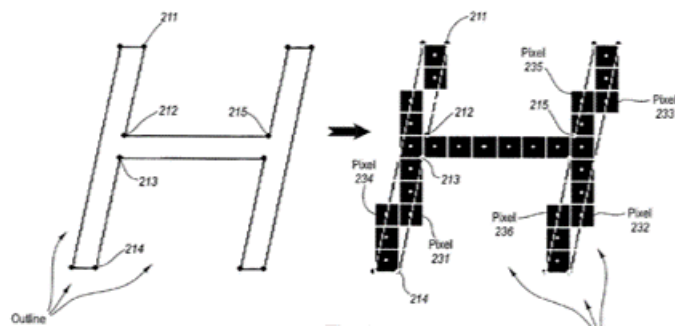
**G06T 11/23****using straight lines or curves****Definition statement**

*This place covers:*

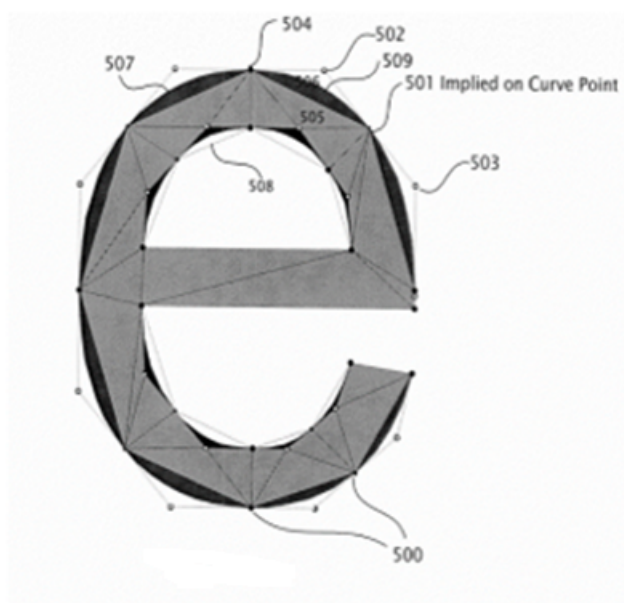
- Rendering, scan conversion of vectors, lines, ellipses, circles
- Offset curves, contour curves
- Wide, thick lines or strokes
- Splines, B-splines, NURBS; Bézier, algebraic, parametric, polynomial, cubic curves
- Approximation of curves or polygons
- Antialiasing of lines and curves; e.g. using supersampling; subpixel or area weighting
- Font rendering, e.g. scalable, outline, contour, edge fonts
- Sketching; freehand curve drawing

Illustrative examples of subject matter classified in this place:

1.



2.



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Vehicle instruments	<a href="#">B60K 35/00</a>
Printer fonts	<a href="#">G06K 15/02</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Vector coding	<a href="#">G06T 9/20</a>
Filling a planar surface by adding surface attributes	<a href="#">G06T 11/40</a>
Entering handwritten data	<a href="#">G06F 3/04883</a>
Font handling; Temporal or kinetic typography	<a href="#">G06F 40/109</a>
Feature extraction by contour coding	<a href="#">G06V 10/469</a>
Display character generators	<a href="#">G09G 5/24</a>

## G06T 11/26

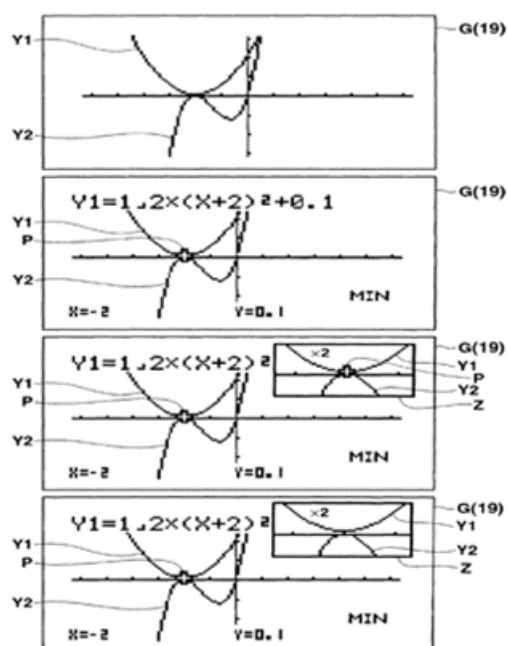
### Drawing of charts or graphs

#### Definition statement

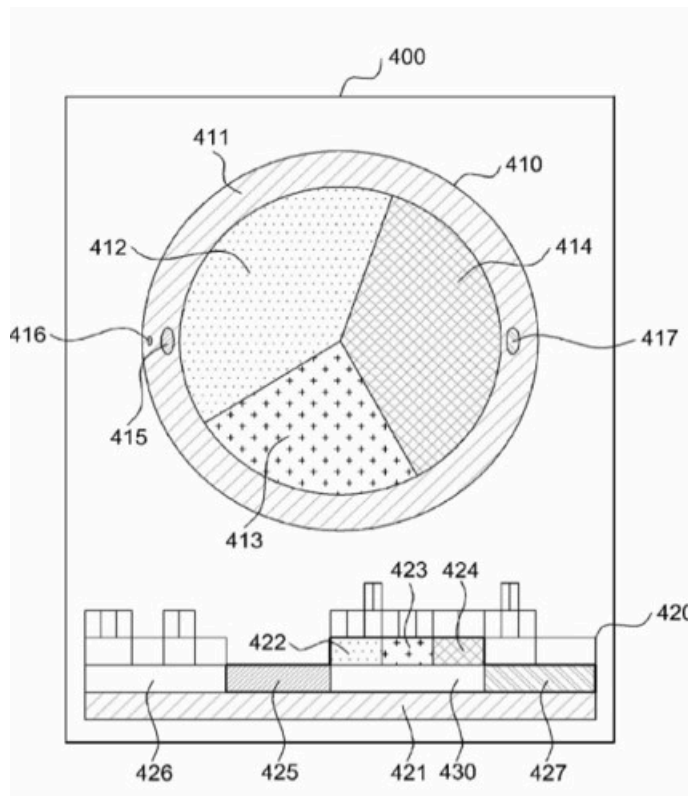
This place covers:

Illustrative examples of subject matter classified in this place:

1.



2.



- Diagram, graph layout; directed graph; flow graph; flowchart
- Venn diagram; nested tree-map
- Pie, tile, column, bar, business charts
- 2D and 3D visualisation of data; fluid flows; vector fields; scattered data
- Sketched diagrams or graphs

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Navigational instruments, e.g. for aircrafts	<a href="#">G01C 21/00</a> , <a href="#">G01C 23/00</a>
ICT specially adapted for bioinformatics-related data visualisation, e.g. displaying of maps or networks	<a href="#">G16B 45/00</a>
ICT specially adapted for medical reports, e.g. generation or transmission thereof	<a href="#">G16H 15/00</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Animation of fluid flows, 2D character animation	<a href="#">G06T 13/60</a> , <a href="#">G06T 13/80</a>
Input devices, GUIs	<a href="#">G06F 3/048</a>
GUI programs, e.g. file browsers	<a href="#">G06F 9/451</a>

Menu systems, graphical querying	<a href="#">G06F 16/54</a> , <a href="#">G06F 16/532</a>
Administration, e.g. office automation or reservations; Resource or project management	<a href="#">G06Q 10/00</a>
Finance, e.g. banking, investment or tax processing; Insurance, e.g. risk analysis or pensions	<a href="#">G06Q 40/00</a>
Network visualisation or monitoring	<a href="#">H04L 41/06</a>

## G06T 11/40

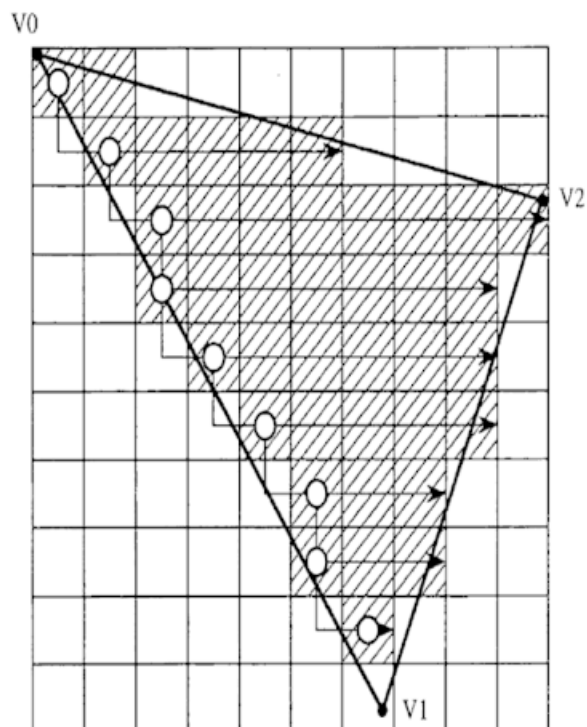
### Filling planar surfaces by adding surface attributes, e.g. adding colours or textures

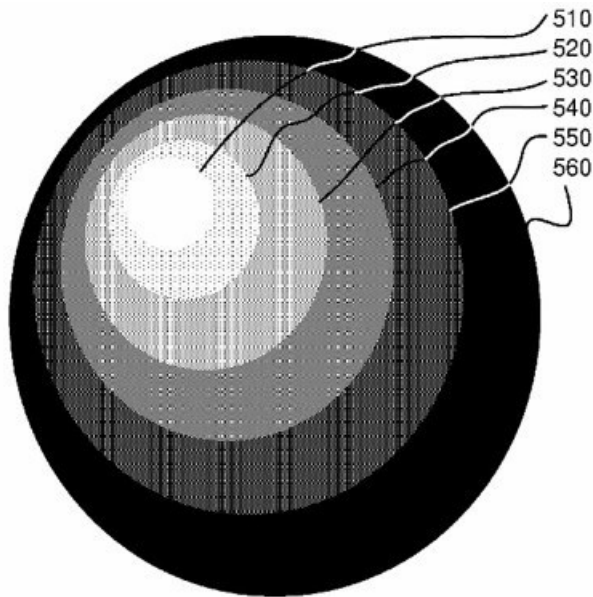
#### Definition statement

*This place covers:*

- Polygon scan conversion; rasterisation
- Scan-line algorithms, fragment processing
- Antialiasing, supersampling, subpixel or coverage masks
- Tile-based rendering
- Filling of a 2D shape, e.g. polygon, circle, ellipse, region, area
- Interior/exterior determination; edge lists or edge flags
- Colour blends, gradient fills, seed filling, e.g. for vector graphics

Illustrative example:





(gradient) fills for vector graphics

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Drawing or scan conversion of lines and fonts	<a href="#">G06T 11/23</a>
-----------------------------------------------	----------------------------

## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- In patent documents the terms "rasterising", "scan conversion" and "rendering" are often used as synonyms.

