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

**Part 3:  
Visual**

**AMENDMENT 1: Visual extensions**

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*Technologies de l'information — Interface de description du contenu  
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*ISO/IEC 15938-3:2002/Amd 1:2004*

*Partie 3: Visuel*

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**AMENDEMENT 1: Extensions visuelles**

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## Foreword

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Amendment 1 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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## Introduction

This document specifies the first Amendment to the Visual part of the ISO/IEC 15938 standard. The normative syntax of the Visual description tools is specified in this document using the Description Definition Language (DDL) and the normative semantics is specified using text.

The current set of relevant documents for the Visual description tools is given as follows:

ISO/IEC 15938-3 – Visual

ISO/IEC 15938-3/Amd.1 – Visual extensions

ISO/IEC TR 15938-8 – Extraction and use of MPEG-7 descriptions

ISO/IEC TR 15938-8/Amd.1 – Extensions of extraction and use of MPEG-7 descriptions

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# Information technology — Multimedia content description interface —

## Part 3: Visual

### AMENDMENT 1: Visual extensions

*Replace subclause 1.2 with:*

#### 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 and motion, as well as localization of the described objects in the image or video sequence. An overview of the visual description tools is shown in Figure 1.

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 descriptor, 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 descriptor provides an intrinsic shape characterization of 3D mesh models.

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 Advance 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.

