



(JEG) HDR Project

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Agenda

Subjective and objective studies for HDR video quality measurement

HDR video database generation

Objective method development

Summary

Progress on HDR video quality

Extension of HEVC to HDR video compression

MPEG has reported some studies

Subjective studies carried at EBU, EPFL

IRCCyN conducted independent subjective studies

IRCCyN HDR video quality database

10 source HDR sequences



src1



src2



src3



src4



src5



src6



src7



src8

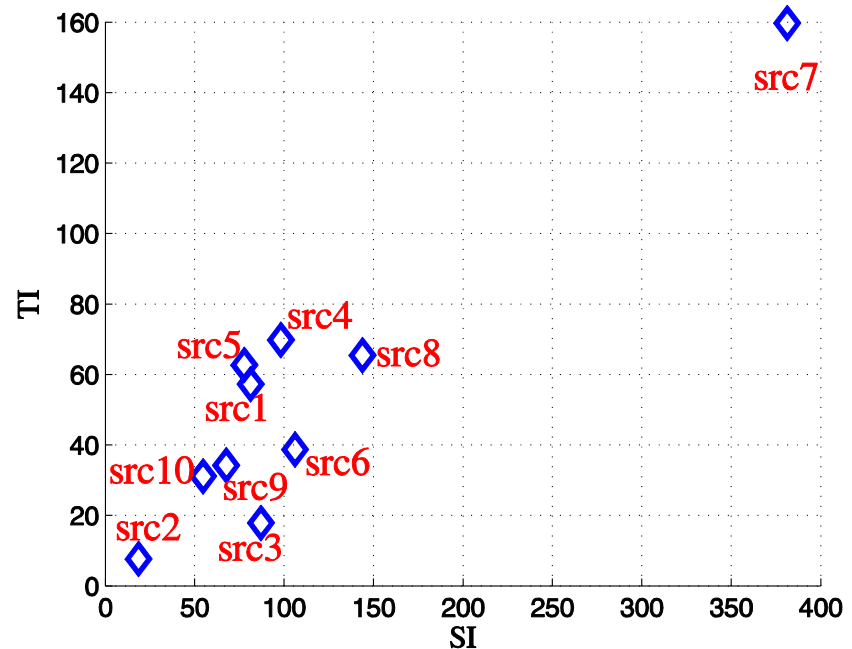
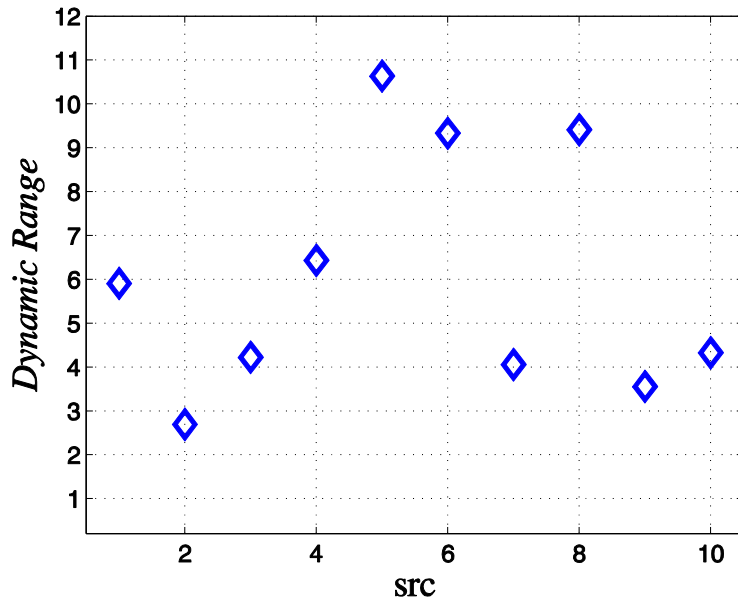


src9



src10

IRCCyN HDR video quality database



Dynamic range is defined as the maximum of the dynamic range of all frames

Notice it is > 3 for all sequences (except src2)

The content thus requires an HDR display

IRCCyN HDR video quality database

Employed a backward-compatible HDR video compression method

forward tone mapping in order to convert HDR video to LDR (8-bit precision)

compression and decompression of the LDR video by H.264/AVC

inverse tone mapping of the decoded (decompressed) LDR bit stream to reconstruct HDR video

IRCCyN HDR video quality database

8 HRCs (different QP values)

90 HDR sequences to be rated (10 src + 10*8 hrc)

25 observers

ACR-HR (hidden reference) method adopted

SIM2 Solar47 HDR display used

IRCCyN HDR video quality database

Even HDR displays require tone mapping!

