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**Information technology — Multimedia  
content description interface —**

**Part 3:  
Visual**

**AMENDMENT 3: Image signature tools**

**iTeh STANDARD PREVIEW**

*Technologies de l'information — Interface de description du contenu  
multimédia —*

*Partie 3: Visuel*

*ISO/IEC 15938-3:2002/Amd 3:2009*

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**AMENDEMENT 3: Outils de signature d'image**

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 3 to ISO/IEC 15938-3:2002 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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# Information technology — Multimedia content description interface —

## Part 3: Visual

### AMENDMENT 3: Image signature tools

*Page 1, Scope*

*Replace 1.2 entirely with the following:*

#### 1.2 Overview of Visual Description Tools

This part of ISO/IEC 15938 specifies tools for description of visual content, including still images, video and 3D models. These tools are defined by their syntax in DDL and binary representations and semantics associated with the syntactic elements. They enable description of the visual features of the visual material, such as color, texture, shape, motion, localization of the described objects in the image or video sequence and also unique and robust identification of visual material. An overview of the visual description tools is shown in Figure 1.

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The basic structure description tools include five supporting tools of visual descriptions defined in clauses 6-11. They are categorized into two groups, descriptor containers and basic supporting tools. The former consists of three datatypes, GridLayout providing efficient representations of visual features on grids, TimeSeries representing temporal arrays of several descriptions, GofGopFeature describes representative descriptions over video segment, and MultipleView describing a 3D object using several pictures captured from different view angles. The latter contains two tools, Spatial2DcoordinateSystem used to specify the 2D coordinate system and TemporalInterpolation indicating the interpolation method between two samples on a time axis.

The remaining description tools, except for the FaceRecognition and ImageSignature descriptors, are associated with visual features and are grouped into five feature categories: Color, Texture, Shape, Motion and Localization.

The color description tools include five color descriptors to represent different aspects of color features: representative colors (DominantColor), color distribution (ScalableColor), spatial distribution of colors (ColorLayout and ColorStructure) and perceptual feeling of illumination color (ColorTemperature). It also contains three supporting tools, ColorSpace and ColorQuantization used in DominantColor and IlluminationInvariantColor to extend four color descriptors, DominantColor, ScalableColor, ColorLayout and ColorStructure, to support illumination invariant similarity matching. An extension of ScalableColor to a group of frames or pictures (GoFGoPColor) is also included in this group. All the color descriptors can be extracted from arbitrarily shaped regions.

The texture description tools facilitate browsing (TextureBrowsing) and similarity retrieval (HomogeneousTexture and EdgeHistogram) using the texture of a still or moving image region. All the texture descriptors can be extracted from arbitrarily shaped regions.

The shape description tools include two descriptors that characterize different shape features of a 2D object or region. The RegionShape descriptor captures the distribution of all pixels within a region and the Contour

Shape descriptor characterizes the shape properties of the contour of an object. The extension of RegionShape is also defined as ShapeVariation to describe temporal variation of shape over video segment. The Shape3D and Perceptual 3D Shape descriptors provide 3-dimensional shape information; the former represents an intrinsic shape characterization of 3D mesh models, and the latter represents part-based representation of a 3D object.

The motion description tools include four descriptors that characterize various aspects of motion. The CameraMotion descriptor specifies a set of basic camera operations such as, for example, panning and tilting. The motion of a key point (pixel) from a moving object or region can be characterized by the MotionTrajectory descriptor. The ParametricMotion descriptor characterizes an evolution of an arbitrarily shaped region over time in terms of a 2D geometric transformation. Finally, the MotionActivity descriptor captures the pace of the motion in the sequence, as perceived by the viewer. All motion descriptors except for CameraMotion can be extracted from arbitrarily shaped regions.

The localization description tools can be used to indicate regions of interest in the spatial (RegionLocator) and spatio-temporal (SpatioTemporalLocator) domains.

The FaceRecognition descriptor and the Advanced Face Recognition descriptor are not associated with any particular visual feature and can be used to describe a human face for applications requiring the matching and retrieval of face images.

