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# Information technology — Multimedia content description interface —

## Part 14: Reference software, conformance and usage guidelines for compact descriptors for visual search

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

*Partie 14: Logiciels de référence, conformité et lignes directrices pour l'utilisation des descripteurs compacts pour recherche visuelle*

Reference number
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# Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

A list of all parts in the ISO/IEC 15938 series can be found on the ISO website.


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# Introduction

ISO/IEC 15938 (all parts) also known as "Multimedia Content Description Interface," provides a standardized set of technologies for describing multimedia content. It addresses a broad spectrum of multimedia applications and requirements by providing a metadata system for describing the features of multimedia content.

The following are specified in ISO/IEC 15938 (all parts).

— **Description schemes (DS)** describe entities or relationships pertaining to multimedia content. Description schemes specify the structure and semantics of their components, which may be Description Schemes, descriptors, or datatypes.

— **Descriptors (D)** describe features, attributes, or groups of attributes of multimedia content.

— **Datatypes** are the basic reusable datatypes employed by description schemes and descriptors

— **Systems tools** support delivery of descriptions, multiplexing of descriptions with multimedia content, synchronization, file format, and so forth.

ISO/IEC 15938 consists of 14 parts.

— **Part 1 – Systems**: specifies the tools for preparing descriptions for efficient transport and storage, compressing descriptions, and allowing synchronization between content and descriptions.

— **Part 2 – Description definition language**: specifies the language for defining the International Standard set of description tools (DSs, Ds, and datatypes) and for defining new description tools.

— **Part 3 – Visual**: specifies the description tools pertaining to visual content.

— **Part 4 – Audio**: specifies the description tools pertaining to audio content.

— **Part 5 – Multimedia description schemes**: specifies the generic description tools pertaining to multimedia including audio and visual content.

— **Part 6 – Reference software**: provides a software implementation of ISO/IEC 15938.

— **Part 7 – Conformance testing**: specifies the guidelines and procedures for testing conformance of implementations of ISO/IEC 15938.

— **Part 8 – Extraction and use of MPEG-7 descriptions**: provides guidelines and examples of the extraction and use of descriptions.

— **Part 9 – Profiles and levels**: provides guidelines and standard profiles.

— **Part 10 – Schema definition**: specifies the schema using description definition language.

— **Part 11 – Profile Schemas**: listing of profile schemas using description definition language.

— **Part 12 – Query format**: contains the tools of the MPEG Query Format (MPQF).

— **Part 13 – Compact descriptors for visual search**: specifies an image description tool for visual search applications.

— **Part 14 – Reference software, conformance and usage guidelines for compact descriptors for visual search**: provides the reference software, specifies the conformance testing, and gives usage guidelines for compact descriptors for visual search.

The compact descriptors for visual search (CDVS) tool specified in ISO/IEC 15938-13 is designed to enable efficient and interoperable visual search applications, allowing visual content matching in images. Visual content matching includes matching of views of objects, landmarks, and printed

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documents, while being robust to partial occlusions as well as changes in viewpoint, camera parameters, and lighting conditions.

ISO/IEC 15938-14:

— specifies the reference software for CDVS (Clause 5);

— specifies the conformance testing dataset, reference descriptors and conditions for CDVS (Clause 6);

— provides guidelines for the usage of CDVS (Clause 7).

The CDVS reference software is provided at http://standards.iso.org/iso-iec/15938/-14/ed-1/en.


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# Information technology — Multimedia content description interface —

# Part 14:
# Reference software, conformance and usage guidelines for compact descriptors for visual search

## 1 Scope

This document provides the reference software, specifies the conformance testing, and gives usage guidelines for ISO/IEC 15938-13.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

**3.1**
**image descriptor**
descriptor extracted from one image

**3.2**
**image descriptor length**
size of an image descriptor in bytes

Note 1 to entry: ISO/IEC 15938-13 specifies six average (i.e. over a large number of images) image descriptor lengths, i.e. 512 bytes, 1024 bytes, 2048 bytes, 4096 bytes, 8192 bytes and 16384 bytes.

**3.3**
**interest point**
point in an image showing detection stability under local and global perturbations in the image domain, including perspective transformations, changes in image scale, and illumination variations

**3.4**
**local region**
area in an image in the neighbourhood of an interest point, used to generate local feature descriptors

**3.5**
**local feature descriptor**
descriptor of a local region

**3.6**
**global descriptor**
aggregation of local feature descriptors into a compact representation of the image

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**3.7**
**compressed local feature descriptor**
compressed representation of a local feature descriptor

# 4 Symbols and abbreviated terms

## 4.1 General

NOTE The mathematical operators used in this part of ISO/IEC 15938 are similar to those used in the C programming language. Unless otherwise indicated, all the arithmetic operations are performed with real values. Numbering and counting conventions generally begin from 0.

## 4.2 Abbreviations

**CDVS** Compact Descriptors for Visual Search

**MPEG** Moving Picture Experts Group

**MPEG-7** ISO/IEC 15938

## 4.3 Arithmetic operations

**+** addition

**–** subtraction (as a binary operator) or negation (as a unary operator)

**++** increment by 1, i.e. x++ is equivalent to x=x+1

**--** decrement by 1, i.e. x-- is equivalent to x=x-1

**+=** increment by value, i.e. x+=y is equivalent to x=x+y

**-=** decrement by value, i.e. x-=y is equivalent to x=x-y

***** multiplication (in binary representation syntax and pseudo-code) or convolution (elsewhere)

**×** multiplication

**·** multiplication

**/** division

**÷** division

**%** modulo operator

## 4.4 Logical operators

**||** logical OR

**∨** logical OR

**&&** logical AND

**∧** logical AND

**!** logical NOT


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