## G06T 11/60

### Creating or editing images; Combining images with text

#### Definition statement

This place covers:

- Editing of bitmaps or vector graphics
- Page layout, page composition, e.g. photo-album, collages, business or greeting cards
- Combining small images by editing in order to generate a new (big) one
- Graphical simulations, e. g. for 2D cosmetic or hairstyle
- Electronic or desktop publishing (DTP), Page Description Language (PDL), PostScript, TeX

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Face sketching with eye witnesses	<a href="#">A61B 5/117</a>
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PDL specifically for printers	<a href="#">G06K 15/02</a>
ICT specially adapted for processing medical images, e.g. editing	<a href="#">G16H 30/40</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Mosaic or panoramic images	<a href="#">G06T 3/40</a>
Image registration	<a href="#">G06T 7/30</a>
Annotating 3D objects with text	<a href="#">G06T 19/00</a>
Input devices, GUIs	<a href="#">G06F 3/048</a>
Formatting, i.e. changing of presentation of documents	<a href="#">G06F 40/103</a>
Form filling or merging of text	<a href="#">G06F 40/174</a>
Document analysis	<a href="#">G06V 30/41</a>
Composing, repositioning or geometrically modifying originals, from scanning	<a href="#">H04N 1/387</a>

### Synonyms and Keywords

In patent documents, the following abbreviations are often used:

DTP	Desktop Publishing
PDL	Page Description Language

## G06T 11/80 (Frozen)

{Creating or modifying a manually drawn or painted image using a manual input device, e.g. mouse, light pen, direction keys on keyboard}

### Special rules of classification

This group is not used for classification. Its subject-matter is covered by [G06F 3/00](#) and subgroups

## G06T 12/00

### Tomographic reconstruction from projections

#### Definition statement

This place covers:

Reconstruction from tomographic projections, i.e. measurements of an unknown object function (e.g. density of matter, activity distribution) using penetrating radiation or electromagnetic waves, described by radiation transport equations, e.g. integration along lines (= radon transform), for, e.g. refraction tomography, CT, SPECT, PET, tomosynthesis, optical tomography.

### References

#### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Impedance measuring for diagnostic purposes	<a href="#">A61B 5/053</a>
---------------------------------------------	----------------------------



Apparatus for radiation diagnosis	<a href="#">A61B 6/00</a>
Radiation diagnosis devices using data or image processing specially adapted for radiation diagnosis	<a href="#">A61B 6/52</a>
Diagnostic device using ultrasound	<a href="#">A61B 8/00</a>

### **Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Image enhancement in general	<a href="#">G06T 5/00</a>
Image analysis, including biomedical image inspection, image registration, segmentation, analysis of motion, analysis of geometric attributes	<a href="#">G06T 7/00</a>
Depth or shape recovery, from multiple images	<a href="#">G06T 7/55</a>
Analysis of materials using tomography, e.g. CT	<a href="#">G01N 23/046</a>
NMR	<a href="#">G01R 33/4824</a>
Measuring and detection of X-radiation	<a href="#">G01T 1/00</a>
ICT specially adapted for processing medical images, e.g. editing	<a href="#">G16H 30/40</a>

### **Special rules of classification**

In this group, it is desirable to add the indexing codes of groups [G06T 2211/404](#) - [G06T 2211/464](#).

The following list of symbols from the series [G06T 2211/404](#) - [G06T 2211/464](#) should be allocated to documents in [G06T 12/00](#) whenever relevant:

<a href="#">G06T 2211/404</a>	Angiography: Angiographic reconstruction includes all the reconstruction methods concerning vessels, tree structures
<a href="#">G06T 2211/408</a>	Dual energy: Reconstruction from dual or multi-energy acquisition, polychromatic X-rays, photon-counting CT
<a href="#">G06T 2211/412</a>	Dynamic: Dynamic reconstruction, i.e. moving objects are involved or motion compensation is required (e.g. heart, lung movement)
<a href="#">G06T 2211/416</a>	Exact reconstruction: Exact or quasi-exact reconstruction algorithms (in contrast to approximate algorithms)
<a href="#">G06T 2211/421</a>	Filtered back projection methods (the projection data can be handled sequentially, view-by-view)
<a href="#">G06T 2211/424</a>	Iterative: Iterative methods including all the methods using iterations independent of the reconstruction method per se (e.g. maximum likelihood [ML] or maximum a posteriori [MAP] estimation, regularisation, compressed sensing)
<a href="#">G06T 2211/428</a>	Real-time: Real-time reconstruction, e.g. fluoroscopy, intra-operative CT
<a href="#">G06T 2211/432</a>	Truncation: All or part of the data from the detectors are spatially truncated, or incomplete projection data is used



<a href="#">G06T 2211/436</a>	Limited angle: Limited angle or few view acquisition, tomosynthesis
<a href="#">G06T 2211/441</a>	AI-based methods, e.g. deep learning or convolutional artificial neural networks
<a href="#">G06T 2211/444</a>	Low-dose acquisition, reduction of radiation dose
<a href="#">G06T 2211/448</a>	Involving metal artefacts, streaking artefacts, beam hardening, photon starvation
<a href="#">G06T 2211/452</a>	Involving suppression of scattered radiation or scatter correction
<a href="#">G06T 2211/456</a>	Optical coherence tomography [OCT]
<a href="#">G06T 2211/461</a>	Phase contrast imaging or dark field imaging
<a href="#">G06T 2211/464</a>	Dual or multimodal imaging, i.e. combining two or more imaging modalities, e.g. PET-CT, PET-MRI

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

CT	computed tomography
NMR	nuclear magnetic resonance
MRI	magnetic resonance imaging
SPECT	single-photon-emission computed tomography
PET	positron emission tomography

## G06T 12/10

### Image preprocessing, e.g. calibration, positioning of sources or scatter correction

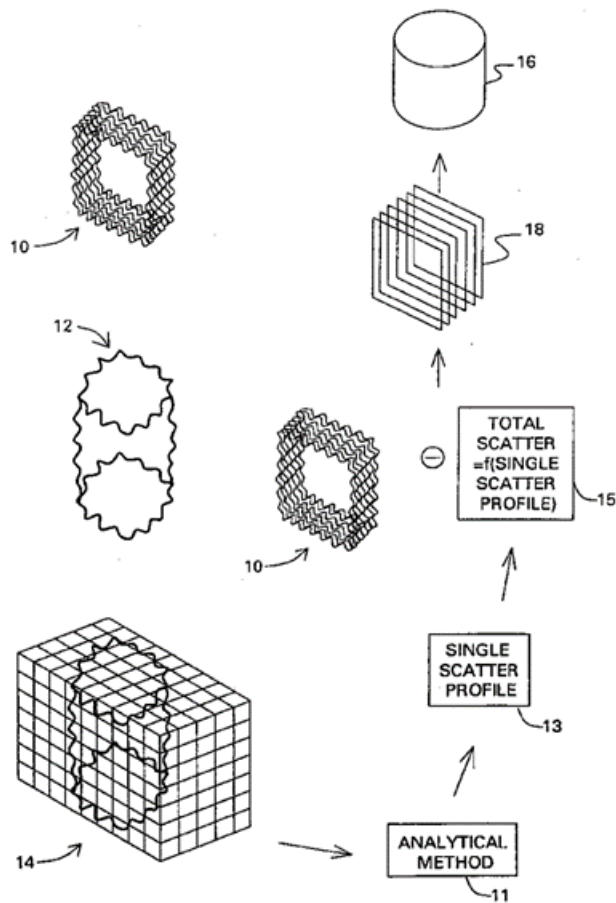
#### Definition statement

*This place covers:*

Specific pre-processing for tomographic reconstruction:

- Calibration
- Source positioning
- Synchronisation
- Scouts
- Rebinning
- Scatter correction
- Attenuation correction
- Metal artefact reduction [MAR]

Illustrative example of subject matter classified in this place:



The Figure illustrates a scatter and beam hardening correction in CT applications.

