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Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 5: Reference software for high efficiency video coding

Technologies de l'information — Codage à haute efficacité et livraison des médias dans des environnements hétérogènes —

Partie 5: Logiciel de référence pour le codage vidéo à haute efficacité

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 ISO documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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*, SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 23008-5:2015), which has been technically revised. It also incorporates ISO/IEC 23008-5:2015/Amd 1: 2016 and ISO/IEC 23008-5:2015/Amd 2:2016.

A list of all parts in the ISO/IEC 23008 series can be found on the ISO website.

Introduction

This document accompanies reference software for Rec. ITU-T H.265 | ISO/IEC 23008-2. The reference software includes both encoder and decoder functionality.

Reference software is useful in aiding users of a video coding standard to establish and test conformance and interoperability and to educate users and demonstrate the capabilities of the standard. For these purposes, the accompanying software is provided as an aid for the study and implementation of Rec. ITU-T H.265 | ISO/IEC 23008-2.

The software has been jointly developed by the ITU-T Video Coding Experts Group (VCEG, Question 6 of ITU-T Study Group 16) and the ISO/IEC Moving Picture Experts Group (MPEG).

Purpose

The purpose of this document is to provide the following:

— reference decoder software capable of decoding bitstreams that conform to Rec. ITU-T H.265 | ISO/IEC 23008-2 in a manner that conforms to the decoding process specified in Rec. ITU-T H.265 | ISO/IEC 23008-2;

— reference encoder software capable of producing bitstreams that conform to Rec. ITU-T H.265 | ISO/IEC 23008-2.

Examples of use

Some examples of uses that may be appropriate for the reference decoder software are as follows:

— as an illustration of how to perform the decoding process specified in Rec. ITU-T H.265 | ISO/IEC 23008-2;

— as the starting basis for the implementation of a decoder that conforms to Rec. ITU-T H.265 | ISO/IEC 23008-2;

— for testing the conformance of a decoder implementation with the decoding process specified in Rec. ITU-T H.265 | ISO/IEC 23008-2 (as the values of the samples in all decoded pictures and the relative ordering of those pictures will be identical from all conforming decoder implementations that support the profile and level used in a bitstream that conforms to Rec. ITU-T H.265 | ISO/IEC 23008-2);

— for testing the conformance of a bitstream to the constraints specified for bitstream conformance in Rec. ITU-T H.265 | ISO/IEC 23008-2, as the software can detect and report many bitstream conformance violations.

NOTE 1 However, the lack of the detection of any conformance violation by the reference decoder software should not be considered as definitive proof that the bitstream conforms to all constraints specified for bitstream conformance in Rec. ITU-T H.265 | ISO/IEC 23008-2.

Some examples of uses that may be appropriate for the reference encoder software are as follows:

— as an illustration of how to perform an encoding process that produces bitstreams that conform to the constraints specified for bitstream conformance in Rec. ITU-T H.265 | ISO/IEC 23008-2;

— as the starting basis for the implementation of an encoder that conforms to Rec. ITU-T H.265 | ISO/IEC 23008-2;

— as a means of generating bitstreams for testing the conformance of a decoder implementation with the decoding process specified in Rec. ITU-T H.265 | ISO/IEC 23008-2;

— as a means of evaluating and demonstrating examples of the quality that can be achieved by an encoding process that conforms to Rec. ITU-T H.265 | ISO/IEC 23008-2.

NOTE 2 However, no guarantee of the quality that will be achieved by an encoder is provided by its conformance to Rec. ITU-T H.265 | ISO/IEC 23008-2, as the conformance of an encoder to Rec. ITU-T H.265 | ISO/IEC 23008-2 is defined only in terms of format constraints imposed on the bitstream syntax. Thus, while the reference encoder software may suffice to provide some illustrative examples of what quality can be achieved in conformance to Rec. ITU-T H.265 | ISO/IEC 23008-2, it provides neither an assurance of minimum guaranteed video encoding quality nor maximum achievable video encoding quality.

