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Information technology — JPEG XS low-latency lightweight image coding system —

Part 2: Profiles and buffer models

Technologies de l'information — Système de codage d'images léger à faible latence JPEG XS —

Partie 2: Profils et modèles tampons

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Contents

Page

Foreword

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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 or www.iec.ch/members_experts/refdocs).

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For an explanation of 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 www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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

This second edition cancels and replaces the first edition (ISO/IEC 21122-2:2019), which has been technically revised.

The main changes are as follows:

— addition of new profiles to compress colour filter array images (CFA images), to allow mathematically lossless image compression, and to compress 4:2:0 colour sampled images.

A list of all parts in the ISO/IEC 21122 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

This document is part of a series of standards for a low-latency lightweight image coding system, denoted as JPEG XS.

While ISO/IEC 21122-1 specifies a full set of compression coding tools needed to satisfy all of the requirements of JPEG XS, a targeted application can often work with a simpler and reduced set of coding tools, and with or without tighter constraints, to meet its targeted goals. For this reason, profiles, levels, and sublevels are defined in this document. These three concepts facilitate partial and reduced complexity implementations of ISO/IEC 21122-1 for such specific application use cases, while also safeguarding interoperability.

This document specifies a limited number of profiles to represent interoperability subsets of the codestream syntax specified in ISO/IEC 21122-1 with each profile serving specific application use cases. In other word, profiles select a subset of the available coding tools. In addition, levels and sublevels provide limits to the maximum throughput in respectively the encoded (codestream) and the decoded (spatial/pixel) domains. In this way, profiles, levels and sublevels allow designing cost-efficient implementations that serve the needs of the desired applications.

In addition to being light-weight, another major requirement of JPEG XS is to allow low end-to-end latency, limited to a fraction of the frame size. To ensure this low-latency property, this document also specifies a buffer model, consisting of a decoder model and a transmission channel model. The models show the interaction of a hypothetical reference decoder, including its smoothing buffer with a constant bitrate channel feeding this buffer. The size of the decoder smoothing buffer is computed from the profile, level, and sublevel. Codestreams are formed such that the buffer of a decoder, operating according to this buffer model, never overflows or underflows. In effect, the buffer model provides encoders with the necessary information to generate codestreams that can be decoded by an arbitrary decoder implementation, ensuring system interoperability.

In addition to the size of the decoder smoothing buffer, end-to-end latency also depends on the latency inherent to each processing step of the encoding-decoding chain whose methods are described in ISO/IEC 21122-1. To help implementers estimate the latency of their device, this document gives extra information on the minimum latency that can be achieved by the different methods described in ISO/IEC 21122-1.

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Part 2: Profiles and buffer models

1 Scope

This document defines a number of subsets of the syntax specified in ISO/IEC 21122-1 as profiles. It also defines lower bounds on the throughput in the decoded domain via levels and the encoded domain via sublevels that a conforming decoder implementation shall support. Furthermore, it defines a buffer model to ensure interoperability between implementations in the presence of a latency constraint.

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.

ISO/IEC 21122-1, *JPEG XS low-latency lightweight image coding system — Part 1: Core coding system*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 21122-1 and the following apply.

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

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

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

3.1.1
blanking codestream fragment
placeholder *codestream fragment* representing blanking periods

3.1.2
buffer model
combination of a *decoder model* and a *channel model* whose behaviour can be defined by a set of parameters

3.1.3
buffer model instance
specific configuration of a *buffer model* specified by the assignment of well-defined values to the buffer model parameters

3.1.4
channel model
model describing the temporal behaviour of the *transmission channel* connecting an encoder and a decoder