## G06T 12/20

**Inverse problem, i.e. transformations from projection space into object space**

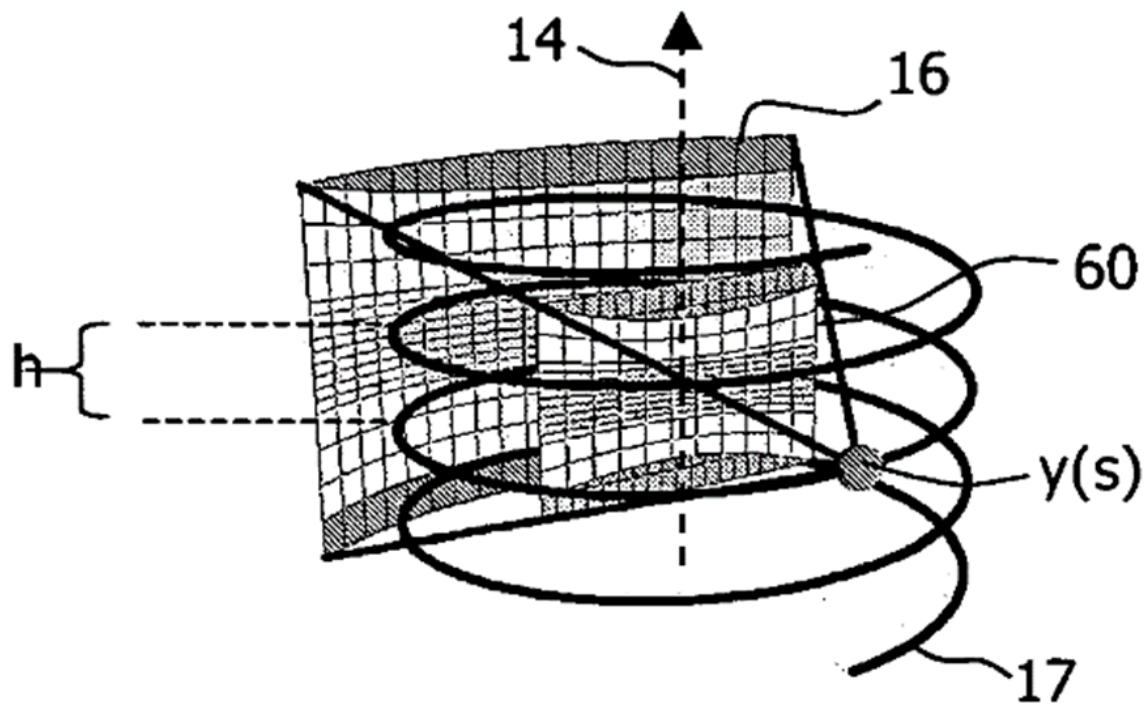
### Definition statement

*This place covers:*

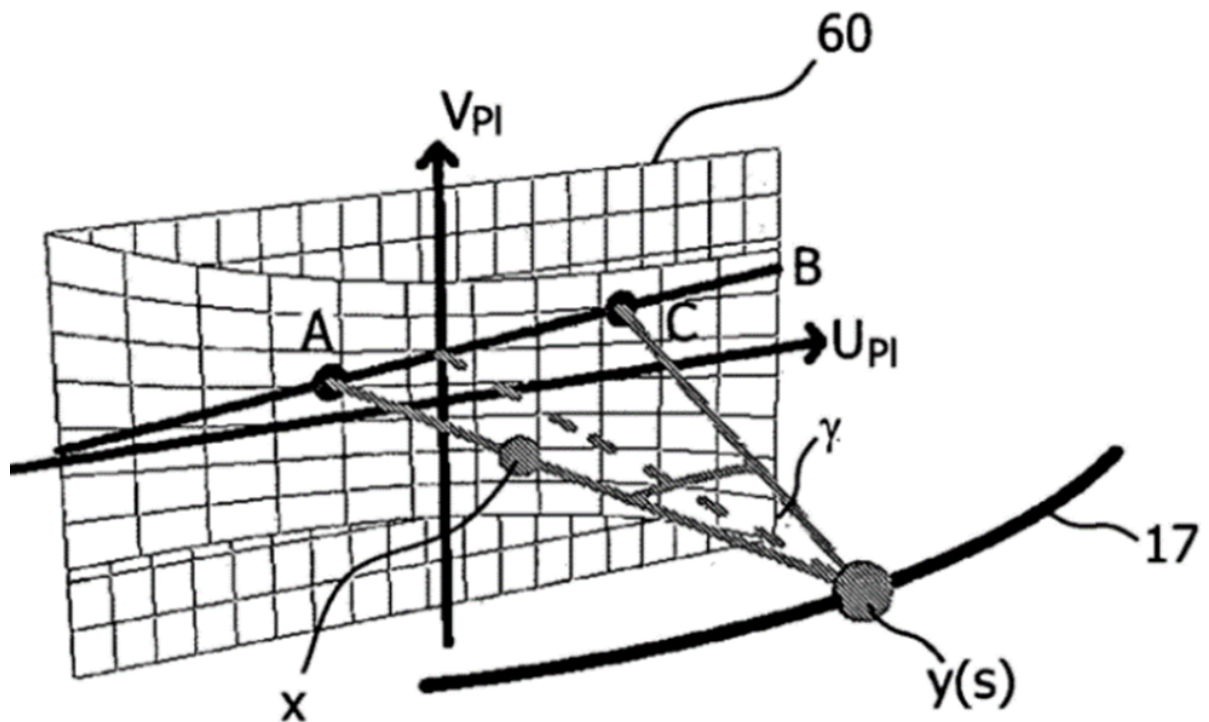
- Inverse problem, transformation from projection-space into object-space
- Fourier methods
- Algebraic methods
- Back-projection
- Statistical methods, e.g. maximum likelihood
- Compressed sensing, sparsity
- AI-based methods, e.g. neural networks

Illustrative examples of subject matter classified in this place:

1. Reconstruction method for cone-beam CT



2.



## G06T 12/30

Image post-processing, e.g. metal artefact correction

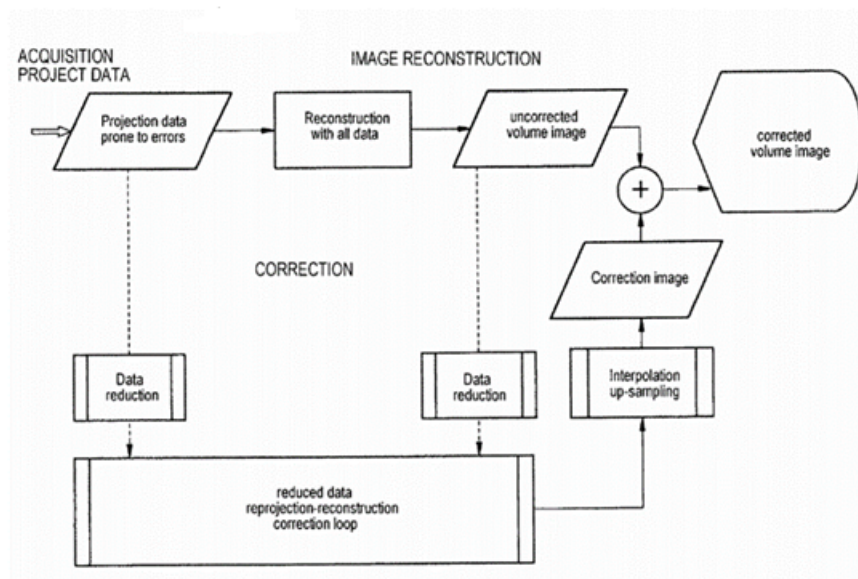
### Definition statement

*This place covers:*

- Specific post-processing after tomographic reconstruction
- Processing which relies essentially on unique properties of tomographic images, e.g. projection geometry or interactions of radiation with matter
- Voxelisation
- Artefact correction (e.g. scatter, metal, cone-beam)

## Definition statement

Illustrative example of subject matter classified in this place:



The Figure illustrates a method for post-reconstructive correction of images of a computer tomograph.

## G06T 13/00

### Animation

#### Definition statement

*This place covers:*

Generating and displaying a sequence of images of artwork or model positions in order to create the effect of movement in a scene.

Animation of data representing a 3D or 2D image model or object.

Time related computation of 2D or 3D images, generation of a sequence of 2D or 3D images is classified in this group.

This group is also given as classification to indicate that animation aspects are present but the invention lies in another group than [G06T 13/00](#).

Documents only dealing with related subject-matter like for example motion capture for animation or navigation in virtual worlds and merely mentioning animation in passing are not classified in [G06T 13/00](#) i.e. the generation of an animation has to be a substantive part of the document to be classified here.

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric image transformations for image warping	<a href="#">G06T 3/18</a>
Motion capture (for animation)	<a href="#">G06T 7/20</a>
3D modelling for computer graphics	<a href="#">G06T 17/00</a>
Manipulation of 3D models for computer graphics	<a href="#">G06T 19/00</a>
Navigation in virtual worlds	<a href="#">G06T 19/003</a>

Video games	<a href="#">A63F 13/00</a>
Computer aided design using simulation	<a href="#">G06F 30/3308</a>
Processing, recording or transmission of stereoscopic or multi-view image signals	<a href="#">H04N 13/10</a>
Model based coding of video objects	<a href="#">H04N 19/20</a>

### Special rules of classification

Deforming meshes for animation purposes get both classifications: [G06T 13/00](#) or one of its subgroups and [G06T 17/20](#).

The series [G06T 2213/00](#) of Indexing Codes is reserved for the use of documents classified in [G06T 13/00](#) and subgroups. They should be allocated to documents in [G06T 13/00](#) and subgroups whenever relevant:

<a href="#">G06T 2213/00</a>	Head group of indexing scheme for animation. This symbol should not be allocated to any documents because the group only serves as an internal node in the group hierarchy.
<a href="#">G06T 2213/04</a>	Animation description languages: computer languages for the description of an animation.
<a href="#">G06T 2213/08</a>	Animation software package: also includes hardware packages for animation.
<a href="#">G06T 2213/12</a>	Rule based animation: e.g. rules for behaviour, script, personality.

Furthermore, Indexing Codes from the series [G06T 2200/00](#) and [G06T 2210/00](#) should be allocated to documents whenever relevant. Specific symbols from these series that are especially relevant for the documents in a certain subgroup are mentioned under the "Specific rules for classification" of the respective subgroups.

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Animation system	traditional animation systems are based on key-frames, which are a succession of individual states (the position, orientation, and current shape of objects) specified by an animator or user
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### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "simulation (of motion)" and "animation"

## G06T 13/20

### Three-dimensional [3D] animation

#### Definition statement

*This place covers:*

Subject matter wherein the animated image data presents a three-dimensional image model or object.

Means or steps for the generation of a sequence of 3D images.

## Definition statement

Documents in this group concern the generation of an animation of 3D objects in general and articulated 3D objects not representing characters.

Simulations with 3D objects (e.g. bouncing balls) or 2D surfaces in 3D space (e.g. cloth) are classified here.

## References

### Limiting references

*This place does not cover:*

Nominally claimed subject-matter directed to animation with significant user interaction or manipulation	<a href="#">G06T 19/00</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Coding of wireframe meshes for animation	<a href="#">G06T 9/00</a>
Simulating properties, behaviour or motion of objects in video games	<a href="#">A63F 2300/64</a>

## Special rules of classification

For documents concerning both 2D and 3D animation of objects the first place priority rule is applied, i.e. they are classified only in [G06T 13/20](#) or its subgroups.

Documents where cloth moves according to wind effects are classified in both subgroups [G06T 13/20](#) and [G06T 13/60](#).

For specific aspects of documents in this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated to documents in [G06T 13/20](#) and subgroups whenever relevant:

For animation of cloth: [G06T 2210/16](#)

For collision of 3D objects: [G06T 2210/21](#)

For fluid flows: [G06T 2210/24](#)

For animation using particles: [G06T 2210/56](#)

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

CFD	Computational fluid dynamics
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## G06T 13/205

{driven by audio data}

### Definition statement

*This place covers:*

Means or steps for the generation of an animation sequence based on audio data.