The ImageSignature descriptor provides a "fingerprint" of an image that uniquely identify it. The signature is robust (unchanging) across a wide range of common editing operations, but is sufficiently different for every item of "original" content to identify it uniquely and reliably – just like human fingerprints. The ImageSignature has no direct association with specific visual features such as colour, shape or texture.

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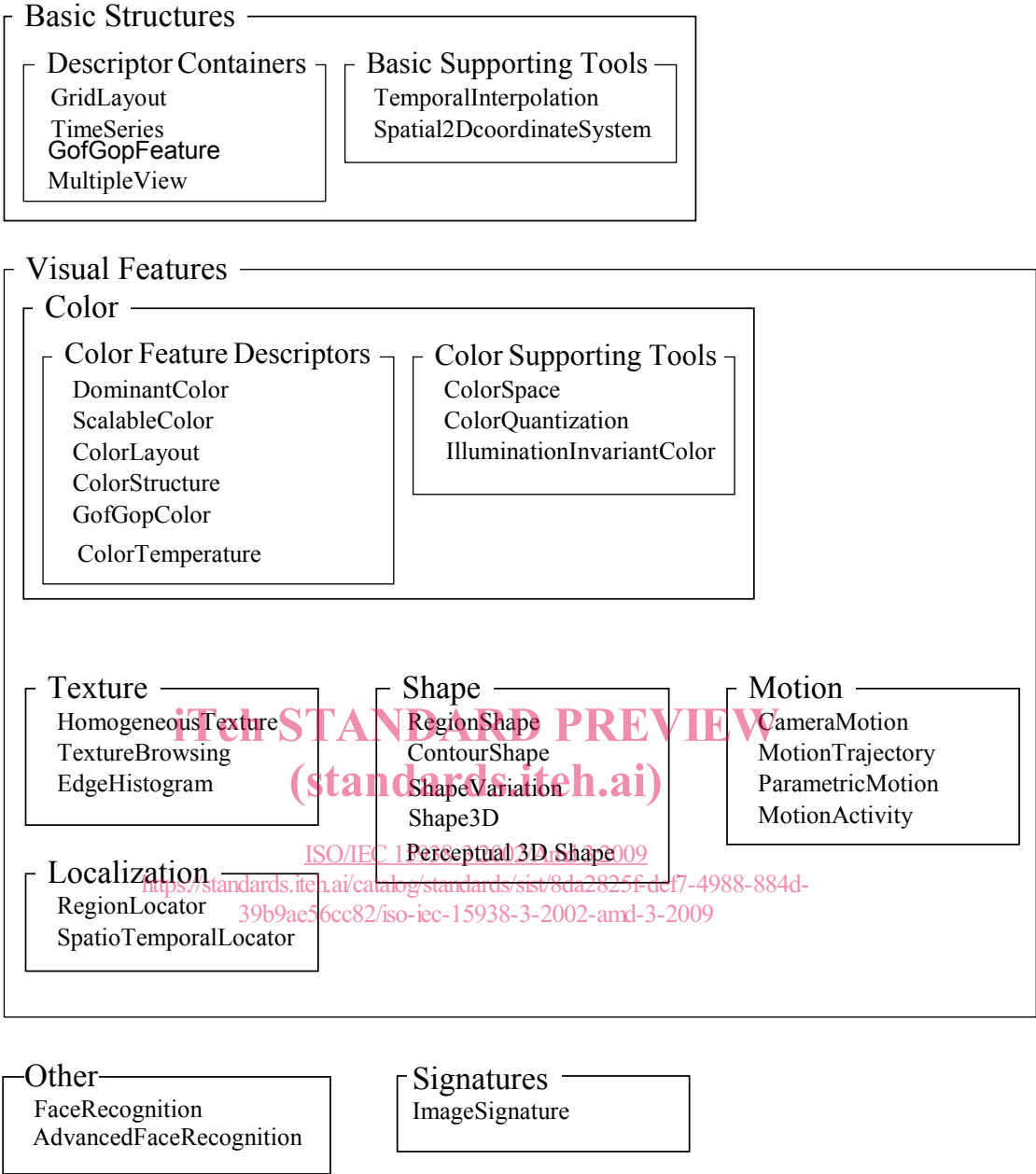