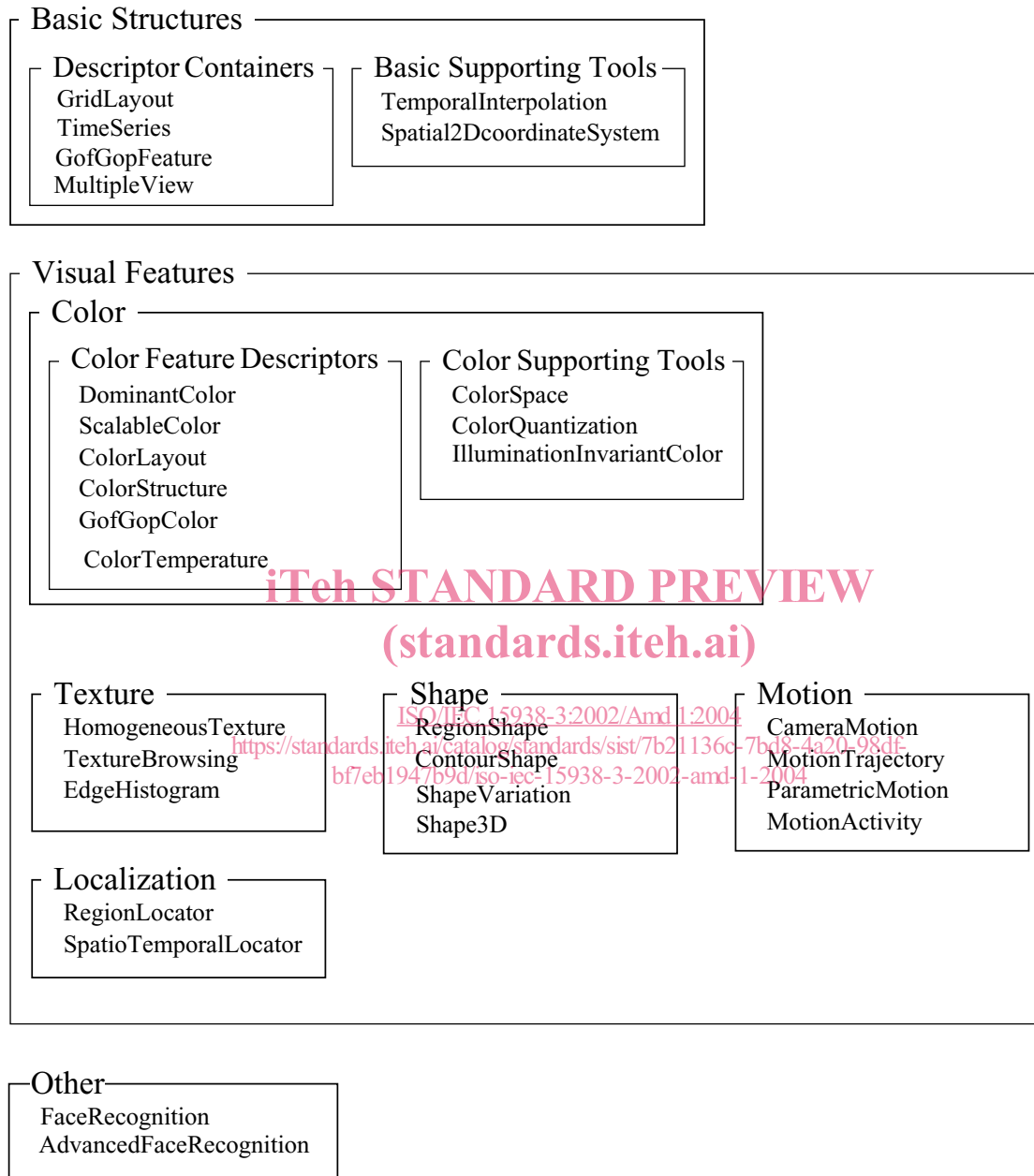


Figure 1 - Overview of Visual Description Tools

Extend the definitions in subclause 3.2:

NSVM      Negative Shape Variation Map

SVM	Shape Variation Map
LDA	Linear Discriminant Analysis
PCA	Principal Component Analysis
PCLDA	Linear Discriminant Analysis of Principal Components
MIRED	Micro REciprol Degree

*Extend the definitions in subclause 3.3:*

$\Re[z]$  Real part of a complex value  $z$

$\Im[z]$  Imaginary part of a complex value  $z$

*Replace subclause 4.2.2 with:*

#### 4.2.2 Generic binary representation

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

```
<ClassificationScheme uri="urn:mpeg:mpeg7:cs:VisualDescriptorCodecCS:2001">
  <Term termID="1">
    <Name xml:lang="en">MPEG7CameraMotion</Name>
    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Camera Motion
      Codec</Definition>
  </Term>
  <Term termID="2">
    <Name xml:lang="en">MPEG7ColorLayout</Name>
    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Layout
      Codec</Definition>
  </Term>
  <Term termID="3">
    <Name xml:lang="en">MPEG7ColorQuantization</Name>
    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Quantization
      Codec</Definition>
  </Term>
  <Term termID="4">
    <Name xml:lang="en">MPEG7ColorSpace</Name>
    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Space
      Codec</Definition>
  </Term>
  <Term termID="5">
    <Name xml:lang="en">MPEG7ColorStructure</Name>
    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Structure
      Codec</Definition>
  </Term>
  <Term termID="6">
    <Name xml:lang="en">MPEG7ContourShape</Name>
    <Definition xml:lang="en">ISO/IEC 15938-3 Binary Contour Shape
      Codec</Definition>
  </Term>
</ClassificationScheme>
```

```

</Term>
<Term termID="7">
  <Name xml:lang="en">MPEG7DominantColor</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Dominant Color
    Codec</Definition>
</Term>
<Term termID="8">
  <Name xml:lang="en">MPEG7EdgeHistogram</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Edge Histogram
    Codec</Definition>
</Term>
<Term termID="9">
  <Name xml:lang="en">MPEG7FaceRecognition</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Face Recognition
    Codec</Definition>
</Term>
<Term termID="10">
  <Name xml:lang="en">MPEG7FoFGoPColor</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary GoFGoP Color
    Codec</Definition>
</Term>
<Term termID="11">
  <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>
<Term termID="13">
  <Name xml:lang="en">MPEG7IrregularVisualTimeSeries</Name>
  <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">
  <Name xml:lang="en">MPEG7MotionTrajectory</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Motion Trajectory
    Codec</Definition>
</Term>
<Term termID="16">
  <Name xml:lang="en">MPEG7MultipleView</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Multiple View
    Codec</Definition>
</Term>
<Term termID="17">
  <Name xml:lang="en">MPEG7ParametricMotion</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Parametric Motion
    Codec</Definition>
</Term>
<Term termID="18">
  <Name xml:lang="en">MPEG7RegionLocator</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Region Locator
    Codec</Definition>