The input is audio data, e.g. music, speech data, i.e. no written text.

## Definition statement

Changes e.g. in motion, colour, shape or position of objects in the animation are generated based on time events in the audio data, e.g. the beat in the music or the change of instrumentation.

## References

*Limiting references*

*This place does not cover:*

Electroponic musical instruments	<a href="#">G10H</a>
Emotion analysis from speech for face animation or talking heads	<a href="#">G10L 17/26</a>
Lip-synchronization or synthesis of lip shapes (visemes) from speech for face animation or talking heads	<a href="#">G10L 21/10</a>

*Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

Animation based on written text	<a href="#">G06F 40/00</a>
Video editing or indexing or timing	<a href="#">G11B 27/00</a>

## Special rules of classification

Documents where the audio input animates a 2D object are classified in both subgroups [G06T 13/205](#) and [G06T 13/80](#).

**G06T 13/40**

**of characters, e.g. humans, animals or virtual beings**

## Definition statement

*This place covers:*

Subject matter wherein the animated object exhibits lifelike motions or behaviours.

Means or steps for the generation of an animation sequence of articulated objects representing virtual characters or for the generation of an animation sequence of "body" parts.

The animated characters herein include, e.g. humans, animals or virtual beings.

Animation of a character normally consists of an articulated skeleton surrounded by an implicitly defined volume or a wireframe surface mesh.

Lifelike motions include walking, running, waving or talking. Lifelike behaviours include showing emotions or reactions to events.

Animation of e.g. faces, lips, eyes, gestures, hair or feathers on a character.

Documents concerning only the synthesizing aspect of character animations for Tele- or Videoconferencing (no image capturing, no data transmission)

## References

*Limiting references*

*This place does not cover:*

Interaction of avatars in virtual worlds	<a href="#">A63F 13/00</a>
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Interaction of avatars in virtual worlds for business	<a href="#">G06Q 30/00</a>
Tele- or Video-conferencing	<a href="#">H04N 7/14</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Animation of articulated objects in general, i.e. not exclusively or not with the main application for character animation	<a href="#">G06T 13/20</a>
Garment try-on simulators	<a href="#">G06T 19/00</a> , <a href="#">G06T 2210/16</a>
Computing the motion of game characters with respect to other game characters, virtual objects or elements of a game scene	<a href="#">A63F 2300/6607</a>
Head tracking input arrangements for interaction between user and computer	<a href="#">G06F 3/012</a>
Eye tracking input arrangements for interaction between user and computer	<a href="#">G06F 3/013</a>
Emotion analysis from speech for face animation or talking heads	<a href="#">G10L 17/26</a>
Lip-synchronization or synthesis of lip shapes (visemes) from speech for face animation or talking heads	<a href="#">G10L 21/10</a>

### Special rules of classification

- Documents where the characters are only 2D are classified in both subgroups [G06T 13/40](#) and [G06T 13/80](#).
- Documents where the hair on a character is moved by wind effects are classified in both subgroups [G06T 13/40](#) and [G06T 13/60](#).
- Documents where the animation data for the character results from motion capture of real characters are classified in both subgroups [G06T 7/00](#) and [G06T 13/40](#).

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Avatar	graphical representation of the user or the user's character
(inverse) kinematics	calculates the motions necessary to achieve a desired position of the character
Mocap	motion capture
Motion retargeting	transferring the motion from one character to another, different one
Skeleton	tree structure composed of several joints to facilitate modelling the motion of the character
Skinning	technique to deform the skin from the deformation of the skeleton

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "Avatar" and "character"

**G06T 13/60****of natural phenomena, e.g. rain, snow, water or plants****Definition statement**

*This place covers:*

Subject-matter wherein the animated images are associated with natural phenomena.

Means or steps for the generation of a simulation of natural elements or phenomena.

Documents concerning:

- the simulation of rain, water, foam, water waves, clouds, fog, snow, fireworks, explosions or
- wind effects on grass, plants, flags or hair or
- growing processes of plants or beings or
- destruction processes

are classified here.

**References****Limiting references**

*This place does not cover:*

Physical forces (other than wind) acting on 3D objects, e.g. simulation of a flying bullet or bouncing of a ball	<a href="#">G06T 13/20</a>
The simulation of behavioural effects of characters, e.g. the flee behaviour of sea anemons	<a href="#">G06T 13/40</a>

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Simulation of fluid flows in general (3D flows)	<a href="#">G06T 13/20</a>
Simulation of fluid flows in general (2D flows)	<a href="#">G06T 13/80</a>
Computer aided design using simulation	<a href="#">G06F 30/3308</a>

**Special rules of classification**

Documents where the hair on a character is moved by wind effects are classified in both subgroups [G06T 13/40](#) and [G06T 13/60](#).

Documents where cloth moves according to wind effects are classified in both subgroups [G06T 13/20](#) and [G06T 13/60](#).

For specific aspects of documents In this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated whenever relevant:

For fluid flows: [G06T 2210/24](#)

For animation using particles, e.g. fireworks, dust: [G06T 2210/56](#)

For weathering effects like e.g. aging, corrosion: [G06T 2210/64](#)

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Weathering	aging process of material by exposure to weather, e.g. wind, water, certain temperatures
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## G06T 13/80

### Two-dimensional [2D] animation, e.g. using sprites

#### Definition statement

*This place covers:*

- Subject matter wherein the animated image data is a 2D image object.
- Means or steps for time related computation of a sequence of 2D images, e.g. a small moveable 2D graphic pattern on a display, often used in video game animation.
- Generation of 2D animated cartoons.
- Animation of 2D text, 2D letters.
- Change over in slide shows, leafing through digital photo albums.
- General aspects of 2D morphing or keyframe interpolation.
- All documents exclusively dealing with the animation of 2D images, i.e. no 3D animation.
- Generation of 2D motion blur.

## References

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric image transformations for image warping	<a href="#">G06T 3/18</a>
Video editing or indexing or timing	<a href="#">G11B 27/00</a>

## Special rules of classification

- Documents where the animated 2D object is a character, i.e. 2D character animation, are classified in both subgroups [G06T 13/40](#) and [G06T 13/80](#).
- Documents where the motion blur concerns only the background image are classified in both subgroups [G06T 13/20](#) and [G06T 13/80](#).
- Documents where the audio input animates a 2D object are classified in both subgroups [G06T 13/205](#) and [G06T 13/80](#).
- For documents concerning both 2D and 3D animation of objects with similar algorithms the first place priority rule is applied, i.e. they are classified only in [G06T 13/20](#) or its subgroups, not in [G06T 13/80](#).
- Documents concerning morphing or warping are additionally classified with the Indexing Code [G06T 2210/44](#).

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Keyframe interpolation	generation of a smooth transition between a starting and an ending keyframe
Morphing	continuous transformation between images (shape and colour)
Sprite	2D image or animation that is integrated into a larger 2D scene

Warping	geometric transformation of the 2D object shape
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## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "Keyframe interpolation" and "inbetweening"
- "Morphing" and "warping"

## G06T 15/00

### Three-dimensional [3D] image rendering

#### Definition statement

*This place covers:*

Means or steps for generating a displayable monoscopic image from a 3D model or 3D data set.

The 3D model is a description of three-dimensional objects in a strictly defined language or data structure.

A 3D data set may include voxel data.

Included in this group are input data sets of 3D coordinates or higher.

This group covers the geometry subsystem of the graphics rendering pipeline, i.e. modeling transformation, lighting, viewing transformation, clipping, mapping to viewport.

#### References

##### Limiting references

*This place does not cover:*

Rasterization	<a href="#">G06T 11/40</a>
Visualization of models without surface characteristics or attributes	<a href="#">G06T 17/00</a>
Manipulation and visualization of 3D models for computer graphics	<a href="#">G06T 19/00</a>
Image signal generator	<a href="#">H04N 13/20</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Video games	<a href="#">A63F 13/00</a>
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## Special rules of classification

The boundaries between [G06T 15/00](#) (in particular [G06T 15/08](#) and [G06T 15/10](#)) on the one hand, and [G06T 3/06](#) and subgroups on the other hand is not yet completely determined. Thus double classification should be considered.

Architectural elements are in general classified in [G06T 15/005](#). However, if the architectural element is only related to a certain part or function within the graphics pipeline (e.g. texture mapping or ray tracing) the document is classified in the respective subgroup (e.g. [G06T 15/04](#) for texture mapping) and additionally the Indexing Code [G06T 2200/28](#) is assigned.

The series [G06T 2215/00](#) of Indexing Codes is reserved for the use of documents classified in [G06T 15/00](#) and subgroups. They should be allocated to documents in [G06T 15/00](#) and subgroups whenever relevant:

<a href="#">G06T 2215/00</a>	Indexing scheme for image rendering: SHOULD BE EMPTY!
<a href="#">G06T 2215/06</a>	curved planar reformation of 3D line structures: CPR of tubular structures (e.g. bronchia, arteries, colon, vertebrae), deployment of line structures in 3D to a 2D plane
<a href="#">G06T 2215/08</a>	gnomonic or central projection: projection from a center of an object, e.g. a ball, to the surrounding surface, related to VTV (virtual television)
<a href="#">G06T 2215/12</a>	shadow map, environment map: generation and use of shadow maps, soft shadows, environment maps
<a href="#">G06T 2215/16</a>	using real world measurements to influence rendering: e.g. shadow based on actual light, viewport based on viewer's pose, texturing with real-time output from camera

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

OpenGL	Open Graphics Library: standard specification defining an application programming interface (API) for writing applications that produce 2D and 3D computer-graphics
Direct3D	standard specification defining an API for writing graphic applications; is part of DirectX
Graphics pipeline	rendering pipeline

## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "rasterization" and "rendering"

## G06T 15/005

### {General purpose rendering architectures}

#### Definition statement

*This place covers:*

Functional or operational structure of an image rendering computer system.

Documents in this group focus largely on the way by which the central processing unit (CPU) performs internally with the different units (e.g. the GPU) and accesses memories.

Information relevant is the selection and interconnection of hardware components or functional units in 3D rendering systems.

Hardware and software shader units.

This subgroup is given as classification if the document covers elements of the whole pipeline architecture or if the architectural element covers multiple functions of the graphics pipeline.