Figure 1 — Overview of Visual Description Tools

Replace 3.2 with:

### 3.2 Abbreviations

ART	Angular-Radial Transform
CSS	Curvature Scale Space
DDL	Description Definition Language
DS	Description Scheme
D	Descriptor
DCT	Discrete Cosine Transform
FOC	Focus of Contraction
FOE	Focus of Expansion
FFT	Fast Fourier Transform
GoF	Group of Frames
GoP	Group of Pictures
HMMD	Hue-Min-Max-Difference
HSV	Hue-Saturation-Value
RGB	Red-Green-Blue

Replace 4.2.2 with:

#### 4.2.2 Generic binary representation

The use of the video-specific syntax is signalled using the codec configuration mechanism defined in ISO/IEC 15938-1. The following classification scheme is defined for this purpose.

```
<ClassificationScheme uri="urn:mpeg:mpeg7;cs:VisualDescriptorCodecCS:2001">
  <Term termID="1">
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    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Camera Motion
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  <Term termID="2">
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  </Term>
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    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Quantization
      Codec</Definition>
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    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Space
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  </Term>
  <Term termID="5">
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    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Structure
      Codec</Definition>
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</Term>
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    Codec</Definition>
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  <Definition xml:lang="en">ISO/IEC 15938-3 Binary GoFGoP Color
    Codec</Definition>
</Term>
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  <Name xml:lang="en">MPEG7GridLayout</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Grid Layout
    Codec</Definition>
</Term>
<Term termID="12">
  <Name xml:lang="en">MPEG7HomogeneousTexture</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Homogeneous Texture
    Codec</Definition>
</Term>
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  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Irregular Time Series
    Codec</Definition>
</Term>
<Term termID="14">
  <Name xml:lang="en">MPEG7MotionActivity</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Motion Activity
    Codec</Definition>
</Term>
<Term termID="15">
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  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Motion Trajectory
    Codec</Definition>
</Term>
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  <Name xml:lang="en">MPEG7MultipleView</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Multiple View
    Codec</Definition>
</Term>
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</Term>
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  <Definition xml:lang="en">ISO/IEC 15938-3 Binary SpatioTemporal Locator
    Codec</Definition>
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    Codec</Definition>
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    Codec</Definition>
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  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Gof Gop Feature
    Codec</Definition>
</Term>
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    Codec</Definition>
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  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Shape Variation
    Codec</Definition>
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    Color Codec</Definition>
</Term>

```

```

<Term termID="31">
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Codec</Definition>
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Codec</Definition>
</Term>
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  <Name xml:lang="en">MPEG7ImageSignature</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Image Signature
Codec</Definition>
</Term>
</ClassificationScheme>

```

In 5.2.4, replace Table 1 with:

**Table 1 — Assignment of IDs to descriptors**

ID	Descriptor
0	Forbidden
1	CameraMotion
2	ColorLayout
3	ColorSpace
4	ColorStructure
5	ColorQuantization
6	ContourShape
7	DominantColor
8	EdgeHistogram
9	FaceRecognition
10	GoFGoPColor
11	GridLayout
12	HomogeneousTexture
13	IrregularVisualTimeSeries
14	MotionActivity
15	MotionTrajectory
16	MultipleView
17	ParametricMotion
18	RegionLocator
19	RegionShape
20	RegularVisualTimeSeries
21	ScalableColor
22	Shape3D
23	Spatial2DCoordinateSystem
24	SpatioTemporalLocator
25	TemporalInterpolation
26	TextureBrowsing
27	GofGopFeature
28	ColorTemperature
29	ShapeVariation
30	IlluminationInvariantColor
31	AdvancedFaceRecognition
32	Perceptual3DShape
33	ImageSignature
34-255	Reserved