```

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```

</Term>
<Term termID="19">
  <Name xml:lang="en">MPEG7RegionShape</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Region Shape
    Codec</Definition>
</Term>
<Term termID="20">
  <Name xml:lang="en">MPEG7RegularVisualTimeSeries</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Regular Time Series
    Codec</Definition>
</Term>
<Term termID="21">
  <Name xml:lang="en">MPEG7ScalableColor</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Scalable Color
    Codec</Definition>
</Term>
<Term termID="22">
  <Name xml:lang="en">MPEG7Shape3D</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Shape 3D
    Codec</Definition>
</Term>
<Term termID="23">
  <Name xml:lang="en">MPEG7Spatial2DCoordinateSystem</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Spatial 2D Coordinate
    System Codec</Definition>
</Term>
<Term termID="24">
  <Name xml:lang="en">MPEG7SpatioTemporalLocator</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary SpatioTemporal Locator
    Codec</Definition>
</Term>
<Term termID="25">
  <Name xml:lang="en">MPEG7TemporalInterpolation</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Temporal Interpolation
    Codec</Definition>
</Term>
<Term termID="26">
  <Name xml:lang="en">MPEG7TextureBrowsing</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Texture Browsing
    Codec</Definition>
</Term>
<Term termID="27">
  <Name xml:lang="en">MPEG7GofGopFeature</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Gof Gop Feature
    Codec</Definition>
</Term>
<Term termID="28">
  <Name xml:lang="en">MPEG7ColorTemperature</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Color Temperature
    Codec</Definition>
</Term>
<Term termID="29">
  <Name xml:lang="en">MPEG7ShapeVariation</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Shape Variation
    Codec</Definition>
</Term>
<Term termID="30">
  <Name xml:lang="en">MPEG7IlluminationInvariantColor</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Illumination Invariant
    Color Codec</Definition>

```

```

</Term>
<Term termID="31">
  <Name xml:lang="en">MPEG7AdvancedFaceRecognition</Name>
  <Definition xml:lang="en">ISO/IEC 15938-3 Binary Advanced Face Recognition
  Codec</Definition>
</Term>
</ClassificationScheme>

```

Replace Table 1 in subclause 5.2.4 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
32-255	Reserved

Add after subclause 5.6:

## 5.7 GofGopFeature

### 5.7.1 Introduction

This container is a generic and extensible container to use several description tools defined in ISO/IEC 15938-3 to describe the representative feature over Group of Frames (GoF)/Group of Pictures (GoP). For the use to describe the transition of the feature through a video frame, VisualTimeSeries is much preferable.

### 5.7.2 DDL representation syntax