## References

### Limiting references

*This place does not cover:*

Architectures for general purpose image data processing	<a href="#">G06T 1/20</a>
Memory management for general purpose image data processing	<a href="#">G06T 1/60</a>
Program control in graphics processors	<a href="#">G06F 9/44</a>
Use of graphics processors for other purposes than rendering	<a href="#">G06F 9/44</a>
Graphics controllers, e.g. control of visual indicators or display of a graphic pattern	<a href="#">G09G 5/363</a>

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

GPU	graphics processing unit
Shader unit	instruction sets (in software or hardware) to calculate rendering effects on the graphics hardware

## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "shader unit" and "hardware shader"

## G06T 15/02

### Non-photorealistic rendering

#### Definition statement

*This place covers:*

Means or steps for rendering a scene in a style intended to look like a painting or drawing.

Illustrative examples of non-photorealistic rendering may include, e.g. cartoons, sketches, paintings or drawings.

## References

### Limiting references

*This place does not cover:*

Generation of texture or colour, e.g. brush strokes	<a href="#">G06T 11/10</a>
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## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "Cartoon-style rendering", "Freehand-style rendering", "Handmade-style rendering", "Ink rendering", "Painterly rendering", "Pen rendering", "Pencil rendering", "Silhouette rendering", "Sketchy rendering", "Toon-Style rendering" and "non-photorealistic rendering"

## G06T 15/04

### Texture mapping

#### Definition statement

*This place covers:*

Means or steps for applying or mapping surface detail or colour pattern to a computer-generated graphic, geometry or 3D-model.

Texture mapping used for the generation of a surface image in final format or form is classified herein.

MIP maps, bump mapping, displacement mapping, environment mapping, shadow maps.

#### References

##### Limiting references

*This place does not cover:*

Generation of texture	<a href="#">G06T 11/10</a>
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#### Special rules of classification

Documents dealing with shadow maps are classified in both subgroups [G06T 15/04](#) and [G06T 15/60](#).

Documents dealing with environment mapping are classified in both subgroups [G06T 15/04](#) and [G06T 15/506](#).

Documents concerning environment maps or shadow maps are additionally classified with the Indexing Code [G06T 2215/12](#).

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Texel	texture element or texture pixel
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## G06T 15/06

### Ray-tracing

#### Definition statement

*This place covers:*

Means or steps for creating an image by tracing rays from a viewpoint through each pixel to a visible point on an object.

#### Special rules of classification

Ray casting for hidden part removal is classified in both subgroups [G06T 15/06](#) and [G06T 15/40](#).

Generation of a photon map via photon tracing is classified in both subgroups [G06T 15/06](#) and [G06T 15/506](#).

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Ray casting	non-recursive variant of ray tracing
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## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "ray tracing" and "ray casting (especially in early patent documents)"

## G06T 15/08

### Volume rendering

#### Definition statement

*This place covers:*

Means or steps for displaying a two-dimensional representation of three-dimensional volume data sets.

Volume data sets are typically voxels or 3D data sets consisting of groups of 2D slice images acquired by e.g. CT, MRT.

Illustrative examples of volume rendering techniques are Direct Volume Rendering Techniques (e.g. splatting, shear warp), Maximum Intensity Projection (MIP), Minimum Intensity Projection, Curved Planar Reformation (CPR), Multiplanar Reformatting (MPR), Curved Multiplanar Reformatting (CMPR).

Technical details of the projection or mapping technique used for volume rendering.

#### References

##### Limiting references

*This place does not cover:*

Definition of the position of the projection plane, surface or curve for volume rendering	<a href="#">G06T 19/00</a> , <a href="#">G06T 2219/008</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Volumetric displays for the representation of 3D data sets	<a href="#">H04N 13/388</a>
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## Special rules of classification

Documents concerning curved planar reformation of tubular structures are additionally classified with the symbol [G06T 2215/06](#) .

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

CMPR	Curved Multi-Planar Reformatting
CPR	Curved Planar Reformation
MIP	Maximum (or Minimum) Intensity Projection
MPR	Multi-Planar Reformatting



## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "curved Planar Reformatting", "curved Multiplanar Reformatting", "curved Multiplanar Reformation", "deployment" and "Curved Planar Reformation"

## G06T 15/10

### Geometric effects

#### Definition statement

*This place covers:*

Means or steps for changing the visualization of a graphical object due to view transformations.

Generation of views, multiple views.

Visualization of a graphical object through projection, e.g. parallel projections, oblique projections, gnomonic projections

Mapping of the 3D graphical object on a subspace for visualization, e.g. on (a part of) a plane or on a surface in 3D space (e.g. a bend virtual screen)

#### References

##### Limiting references

*This place does not cover:*

Visualization of volume data sets	<a href="#">G06T 15/08</a>
Perspective projections	<a href="#">G06T 15/20</a>
Changes in the visualization related to lighting effects	<a href="#">G06T 15/50</a>
Changes in the visualization due to geometric transformations of the object (rotation, translation etc.)	<a href="#">G06T 19/00</a>
Stereoscopic imaging or 3D displays	<a href="#">H04N 13/00</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric transformations in the plane of the image, i.e. from 2D to 2D	<a href="#">G06T 3/00</a>
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#### Special rules of classification

The boundaries between [G06T 15/10](#) on the one hand, and [G06T 3/08](#) on the other hand is not yet completely determined. Thus double classification should be considered.

Documents concerning gnomonic or central projections are additionally classified with the Indexing Code [G06T 2215/08](#).

## G06T 15/20

### Perspective computation

#### Definition statement

*This place covers:*

Means or steps for presenting a 3D-object on a screen such that objects closer to the viewpoint appear larger than if farther from the viewpoint.

Perspective projections of graphical objects.

Subject matter related to details of viewpoint determination or computation with claimed or disclosed rendering aspects.

#### References

##### Limiting references

*This place does not cover:*

View determination or computation without rendering	<a href="#">G06T 19/00</a>
Changing the viewpoint for navigation without details of view generation	<a href="#">G06T 19/003</a>
Transformation of image signals corresponding to virtual viewpoints	<a href="#">H04N 13/111</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Changing parameters of virtual cameras in video games	<a href="#">A63F 2300/66</a>
Navigational Instruments, e.g. visual route guidance with on-board computers using 3D or perspective road maps	<a href="#">G01C 21/3635</a>
Interaction techniques, e.g. control of the viewpoint to navigate in a 3D environment	<a href="#">G06F 3/04815</a>
TV systems, e.g. alteration of picture orientation, perspective, position etc.	<a href="#">H04N 5/2628</a>
Stereoscopic images	<a href="#">H04N 13/00</a>

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Multiple views	rendering a graphical object seen from different viewpoints
View generation	visual rendering of geometric properties of a graphical object seen from a certain viewpoint
Viewpoint alteration	change of a viewpoint (of a virtual camera)
Virtual camera	display of a view of a 3D virtual world
Virtual Studio	technological tools for simulating a physical television or movie studio, the image of the virtual camera is rendered in real-time from the same perspective as the real camera in 3D space

## G06T 15/205

### {Image-based rendering}

#### Definition statement

*This place covers:*

Means or steps for rendering a 3D-object or scene using a set of two-dimensional images of it.

Generation of a new view of a graphics object exclusively from 2D images of the object without prior generation of a 3D model.

Rendering using billboards.

Pixel based rendering or point based rendering of 3D objects which are not volume data.

Depth image-based rendering.

#### References

##### Limiting references

*This place does not cover:*

From multiple images	<a href="#">G06T 7/55</a>
Determining parameters from multiple pictures	<a href="#">G06T 7/97</a>
Splatting of volume data	<a href="#">G06T 15/08</a>
Rendering of a 3D model generated from 2D images of it	<a href="#">G06T 17/00</a>

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

IBR	image-based rendering
Billboard	textured rectangles that are used as simplified version of 3D models for rendering

## G06T 15/30

### Clipping

#### Definition statement

*This place covers:*

Means or steps for eliminating those portions of graphics primitives that extend beyond a predetermined region.

The predetermined region may include a viewing volume or any subset of the view volume of any shape.

The shape of the graphics primitives that partly extend beyond the predetermined region is modified.

## References

### Limiting references

*This place does not cover:*

Cropping of 2D images	<a href="#">G06T 11/60</a>
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## Special rules of classification

Documents where a bounding box or shape is defined or used are additionally classified with the Indexing Code [G06T 2210/12](#).

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Bounding box or bounding shape	minimal box or convex polygon surrounding the graphic object
Viewport	rectangular area on the screen for displaying the rendered graphical object

## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "viewing volume", "view volume" and "view frustum"

## G06T 15/40

### Hidden part removal

#### Definition statement

*This place covers:*

Means or steps for determining which surfaces or part of surfaces of a graphic object are visible from a certain viewpoint and optionally removing them.

Hidden surface or line removal.

Culling, e.g. frustum culling, backface culling, frontface culling, occlusion culling. Culling removes graphics objects or scene graph nodes that are completely falling outside the view frustum. This is usually performed before clipping.

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

VSD	visible surface determination
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## G06T 15/405

### {using Z-buffer}

#### Definition statement

*This place covers:*

Means or steps for determining which surfaces or parts of surfaces of a graphic object are visible from a certain viewpoint and optionally removing them using Z-Buffer information.

## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Z-Buffer" and "Depth-Buffer"

## G06T 15/50

### Lighting effects

#### Definition statement

*This place covers:*

Means or steps for determining intensity or colour on a surface of an object based on interaction of light with the object, considering surface properties or its orientation.

## G06T 15/503

### {Blending, e.g. for anti-aliasing}

#### Definition statement

*This place covers:*

Means or steps for computing an image or pixel-value from several (source) images or pixel-values taking into account their weighting factors.

Weighting factors are usually opacity or transparency associated values.

Compositing.

Vertex or geometry blending.

## References

### Limiting references

*This place does not cover:*

Video editing or indexing or timing	<a href="#">G11B 27/00</a>
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## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Alpha channel or alpha transparency channel	a portion of each pixel's data that is reserved for transparency information
Alpha compositing	combining an image with a background to create the appearance of partial or full transparency
Matte	contains the coverage information, e.g. the shape of the object to be drawn

## G06T 15/506

### {Illumination models}

#### Definition statement

*This place covers:*

Means or steps for computing the amount of energy absorbed, reflected, diffracted or transmitted by an object (or element) to be 3D rendered.