Need a temporally coherent strategy

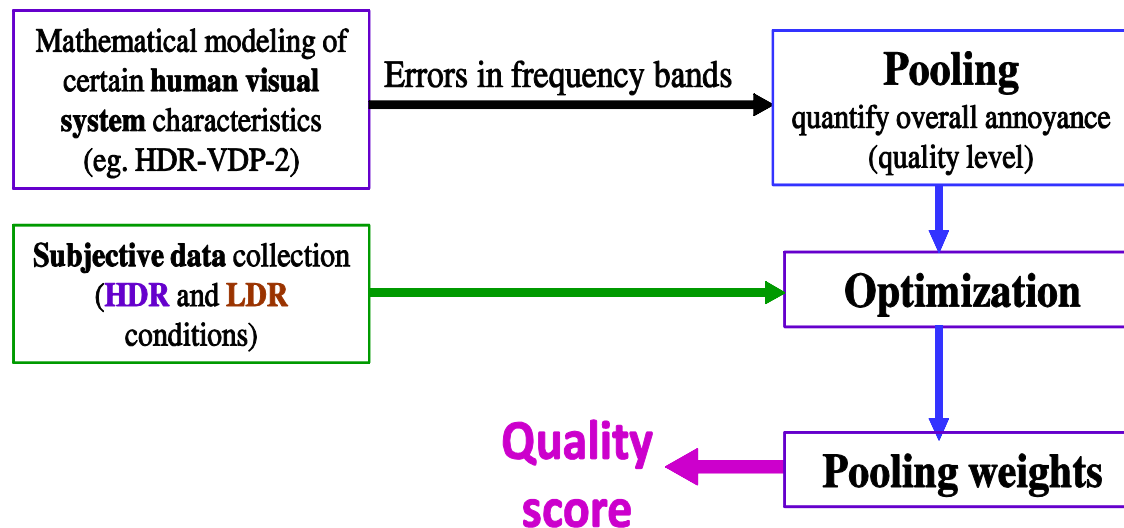
normalization factor was determined as the maximum of the mean of top 5% luminance values of all the frames in an HDR video sequence

Other strategies such as dual modulation may be used

Progress in objective measurement

Developed HDR-VDP-2.2

Improved pooling in the original HDR-VDP-2



Progress in objective measurement

HDR-VDP-2.2 trained on both HDR and LDR conditions (for static images)

Narwaria et al. “HDR-VDP-2.2: A calibrated method for objective quality prediction of high dynamic range and standard images”, *Journal of Electronic Imaging*, vol. 24, no. 1, p. 010501, 2015.

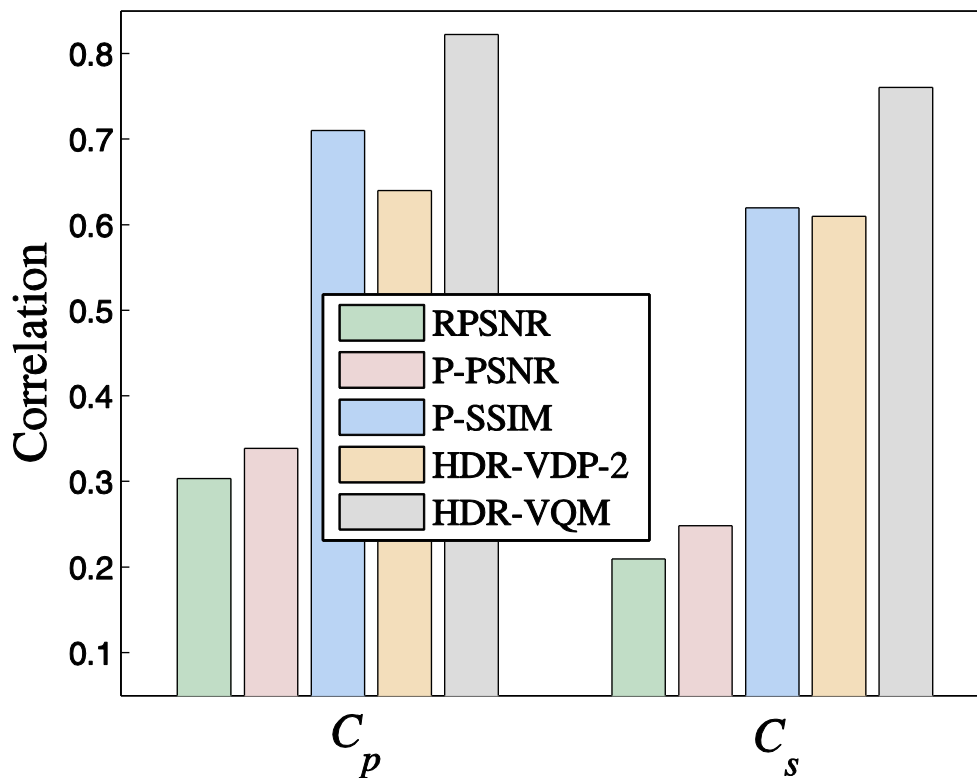
Software freely available at: <http://hdrvdp.sf.net/>

Progress in objective video quality measurement

Proposed HDR-VQM (one of the first method for HDR video)

Based on accurate display modeling

Progress in objective video quality measurement



Pearson and Spearman correlation comparison on HDR video dataset

Narwaria et al. "HDR-VQM: An Objective Quality Measure for High Dynamic Range Video, submitted to *Signal Processing: Image Communication*, 2015.

Summary

HDR database development at IRCCyN IVC:

– Visual attention

- How tone mapping affects human attention
- Modification of artistic intent
- Comprehensive evaluation of objective methods and solid statistical analysis

– Visual quality

- Study of tone mapping operators for quality
- Quality issues in local and global HDR codec optimization
- HDR database with corresponding subjective scores
- Useful to validate objective methods for HDR quality assessment

Summary

Useful tools for objective HDR quality assessment developed (HDR-VQM, HDR-VDP-2.2)

Software already released (or to be available shortly)

Summary

- HDR databases/resources for research community from IRCCyN IVC:
 - Eye-tracking on HDR and tone mapped images : the ETHyma database **Available at**

<http://www.irccyn.ec-nantes.fr/spip.php?article1194&lang=en>

- HDR quality databases:

<http://www.irccyn.ec-nantes.fr/spip.php?article1447>