```

<!-- ##### -->
<!-- Definition of MPEG-7 GofGopFeature -->
<!-- ##### -->
<complexType name="GofGopFeature">
  <sequence>
    <element name="Descriptor" xsi:type="mpeg7:VisualDType"/>
  <sequence>
    <attribute name="aggregation" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="Average"/>
          <enumeration value="Median"/>
          <enumeration value="SplitMerge"/>
        </restriction>
      </simpleType>
    </attribute>
  </sequence>
</complexType>

```

### 5.7.3 Binary representation syntax

GofGopFeature {	Number of bits	Mnemonic
<b>AggregationFlag</b>	1	bsbf
if(AggregationFlag){		
<b>AggregationType</b>	3	bsbf
}		
<b>DescriptorID</b>	8	uimsbf
<b>SizeOfDescriptor</b>	8	uimsbf
<b>Descriptor</b>	see subclauses 5 to 8	bsbf
}		

### 5.7.4 Descriptor component semantics

#### DescriptorID

This field, which is only present in the binary representation, specifies a descriptor identifier. The descriptor identifier indicates the descriptor type accommodated in this container. The assignment of IDs to the descriptors is specified in Table 1 in subclause 5.2.4. The available value of this field is 2 for Color Layout, 7 for Dominant Color, 8 for Edge Histogram, and 12 for Homogeneous Texture. The other values are prohibited.

#### SizeOfDescriptor

This field, which is only present in the binary representation, specifies a size of following descriptor in bytes.

#### Descriptor

This element represents the elementary feature using several description tools defined in ISO/IEC 15938-3. The applicable tools are Dominant Color, Color Layout, Edge Histogram and Homogeneous Texture which are specified in subclause 6.4, 6.6, 7.4 and 7.2, respectively. The size of this element shall be a multiple of 8 bits, and be equal to the value of SizeOfDescriptor element in bits. For the alignment of byte boundary, '0' bits should be staffed just after the Descriptor bitstream.

#### AggregationFlag

This field signals the presence of aggregation attribute. If it is set to "1", the aggregation attribute is following.

**aggregation**

This optional field specifies the aggregation method to create representative feature from the ones extracted from group of frames/pictures. The aggregation is performed over all the elementary descriptions of the group of video frames or images. One of the three types of aggregation presented below is allowed. If the aggregation is not explicitly specified, one of the allowed aggregation methods for the embedded descriptor is used.

**Average**

The average aggregation means that each element of the Descriptor is computed by accumulating the corresponding elements over group of frame/picture and subsequently normalizing each accumulated value by the number of the frames/pictures.

**Median**

The median aggregation means that each element of the Descriptor is obtained by constructing the ascending list of element values over the frame/picture, and assigning the median of this list to the representative value.

**SplitMerge**

The SplitMerge aggregation is allowed to be used only for Dominant Color. When this method is used, the descriptors are first extracted from all frames/pictures and then merged into a single descriptor consisting of all representative color values (“Value” elements in subclause 6.3). The size of the resulting descriptor is then brought down to the limit imposed by the syntax of DominantColor descriptor by iterative merging of the closest dominant color “Value” elements, where closeness is defined by Euclidean distance in color space. The values of the merged “Value” element fields are as follows:

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$$W = \frac{w_1 + w_2}{N}$$

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$$M = \frac{w_1 * m_1 + w_2 * m_2}{w_1 + w_2}$$

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$$V = \frac{w_1 * v_1 + w_2 * v_2}{w_1 + w_2} + \frac{w_1 * w_2 * (m_1 - m_2)^2}{(w_1 + w_2)^2}$$

Where  $W$  ,  $M$  , and  $V$  are the values of the “Percentage”, “Index”, and “ColorVariance” fields of the merged “Value” element,  $w_1$ ,  $w_2$ ,  $m_1$ ,  $m_2$ , and  $v_1$ ,  $v_2$  are the corresponding fields of the elements being merged and  $N$  is the total number of frame/pictures. If SpatialCoherency field is used, it is simply averaged over all frames/pictures.

Note, the use of some of the aggregation methods is prohibited. The applicable methods for each description tool are specified using “Y” mark in Table Amd1-1.

**Table Amd1-1 - Applicable Aggregation Methods**

Description Tools	Average	Medium	SplitMerge
Color Layout	Y	Y	n/a
Edge Histogram	Y	Y	n/a
Homogeneous Texture	Y	Y	n/a
Dominant Color	n/a	n/a	Y

In the binary description, the following mapping table is used

AggregationType	Aggregation
000	Reserved
001	Average
010	Medium
011	SplitMerge
100-111	Reserved

Add after subclause 6.8:

## 6.9 Color Temperature

### 6.9.1 Introduction

This descriptor specifies the perceptual temperature feeling of illumination color in an image for browsing and display preference control purposes. Four perceptual temperature browsing categories are provided; hot, warm, moderate, and cool. Each category is used for browsing images based upon its perceptual meaning. This descriptor can be used to control the display quality of images or videos to either warmer or cooler direction so as to gratify user's preference.

### 6.9.2 DDL representation syntax