Illumination models usually include composition, direction or geometry of the light source, surface orientation and/or surface properties of the object.

Local illumination models only take into account light arriving straight from the light source.

Global illumination models take into account light arriving after interaction with another object in the scene.

Direct light sources, indirect light sources, multiple light sources, physically based illumination models.

#### Special rules of classification

Generation of a photon map via photon tracing is classified in both subgroups [G06T 15/06](#) and [G06T 15/506](#).

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

BRDF	bidirectional reflectance distribution function
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## G06T 15/55

### Radiosity

#### Definition statement

*This place covers:*

Means or steps for rendering graphic objects through computing the balancing of substantially all light energy coming toward and going away from every point on a surface.

In radiosity, the balance of light energy is usually independent of the viewpoint.

#### References

##### Limiting references

*This place does not cover:*

Subject matter directed to illumination models that only consider viewpoint dependent vectors	<a href="#">G06T 15/506</a>
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## G06T 15/60

### Shadow generation

#### Definition statement

*This place covers:*

Means or steps for determination and generation of a region of darkness on an object where light is at least partially blocked by another graphical object.

The blocking object herein might be a semitransparent object.

Shadow computation normally refers to computation of shadow caused by one object onto another object.

Concave Objects where the shadow caused by one portion of the object falls onto another portion of the concave object is classified herein, e.g. an "L" shaped object can cast a shadow from the vertical portion onto the horizontal portion.

#### Special rules of classification

Documents concerning the calculation of the position of the light source from the shadow are classified in both subgroups [G06T 15/50](#) and [G06T 15/60](#).

Documents concerning shadow maps are classified in both subgroups [G06T 15/04](#) and [G06T 15/60](#) and are additionally classified with the Indexing Code [G06T 2215/12](#).

## G06T 15/80

### Shading

#### Definition statement

*This place covers:*

Means or steps for assigning colour or intensity alterations or gradations in a particular area of a graphical object's surface based on its relationship with light.

Relationship of light herein includes vector of light which consists of angle and distance or it even may include ambient light.

Surfaces may include polygons or curved surfaces or patches.

Interpolation of colour or shade based on vertex data or other pixels on the surface is classified herein.

Shading caused by the object blocking light on the back side of the same object with respect to a light source is classified herein.

#### References

##### Limiting references

*This place does not cover:*

Shader units	<a href="#">G06T 15/005</a>
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## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Scanline interpolation	Interpolation of values along each surface edge linearly and interpolation of values in the interior of each surface from left edge to rightedge, i.e. along a scanline
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## G06T 15/83

### Phong shading

#### Definition statement

*This place covers:*

Means or steps for interpolating surface normals from the vertices of a graphical object in rasterizing a surface thereby calculating specular reflections on a graphical object.

## G06T 15/87

### Gouraud shading

#### Definition statement

*This place covers:*

Means or steps for producing a smooth variation of surface intensity over a surface by bilinearly interpolating the color or intensities from the vertices of a graphical object.

## G06T 17/00

### Three-dimensional [3D] modelling for computer graphics

#### Definition statement

*This place covers:*

Means or steps for generating a description of a 3D model or scene.

The 3D model description is usually generated from point clouds, 2D images, mathematical definitions for the description of curves, surfaces or volumes or data from different sensors.

Marching Cubes, sampled distance fields.

Image data format conversions, e.g. converting polar coordinates to rectangular coordinates or IGES to combinatorial geometry descriptions.

## References

### Limiting references

*This place does not cover:*

Depth or shape recovery	<a href="#">G06T 7/50</a>
Manipulating 3D models or images for computer graphics	<a href="#">G06T 19/00</a>
Route guidance using 3D or perspective road maps including 3D objects and buildings	<a href="#">G01C 21/3635</a>
Generation of 3D objects with NC-machines	<a href="#">G05B 19/4099</a>
CAM (Computer aided manufacturing)	<a href="#">G05D 3/00</a>



CAD (Computer aided design) in general	<a href="#">G06F 30/00</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Methods for drafting or marking-out cutting-out patterns for cloth	<a href="#">A41H 3/007</a>
Collision detection for path planning of manipulators	<a href="#">B25J 9/1666</a>
Collision detection for programme-controlled systems	<a href="#">G05B 19/4061</a>
Image signal generators	<a href="#">H04N 13/268</a>

### Special rules of classification

Documents concerning image data format conversion are additionally classified with the Indexing Code [G06T 2210/32](#) - image data format.

### Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

IGES	Initial Graphics Exchange Specification
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## G06T 17/005

{Tree description, e.g. octree, quadtree}

### Definition statement

This place covers:

Means or steps for generating a hierarchical tree-based description of a 3D model or scene.

### Special rules of classification

Documents concerning scene graphs are additionally classified with the Indexing Code [G06T 2210/61](#) - scene description

### Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Bintree or binary tree" and "tree structure in which each node has at most two child nodes"
- "Quadtree or quad tree" and "tree structure in which each node has at most four child nodes"
- "K-tree" and "tree structure in which each node has at most K child nodes"
- "Hextree" and "tree structure in which each node has at most six child nodes"
- "Volume octree" and "tree structure in which each voxel is subdivided into at most 8 subvoxels"
- "Surface octree" and "Volume octree with incorporated surface information"
- "Multi tree" and "directed acyclic graph in which the set of nodes reachable from any node forms a tree"

## G06T 17/05

### Geographic models

#### Definition statement

*This place covers:*

Means or steps for generating 3D models which relate to geographic data.

The geographic data is usually obtained from different sensors, e.g. LIDAR, stereo photogrammetry from aerial surveys, radar, infrared cameras, GPS, satellite photography and maps e.g. topographic maps, road maps, development plans.

Digital Elevation Models (DEM), contour maps, digital cartography.

Superimposing or overlaying of registered geographic data from different sensors.

Editing of maps, e.g. modelling of roofs or generation of 3D models for buildings displayed on a map.

Map revision, map updating.

Calculation of visibility fields for geographic areas.

Geographical fractal modeling.

#### References

##### Limiting references

*This place does not cover:*

Determination of transform parameters for the alignment of images, i.e. image registration	<a href="#">G06T 7/30</a>
Navigation in a road network, GPS for navigation	<a href="#">G01C 21/26</a>
Navigational Instruments, e.g. visual route guidance using 3D or perspective road maps (including 3D objects and buildings)	<a href="#">G01C 21/3635</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric image transformations for image registration	<a href="#">G06T 3/14</a>
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### Special rules of classification

This subgroup is an application oriented group. Therefore, whenever possible, documents classified herein should also be classified in a function oriented group.

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

GIS	Geographic Information Systems
AMS	Automated Mapping System

## Synonyms and Keywords

*In patent documents the following expressions are often used as synonyms:*

Chorography	description of a landscape
Choropleth map	thematic map

## G06T 17/10

### Constructive solid geometry [CSG] using solid primitives, e.g. cylinders, cubes

#### Definition statement

*This place covers:*

Means or steps for generating 3D models using boundary or volumetric representations of solid primitive objects.

Incremental feature generation, feature modification or modelling, feature-based design is classified here.

Solid modelling via sheet modelling or via sweeping or extrusion of contours, areas or volumes, e.g. the generation of sweep objects or generalized cylinders.

Modelling of solids using volumetric representations, an "alternating sum of volumes" process, volume or convex decomposition or boundary representations.

Generation of 3D objects from 2D line drawings.

#### Special rules of classification

For specific aspects of documents In this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated whenever relevant:

For convex hull for 3D objects: [G06T 2210/12](#)

For collision detection or intersection of 3D objects: [G06T 2210/21](#)

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

B-rep or BREP	boundary representation
Alternating sum of volumes (ASV) process	a convex decomposition method for volumetric objects

## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- "sweep object" and "generalized cylinder"

## G06T 17/20

### Finite element generation, e.g. wire-frame surface description, {tessellation}

#### Definition statement

*This place covers:*

Means or steps for the generation or modification of polygonal surface descriptions of 3D models or parts thereof.

Meshes, grids, tessellations, tessellated surface patches, triangulations, tilings are classified here.

Delaunay triangulation, Voronoi diagrams.

Concatenation of tessellated surface patches, T-junctions.

Meshes for finite element modelling.

#### References

##### Limiting references

*This place does not cover:*

Compression using wireframes	<a href="#">G06T 9/00</a>
Computer-aided design using finite element methods	<a href="#">G06F 30/23</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Seismic models	<a href="#">G01V 1/282</a>
Geologic models	<a href="#">G09B 23/40</a>

#### Special rules of classification

For specific aspects of documents In this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated whenever relevant:

For modelling of cloth: [G06T 2210/16](#)

For collision detection or intersection of 3D objects: [G06T 2210/21](#)

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

FEM	Finite element modelling
TIN	Triangulated irregular network
T-junction	a spot where two polygons meet along the edge of another polygon

**G06T 17/205****{Re-meshing}****Definition statement**

*This place covers:*

Means or steps for modifying the structure of a mesh by inserting or deleting mesh vertices.

Generation of meshes with different level of detail from a source mesh.

Refinement or simplification of meshes, honeycomb scheme.

The refinement or coarsening may be locally or globally.

**Special rules of classification**

Documents concerning the generation of meshes with different levels of detail are additionally classified with the Indexing Code [G06T 2210/36](#).

**G06T 17/30****Polynomial surface description****Definition statement**

*This place covers:*

Means or steps for generating a meshfree surface description.

Polynomial surface descriptions, e.g. NURBS, Bézier surfaces, B-spline surfaces, Coons patches, Tensor product patches, without mesh generation or visualization based on tessellations.

Analytical surface descriptions.

Free-form surfaces.

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

NURBS	Non-Uniform Rational B-Spline
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**G06T 19/00****Manipulating three-dimensional [3D] models or images for computer graphics****Definition statement**

*This place covers:*

Means or steps for changing 3D models, for adding information or for changing the visualization via a user interface.

View determination or computation without rendering details, geometric transformations of the whole 3D object to change the viewpoint.

Manipulating 3D models by multiple users in a collaborative environment.

Annotating or labelling of 3D models with text, markers

## Definition statement

Dimensioning and tolerancing of 3D models, e.g. display of dimension information for each part

Display of 3D models as an exploded view drawing.

