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Information technology — MPEG video technologies —

Part 8:
Working practices using objective metrics for evaluation of video coding efficiency experiments

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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 Technical Committee ISO/IEC JTC1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T (as ITU-T HSTP-VID-WPOM (07/2020)).

A list of all parts in the ISO/IEC 23002 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.

Information technology — MPEG video technologies —

Part 8:
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1 Scope

This document provides general information about coding efficiency measurement practices for video coding. This document does not provide recommendations for evaluating video quality; it describes the practices that have recently been followed for coding efficiency experiments conducted during work to develop video coding standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following term and definition apply.

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

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

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

3.1
Bjøntegaard delta bit rate
BD-rate
average percentage bit rate difference at equal measured distortion, integrated across a range of bit rates in the log domain

Note 1 to entry: The Bjøntegaard delta bit rate measurement method was originally specified in VCEG-M33[1].

4 Abbreviated terms

AVC   advanced video coding (Rec. ITU-T H.264 | ISO/IEC 14496-10)

BD-rate   Bjøntegaard delta bit rate

HDR   high dynamic range

HEVC   high efficiency video coding (Rec. ITU-T H.265 | ISO/IEC 23008-2)

HLG   hybrid log gamma

JCT-VC   joint collaborative team on video coding (for development of HEVC)

JVET   joint video experts team (for development of VVC)

MPEG	moving picture experts group
MS-SSIM	multi-scale structural similarity
MSE	mean square error
PQ	perceptual quantizer (as defined in SMPTE ST 2084[10] and Rec. ITU-R BT.2100[11])
PSNR	peak signal-to-noise ratio
QP	quantization parameter
SDR	standard dynamic range
SSIM	structural similarity
VCEG	visual coding experts group
VMAF	video multimethod assessment fusion
VVC	versatile video coding (Rec. ITU-T H.266 | ISO/IEC 23090-3)
WCG	wide colour gamut
WVGA	wide video graphics array
$Y'C_BC_R$	colour space representation commonly used for video/image distribution, also written as YUV
YUV	colour space representation commonly used for video/image distribution, also written as $Y'C_BC_R$

5   Video coding experiments using Bjøntegaard delta bit rate (BD-rate) measurements

This document provides general information about coding efficiency measurement practices that have been used for video coding experiments for the development of video coding standards in the ITU-T SG 16 VCEG and ISO/IEC JTC 1/SC 29 MPEG communities. Such work has often been conducted together in the JVET and JCT-VC joint collaborative teams. In particular, the document describes the use of Bjøntegaard delta bit rate (BD-rate) measurements. It provides a concept-level overview of recent practices and provides references to other works that describe further details. It includes comments on why some of the choices were made and indicates situations where caution is needed when interpreting the results.

For comparing different encodings, often it is helpful to control the encodings so that similar types and degrees of encoder optimization are applied, except for the aspects to be tested.

When there are large differences between the coding technologies being tested, and especially when there can be a substantial difference between the resulting subjective quality, subjective testing (i.e. using humans to measure the visual quality) is the appropriate action. There are also cases where the quality difference is expected to be primarily a matter of subjective effect – for example, when measuring the effects of deblocking filters.

The video coding community has typically used formal subjective testing at the call for proposals and verification testing stages of projects for standardization (i.e. at the beginning and the end of the work). For measuring smaller effects and where formal subjective testing is not feasible, it is necessary to use objective measurements. Since objective measurements are collected at multiple operational points, and to better understand coding behaviour across all these points, what has commonly been used in this community is the technique known as the BD-rate (Bjøntegaard delta bit rate) comparison.[1]