```

<!-- #####-->
<!-- Definition of MPEG-7 ColorTemperatureType -->
<!-- #####-->

<complexType name="ColorTemperatureType" final="#all">
  <complexContent>
    <extension base="mpeg7:VisualDType">
      <sequence>
        <element name="BrowsingCategory">
          <simpleType>
            <restriction base="string">
              <enumeration value="hot" />
              <enumeration value="warm" />
              <enumeration value="moderate" />
              <enumeration value="cool" />
            </restriction>
          </simpleType>
        </element>
        <element name="SubRangeIndex" type="mpeg7:unsigned6" />
      </sequence>
    </extension>
  </complexContent>
</complexType>

```

### 6.9.3 Binary representation syntax

ColorTemperature {	Number of bits	Mnemonic
<b>BrowsingCategory</b>	2	bslbf
<b>SubRangeIndex</b>	6	uimsbf
}		

#### 6.9.4 Descriptor component semantics

##### BrowsingCategory

This element specifies the category of perceptual temperature. The color temperature in the range from 1667K (Kelvin) to 25000K estimates the illumination color of an image. The temperature value out of this range shall be clipped to the corresponding range boundary value. A color temperature value is rounded with the first digit under the decimal point to be an integer. This color temperature range is divided and mapped into the 4 corresponding categories as defined in Table Amd1-2. The mapping between binary representation and semantics is also provided in Table Amd1-2.

**Table Amd1-2- Semantics of the Browsing Category field**

Browsing Category	Semantics	Temperature Range
00	Hot	Temperature < 2251K
01	Warm	2251K ≤ Temperature < 4171K
10	Moderate	4171K ≤ Temperature < 8061K
11	Cool	8061K ≤ Temperature

##### SubrangeIndex

This element specifies the sub-range index inside each browsing category. The temperature range for each category is uniformly quantized into 64 sub-ranges in MIREL ( $M/K^{-1}$ ). The color temperature range corresponding to each subrangeindex is provided in Table Amd1-3. A color temperature value is rounded with the first digit under the decimal point to be an integer.

**Table Amd1-3 - SubrangeIndex and its color temperature range for each category**

Index	Hot	Warm	Moderate	Cool
000000	[1667,1674)	[2251,2267)	[4171,4203)	[8061,8147)
000001	[1674,1681)	[2267,2284)	[4203,4235)	[8147,8235)
000010	[1681,1687)	[2284,2301)	[4235,4268)	[8235,8325)
000011	[1687,1694)	[2301,2318)	[4268,4301)	[8325,8417)
000100	[1694,1701)	[2318,2335)	[4301,4334)	[8417,8512)
000101	[1701,1709)	[2335,2352)	[4334,4369)	[8512,8608)
000110	[1709,1716)	[2352,2370)	[4369,4403)	[8608,8706)
000111	[1716,1723)	[2370,2388)	[4403,4439)	[8706,8807)
001000	[1723,1730)	[2388,2407)	[4439,4475)	[8807,8910)
001001	[1730,1737)	[2407,2425)	[4475,4511)	[8910,9015)
001010	[1737,1745)	[2425,2444)	[4511,4548)	[9015,9123)
001011	[1745,1752)	[2444,2464)	[4548,4586)	[9123,9234)
001100	[1752,1760)	[2464,2483)	[4586,4624)	[9234,9347)
001101	[1760,1767)	[2483,2503)	[4624,4663)	[9347,9464)
001110	[1767,1775)	[2503,2523)	[4663,4703)	[9464,9583)
001111	[1775,1782)	[2523,2544)	[4703,4743)	[9583,9705)