Warranty disclaimer

Regardless of any and all statements made herein or elsewhere regarding the possible uses of the reference software, the following disclaimers of warranty apply to the provided reference software.

— ITU and ISO/IEC disclaim any and all warranties, whether expressed, implied, or statutory, including any implied warranties of merchantability or of fitness for a particular purpose.

— In no event shall the contributor(s), ISO/IEC or ITU be liable for any incidental, punitive, or consequential damages of any kind whatsoever arising from the use of these programs.

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— Information regarding the common patent policy for ITU-T/ITU-R/ISO/IEC is available from the ITU website at http://www.itu.int/en/ITU-T/ipr/Pages/policy.aspx.

Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 5:
Reference software for high efficiency video coding

1 Scope

This document provides accompanying reference software for Rec. ITU-T H.265 | ISO/IEC 23008-2 as an electronic attachment. The software is an integral part of this document.

The use of this reference software is not required for making an implementation of an encoder or decoder in conformance to Rec. ITU-T H.265 | ISO/IEC 23008-2. Requirements established in Rec. ITU-T H.265 | ISO/IEC 23008-2 take precedence over the behaviour of the reference software.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Recommendation ITU-T H.265 (2013), *High efficiency video coding for generic audiovisual services*

ISO/IEC 23008-2:2013, *Information technology — Coding of audio-visual objects — Part 2: High efficiency video coding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Rec. ITU-T H.265 | ISO/IEC 23008-2 and the following 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 http://www.iso.org/obp

3.1
bitstream
sequence of bits that may conform to Rec. ITU-T H.265 | ISO/IEC 23008-2

Note 1 to entry: A bitstream that conforms to Rec. ITU-T H.265 | ISO/IEC 23008-2 contains one or more slices.

[SOURCE: Rec. ITU-T H.265 | ISO/IEC 23008-2, 3.12, modified]

3.2
decoder
embodiment of a process that operates on a bitstream and may conform to the decoding process requirements specified for conformance to Rec. ITU-T H.265 | ISO/IEC 23008-2

Note 1 to entry: The scope of decoder, as considered herein, does not include a display process, which is outside the scope of this document.

[SOURCE: Rec. ITU-T H.265 | ISO/IEC 23008-2, 3.41, modified]

3.3
encoder
embodiment of a process, not specified in this document, that produces a bitstream

[SOURCE: Rec. ITU-T H.265 | ISO/IEC 23008-2, 3.50, modified]

3.4
reference software decoder
decoding software accompanying this document

3.5
reference software encoder
encoding software accompanying this document

4 Conventions

For the purposes of this document, relevant conventions are specified in Rec. ITU-T H.265 | ISO/IEC 23008-2, Clause 4.

5 Reference software for Rec. ITU-T H.265 | ISO/IEC 23008-2

The reference software for Rec. ITU-T H.265 | ISO/IEC 23008-2 is found in the electronic attachment to this document.

The attached software package contains three parts:

— HM software: Support for the following profiles:
  — Main, Main 10, and Main Still Picture profiles;
  — Monochrome, Monochrome 12 and Monochrome 16 profiles;
  — Main 12 profile;
  — Main 4:2:2 10 and Main 4:2:2 12 profiles;
  — Main 4:4:4, Main 4:4:4 10, and Main 4:4:4 12 profiles;
  — Main 4:4:4 Still Picture and Main 4:4:4 16 Still Picture profiles;
  — Main Intra, Main 10 Intra, Main 12 Intra, Main 4:2:2 10 Intra, Main 4:2:2 12 Intra, Main 4:4:4 Intra, Main 4:4:4 10 Intra, Main 4:4:4 12 Intra, and Main 4:4:4 16 Intra profiles;
  — High Throughput 4:4:4 16 Intra profile.
— SHM software: Support for the Scalable Main, Scalable Main 10, Scalable Monochrome, Scalable Monochrome 12, Scalable Monochrome 16, and Scalable Main 4:4:4 profiles;
— HTM software: Support for the Multiview Main and 3D Main profiles.