Unfolding or flattening of 3D models or graphs.

Positioning or defining a cut plane or a curved surface in a 3D volume data set, e.g. for projection in volume rendering.

Manipulating 3D data while displaying or updating several views at the same time, e.g. top, front, and side view or sagittal, coronal, and axial view for medical applications.

Virtual try-on or virtual 3D design systems, e.g. virtual dressing or fitting-rooms, virtual mannequins, virtual interior or garden design, architectural design, virtual car configurators.

For documents in this group the function of manipulating 3D objects is prevailing, not the details how it is achieved. Therefore, the documents are usually general and do not contain specific technical details, e.g. documents concerning the change of the viewpoint via a GUI are classified here whereas documents with mathematical details on the change of the viewpoint and the frustum are classified in [G06T 15/20](#).

## References

### Limiting references

*This place does not cover:*

CAD-CAM (Computer Aided Design and Manufacturing)	<a href="#">G05B 19/4097</a>
Generation of 3D objects with NC-machines	<a href="#">G05B 19/4099</a>
Interaction techniques for graphical user interfaces	<a href="#">G06F 3/048</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

2D cosmetic or hairstyle simulations	<a href="#">G06T 11/60</a>
Video games	<a href="#">A63F 13/00</a>
Computer-aided design	<a href="#">G06F 30/00</a>
Transformation of image signals corresponding to virtual viewpoints	<a href="#">H04N 13/111</a>

## Special rules of classification

The boundaries between [G06T 19/00](#) on the one hand, and [G06T 3/06](#) and subgroups and [G06T 3/08](#) on the other hand is not yet completely determined. Thus double classification should be considered.

The Indexing Code series [G06T 2219/00](#) and below is reserved for documents classified in [G06T 19/00](#) and subgroups. They should be allocated to documents in [G06T 19/00](#) whenever relevant:

<a href="#">G06T 2219/00</a>	Indexing scheme for manipulating 3D models or images for computer graphics: SHOULD BE EMPTY!
<a href="#">G06T 2219/004</a>	annotating, labelling: annotating or labelling of 3D models or 3D images with text or markers
<a href="#">G06T 2219/008</a>	cut plane or projection plane definition: positioning or defining a cut plane or a curved surface in a 3D volume data set, e.g. for projection in volume rendering

<a href="#">G06T 2219/012</a>	dimensioning, tolerancing: dimensioning or tolerancing of 3D models, e.g. display of dimension information for each part of the model
<a href="#">G06T 2219/016</a>	exploded view: displaying 3D models as an exploded view drawing
<a href="#">G06T 2219/021</a>	flattening: unfolding or flattening of 3D models or graphs in a 2D plane
<a href="#">G06T 2219/024</a>	multi-user, collaborative environment: collaborative environments, multi-user environments
<a href="#">G06T 2219/028</a>	multiple view windows (top-side-front-sagittal-orthogonal): manipulating 3D data while displaying or updating several views at the same time, e.g. sagittal, axial, and coronal view or top, side, and front view

The Indexing Code series [G06T 2219/20](#) and below is reserved exclusively for documents classified in [G06T 19/20](#). To each document classified in [G06T 19/20](#) at least one of the symbols from this series should be allocated:

<a href="#">G06T 2219/20</a>	Indexing scheme for editing of 3D models: SHOULD BE EMPTY!
<a href="#">G06T 2219/2004</a>	aligning objects, relative positioning of parts: aligning graphical objects or relative positioning of parts of a 3D model
<a href="#">G06T 2219/2008</a>	assembling, disassembling: assembling and disassembling of parts of a 3D model
<a href="#">G06T 2219/2012</a>	colour coding, editing, changing, or manipulating: colour modifications, e.g. colour coding, use of pseudo-colour, highlighting object parts in a different colour
<a href="#">G06T 2219/2016</a>	rotation, translation, scaling: Euclidian transformations of the object or parts thereof, i.e. rotation, translation/dragging/shifting, reflection/mirroring, or size changes of a 3D object or parts thereof
<a href="#">G06T 2219/2021</a>	shape modification: shape modifications of a 3D object, e.g. adding or deleting parts of the object, shearing, free-form deformations
<a href="#">G06T 2219/2024</a>	style variation: modifications of the display style, e.g. changes of patterns for surfaces, change of line drawing style (e.g. bold lines, dotted lines), displaying more details of an object or of parts thereof in a separate window

Furthermore, symbols from the Indexing Code series [G06T 2200/00](#) and below as well as [G06T 2210/00](#) and below should be allocated to documents in [G06T 19/00](#) and subgroups whenever relevant.

For the documents in the group [G06T 19/00](#) the following additional symbols from the Indexing Code series [G06T 2210/00](#) and below are especially relevant and should be allocated whenever possible:

For architectural design: [G06T 2210/04](#)

For bandwidth reduction: [G06T 2210/08](#)

Convex hull for 3D objects: [G06T 2210/12](#)

For virtual dressing rooms: [G06T 2210/16](#)

For collision detection of 3D objects: [G06T 2210/21](#)

For medical applications concerning e.g. heart, lung, brain, tumours: [G06T 2210/41](#)

## G06T 19/003

### {Navigation within 3D models or images}

#### Definition statement

*This place covers:*

Means or steps for generating a sequence of images of a virtual movement (e.g. flight, walk, sail) through a 3D space or scene.

Navigation path or flight path determination.

Virtual navigation within human or animal bodies or organs, e.g. virtual medical endoscopy of the colon, of the ventricular system, of the vascular system, of the bronchial tree, or within 3D objects, e.g. virtual inspection of pipeline tubes.

Walk- or flight-through a virtual museum, a virtual building, a virtual landscape etc.

#### References

##### Limiting references

*This place does not cover:*

Navigational instruments, e.g. visual route guidance using 3D or perspective road maps (including 3D objects and buildings)	<a href="#">G01C 21/3635</a> , <a href="#">G01C 21/3638</a>
Interaction techniques for GUIs, e.g. control of the viewpoint to navigate in a 3D environment	<a href="#">G06F 3/04815</a>

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

ICT specially adapted for processing medical images, e.g. editing	<a href="#">G16H 30/40</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Segmentation; Edge detection	<a href="#">G06T 7/10</a>
Analysis of geometric attributes	<a href="#">G06T 7/60</a>
3D animation	<a href="#">G06T 13/20</a>
Centreline of tubular or elongated structure	<a href="#">G06T 2207/30172</a>
Virtual racing games	<a href="#">A63F 13/803</a>

#### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Virtual angioscopy	virtual endoscopy of the vascular system
Virtual bronchoscopy	virtual endoscopy of the bronchial tree
Virtual colonoscopy	virtual endoscopy of the colon



Virtual ventriculography	virtual endoscopy of the ventricular system
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## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "virtual fly through navigation", "virtual navigation", "virtual flight", "virtual fly-through" and "virtual walk-through"

## G06T 19/006

**{Mixed reality (object pose determination, tracking or camera calibration for mixed reality [G06T 7/00](#))}**

### Definition statement

*This place covers:*

Means or steps for generating 3D mixed reality, i.e. displaying 3D virtual model data together with 2D or 3D real-world image data or for displaying 2D virtual model data together with 3D real-world image data, e.g. real volume data.

3D mixed reality encompasses 3D augmented reality and 3D augmented virtuality.

### References

#### Limiting references

*This place does not cover:*

Object pose determination, tracking or camera calibration for mixed reality	<a href="#">G06T 7/00</a>
Mixed reality by combining 2D virtual models or text with 2D real image data	<a href="#">G06T 11/00</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Head-up displays, head mounted displays	<a href="#">G02B 27/01</a>
With head-mounted left-right displays	<a href="#">H04N 13/344</a>
Volumetric display, i.e. systems where the image distributed through a volume	<a href="#">H04N 13/388</a>

## G06T 19/20

**Editing of three-dimensional [3D] images, e.g. changing shapes or colours, aligning objects or positioning parts**

### Definition statement

*This place covers:*

Means or steps for changing the visual appearance of the 3D object or parts thereof or for changing the position of the 3D object or parts thereof in the visualization environment.

Shape modifications of the 3D object, e.g. adding or deleting parts of the 3D object, shearing, free-form deformations.

## Definition statement

Colour modifications, e.g. colour coding, use of pseudo-colour, highlighting object parts in a different colour.

Modifications of the display style, e.g. changes of patterns for surfaces, change of line drawing style (e.g. stroke width and pattern), displaying more details of the object or of parts thereof in a separate window).

Shifting objects or parts thereof, aligning objects, rotating parts of the object or model, Euclidian transformations, size changes of the object or parts thereof.

Assembling and disassembling of object parts, connecting or mating different 3D parts.

## References

### Limiting references

*This place does not cover:*

Geometric transformations of the whole 3D object to change the viewpoint but without rendering details	<a href="#">G06T 19/00</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Geometric image transforms in the image plane	<a href="#">G06T 3/00</a>
Colour changes in 2D images	<a href="#">G06T 11/10</a>
Editing of 2D images	<a href="#">G06T 11/60</a>
Time-related zooming on 3D objects	<a href="#">G06T 13/20</a>
Time-related zooming on 2D images	<a href="#">G06T 13/80</a>

## Special rules of classification

For the documents in the group [G06T 19/00](#) the following additional symbols from the Indexing Code series [G06T 2210/00](#) and below are especially relevant. To each document classified in [G06T 19/20](#) at least one of the following symbols should be allocated:

For aligning objects, relative positioning of parts: [G06T 2219/2004](#)

For assembling, disassembling: [G06T 2219/2008](#)

For colour coding, editing, changing, or manipulating, pseudo-colours, highlighting: [G06T 2219/2012](#)

For rotation, translation, scaling: [G06T 2219/2016](#)

For shape modifications, adding or deleting parts, shearing, free form deformations: [G06T 2219/2021](#)

For modifications of the display style, e.g. changes of patterns for surfaces, change of line drawing style: [G06T 2219/2024](#)

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

DDM	Direct deformation method
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## G06T 2207/00

### Indexing scheme for image analysis or image enhancement

#### Definition statement

*This place covers:*

Indexing Codes that relate to

- the modality with which the processed image was acquired
- special algorithmic details, also in the sense of further breakdown of groups
- the imaged subject or the context of the image processing

#### Special rules of classification

Whenever classifying in [G06T 5/00](#) and [G06T 7/00](#), additional information should be classified using one or more of the Indexing Codes from the range of [G06T 2207/00](#). The use of the Indexing Codes is obligatory.