010000	[1782,1790)	[2544,2564)	[4743,4784)	[9705,9830)
010001	[1790,1798)	[2564,2586)	[4784,4826)	[9830,9959)
010010	[1798,1806)	[2586,2607)	[4826,4868)	[9959,10091)
010011	[1806,1814)	[2607,2629)	[4868,4912)	[10091,10226)
010100	[1814,1822)	[2629,2651)	[4912,4956)	[10226,10366)
010101	[1822,1830)	[2651,2674)	[4956,5000)	[10366,10509)
010110	[1830,1838)	[2674,2697)	[5000,5046)	[10509,10656)
010111	[1838,1846)	[2697,2720)	[5046,5092)	[10656,10807)
011000	[1846,1855)	[2720,2744)	[5092,5140)	[10807,10962)
011001	[1855,1863)	[2744,2769)	[5140,5188)	[10962,11123)

011010	[1863,1872)	[2769,2793)	[5188,5237)	[11123,11287)
011011	[1872,1880)	[2793,2818)	[5237,5287)	[11287,11457)
011100	[1880,1889)	[2818,2844)	[5287,5338)	[11457,11632)
011101	[1889,1897)	[2844,2870)	[5338,5390)	[11632,11813)
011110	[1897,1906)	[2870,2897)	[5390,5443)	[11813,11999)
011111	[1906,1915)	[2897,2924)	[5443,5497)	[11999,12191)
100000	[1915,1924)	[2924,2951)	[5497,5552)	[12191,12389)
100001	[1924,1933)	[2951,2979)	[5552,5609)	[12389,12594)
100010	[1933,1942)	[2979,3008)	[5609,5666)	[12594,12806)
100011	[1942,1951)	[3008,3037)	[5666,5725)	[12806,13025)
100100	[1951,1961)	[3037,3067)	[5725,5785)	[13025,13252)
100101	[1961,1970)	[3067,3097)	[5785,5846)	[13252,13487)
100110	[1970,1980)	[3097,3128)	[5846,5908)	[13487,13730)
100111	[1980,1989)	[3128,3160)	[5908,5972)	[13730,13982)
101000	[1989,1999)	[3160,3192)	[5972,6037)	[13982,14244)
101001	[1999,2009)	[3192,3225)	[6037,6104)	[14244,14515)
101010	[2009,2018)	[3225,3259)	[6104,6172)	[14515,14797)
101011	[2018,2028)	[3259,3293)	[6172,6241)	[14797,15090)
101100	[2028,2038)	[3293,3328)	[6241,6313)	[15090,15396)
101101	[2038,2049)	[3328,3364)	[6313,6385)	[15396,15713)
101110	[2049,2059)	[3364,3400)	[6385,6460)	[15713,16044)
101111	[2059,2069)	[3400,3437)	[6460,6536)	[16044,16390)
110000	[2069,2080)	[3437,3476)	[6536,6615)	[16390,16750)
110001	[2080,2090)	[3476,3515)	[6615,6695)	[16750,17127)
110010	[2090,2101)	[3515,3554)	[6695,6777)	[17127,17521)
110011	[2101,2112)	[3554,3595)	[6777,6861)	[17521,17934)
110100	[2112,2122)	[3595,3637)	[6861,6947)	[17934,18367)
110101	[2122,2133)	[3637,3680)	[6947,7035)	[18367,18821)
110110	[2133,2145)	[3680,3724)	[7035,7126)	[18821,19298)
110111	[2145,2156)	[3724,3768)	[7126,7219)	[19298,19799)
111000	[2156,2167)	[3768,3814)	[7219,7314)	[19799,20328)
111001	[2167,2179)	[3814,3861)	[7314,7412)	[20328,20886)
111010	[2179,2190)	[3861,3910)	[7412,7513)	[20886,21475)
111011	[2190,2202)	[3910,3959)	[7513,7616)	[21475,22098)
111100	[2202,2214)	[3959,4010)	[7616,7722)	[22098,22758)
111101	[2214,2226)	[4010,4062)	[7722,7832)	[22758,23459)
111110	[2226,2238)	[4062,4115)	[7832,7944)	[23459,24205)
111111	[2238,2251)	[4115,4171)	[7944,8061)	[24205,25001)

## 6.10 Illumination Invariant Color

### 6.10.1 Introduction

This descriptor wraps the color descriptors in ISO/IEC 15938-3 that are Dominant Color, Scalable Color, Color Layout, and Color Structure. Before extracting one of the DominantColor, ScalableColor, ColorLayout, and ColorStructure from an image, the pixel values shall be converted using a transformation which corresponds to changing the illumination to 6500K on the daylight locus.