For Image acquisition modality, see Indexing Code [G06T 2207/10](#).

For Special algorithmic details, see Indexing Code [G06T 2207/20](#).

For Subject of image; Context of image processing, see Indexing Code [G06T 2207/30](#).

For example, the Indexing Codes would be used to classify that a model-based segmentation ([G06T 7/12](#) and [G06T 7/149](#)) using an active shape model ([G06T 2207/20124](#)) is done on a CT image ([G06T 2207/10081](#)) of the heart ([G06T 2207/30048](#)), or to classify that extrinsic camera parameters ([G06T 7/80](#)) are determined for an infrared camera ([G06T 2207/10048](#)) mounted on a car facing to the exterior of the car ([G06T 2207/30252](#)), wherein multiresolution image processing is used ([G06T 2207/20016](#)).

As a basic principle, the Indexing Codes from [G06T 2207/00](#) are applicable only in connection with [G06T 5/00](#) and [G06T 7/00](#).

However, not all Indexing Codes are applicable over the whole range of [G06T 5/00](#) and [G06T 7/00](#). The following restrictions apply:

- The Indexing Codes in the range [G06T 2207/20116](#) - [G06T 2207/20168](#) are applicable only together with [G06T 7/10](#) and subgroups.
- The Indexing Codes in the range [G06T 2207/20182](#) - [G06T 2207/20204](#) are applicable only together with [G06T 5/00](#) and subgroups.
- The Indexing Code [G06T 2207/20228](#) is applicable only together with [G06T 7/97](#).

The following Indexing Codes are only used as nodes to build the classification hierarchy and should not contain any documents, i.e. only their subgroups are used for classification:

- [G06T 2207/00](#)
- [G06T 2207/10](#)
- [G06T 2207/10004](#)
- [G06T 2207/10141](#)
- [G06T 2207/20](#)
- [G06T 2207/20024](#)
- [G06T 2207/20112](#)
- [G06T 2207/20172](#)
- [G06T 2207/30](#)

Moreover, the following Indexing Code is considered redundant in the context of image processing and is, thus, not used for classification:

- [G06T 2207/10004](#)

## G06T 2207/10

### Image acquisition modality

#### Definition statement

*This place covers:*

<a href="#">G06T 2207/10012</a>	Stereo images - image acquisition by two cameras or a single camera that is displaced acquire at least one stereo image pair
<a href="#">G06T 2207/10024</a>	Color image - image acquisition by color or multichannel camera; only to be used when color aspect is of some importance also in the processing
<a href="#">G06T 2207/10028</a>	Range image; Depth image; 3D point clouds - range image, depth image, surface image, i.e. 2D image providing depth information; 3D point clouds
<a href="#">G06T 2207/10032</a>	Satellite or aerial image; Remote sensing - satellite or aerial imaging; space-based; remote sensing; Fernerkundung (German expression)
<a href="#">G06T 2207/10036</a>	Multispectral image; Hyperspectral image - multispectral or hyperspectral radiometers in satellite or aerial imaging
<a href="#">G06T 2207/10068</a>	Endoscopic image - image acquisition by endoscopic instrument, e.g. ultrasound catheter, colonoscope, video endoscope, capsule/pill endoscope
<a href="#">G06T 2207/10084</a>	Hybrid tomography; Concurrent acquisition with multiple different tomographic modalities - image acquisition by hybrid tomographic scanner, i.e. by system that combines different tomographic modalities
<a href="#">G06T 2207/10112</a>	Digital tomosynthesis [DTS] - image from digital tomosynthesis [DTS], i.e. limited angle reconstruction based on radiographies
<a href="#">G06T 2207/10124</a>	Digitally reconstructed radiograph [DRR] - DRR reconstructed from 3D tomographic data
<a href="#">G06T 2207/10128</a>	Scintigraphy - image acquisition by scintigraphy or gamma camera
<a href="#">G06T 2207/10144</a>	Varying exposure - acquisition of multiple images with varying exposure parameters
<a href="#">G06T 2207/10148</a>	Varying focus - modification of focus during acquisition of single image or of multiple images
<a href="#">G06T 2207/10152</a>	Varying illumination - acquisition of multiple images with varying illumination conditions

**G06T 2207/20****Special algorithmic details****Definition statement***This place covers:*

<a href="#">G06T 2207/20008</a>	Globally adaptive - processing of whole image with the same parameters, e.g. the same filter weights, but parameters may vary from image to image
<a href="#">G06T 2207/20012</a>	Locally adaptive - processing of image in a locally differing manner; covers also the limiting of processing to a ROI
<a href="#">G06T 2207/20081</a>	Training; Learning - training or learning, e.g. of background for motion analysis or of model or atlas for segmentation
<a href="#">G06T 2207/20096</a>	Interactive definition of curve of interest - involving interactive definition of non-closed curve of interest; closed curve, see <a href="#">G06T 2207/20104</a>
<a href="#">G06T 2207/20104</a>	Interactive definition of region of interest [ROI] - involving interactive definition of ROI; setting of closed curve or box
<a href="#">G06T 2207/20132</a>	Image cropping - cutting out, cropping, i.e. defining automatically a ROI of simple shape, e.g. rectangular, circular, usually for limiting the further processing to the ROI; this place does not cover manual definition of the ROI: <a href="#">G06T 2207/20104</a>
<a href="#">G06T 2207/20156</a>	Automatic seed setting - automatic setting of seed, e.g. based on statistics of a region of interest, usually for subsequent region-growing or for edge-growing/following; this place does not cover manual seed-setting: <a href="#">G06T 2207/20101</a>
<a href="#">G06T 2207/20164</a>	Salient point detection; Corner detection - detection of salient points, e.g. corners, T-junctions, end points; this place does not cover automatic seed setting: <a href="#">G06T 2207/20156</a> ; salient points for pattern recognition: <a href="#">G06F 18/00</a>
<a href="#">G06T 2207/20201</a>	Motion blur correction - correcting motion blur in still image or video
<a href="#">G06T 2207/20208</a>	High dynamic range [HDR] image processing; - High Dynamic Range Imaging [HDR or HDRl] from a series of conventional images of lower dynamic range
<a href="#">G06T 2207/20216</a>	Image averaging - averaging of multiple images
<a href="#">G06T 2207/20221</a>	Image fusion; Image merging - image fusion, i.e. merging of images of same subject
<a href="#">G06T 2207/20224</a>	Image subtraction - subtraction of images of same subject, e.g. temporal subtraction, subtraction of images with varying illumination conditions or for masking out certain pre-segmented image parts

**G06T 2207/30****Subject of image; Context of image processing****Definition statement***This place covers:*

<a href="#">G06T 2207/30021</a>	Catheter; Guide wire - subject of image: catheter, endoscope or guide wire when imaged in biomedical image
<a href="#">G06T 2207/30052</a>	Implant; Prosthesis - subject of image: implant or prosthesis; also non-synthetical transplants
<a href="#">G06T 2207/30068</a>	Mammography; Breast - subject of image: mammography; breast, usage not limited to x-ray image
<a href="#">G06T 2207/30076</a>	Plethysmography - measurement of possibly periodic volume/size/position changes, e.g. due to blood flow
<a href="#">G06T 2207/30101</a>	Blood vessel; Artery; Vein; Vascular - subject of image: vascular structures, blood vessel, artery, vein, angiography
<a href="#">G06T 2207/30132</a>	Masonry; Concrete- inspection of concrete or masonry in buildings, dams, bridges, etc.
<a href="#">G06T 2207/30144</a>	Printing quality - inspection of printed product
<a href="#">G06T 2207/30152</a>	Solder - inspection of solder, electrical contacts
<a href="#">G06T 2207/30164</a>	Workpiece; Machine component - inspection of workpiece, e.g. machine component; Werkstück (German expression)
<a href="#">G06T 2207/30172</a>	Centreline of tubular or elongated structure - determining the centreline of a tubular or elongated structure, e.g. of a lumen, vessel, colon, pipe
<a href="#">G06T 2207/30176</a>	Document - enhancement or analysis of document image; this place does not cover document recognition: <a href="#">G06F 18/00</a> , <a href="#">G06V</a>
<a href="#">G06T 2207/30181</a>	Earth observation - earth observation with image from remote sensing
<a href="#">G06T 2207/30184</a>	Infrastructure - observation of infrastructure, e.g. urban infrastructure, roads, railway, water channel, power transmission line
<a href="#">G06T 2207/30188</a>	Vegetation; Agriculture - observation of vegetation areas , e.g. agriculture
<a href="#">G06T 2207/30192</a>	Weather; Meteorology - weather, meteorology, climate
<a href="#">G06T 2207/30204</a>	Marker - subject of image: artificial marker or symbol in image, e.g. used for calibration, registration or tracking
<a href="#">G06T 2207/30212</a>	Military - military application, e.g. target tracking

<a href="#">G06T 2207/30216</a>	Redeye defect - redeye defect detection and correction
<a href="#">G06T 2207/30232</a>	Surveillance - application in video surveillance
<a href="#">G06T 2207/30236</a>	Traffic on road, railway or crossing - subject of image: traffic on road, railway, crossing, square
<a href="#">G06T 2207/30241</a>	Trajectory - determination of trajectory, track, trace
<a href="#">G06T 2207/30244</a>	Camera pose - determination of camera pose, as opposed to the determination of the pose of image content
<a href="#">G06T 2207/30248</a>	Vehicle exterior or interior - imaging with camera placed on a vehicle, car, train, plane, boat or mobile robot
<a href="#">G06T 2207/30252</a>	Vehicle exterior; Vicinity of vehicle - subject of image: exterior of a vehicle; imaging from a vehicle
<a href="#">G06T 2207/30256</a>	Lane; Road marking - subject of image: lane, road marking, railroad, pathway
<a href="#">G06T 2207/30261</a>	Obstacle - subject of image: obstacle, e.g. pedestrian, other vehicle
<a href="#">G06T 2207/30264</a>	Parking - imaging from a vehicle, e.g. for parking aid
<a href="#">G06T 2207/30268</a>	Vehicle interior - subject of image: interior of a vehicle