Subjective assessment of stereoscopic video watermarking

TELECOM SudParis

HTI major 2013

cnrs dépasser les frontières — Artemis — Laboratoire MAP5

Project team

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3D LIVE PROJECT

Context

❑ 3D HD TV content

- explosive development
- network / terminal maturity
- pitfalls:
  - property rights
  - quality of experience

Original image

Marked image

Objectives

❑ Subjective quality evaluation:

- image quality
- depth perception
- visual comfort

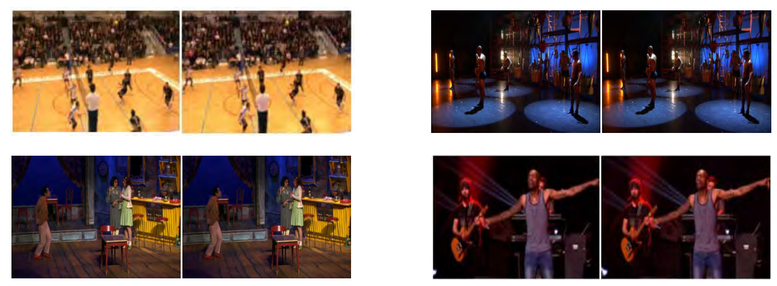
❑ Standard compliance

❑ Statistical relevance

3DLive database

❑ Significance, acceptability and exploitability

- 2h11min24sec (197000 stereoscopic pairs)
- full HD encoded (1920x1080 pixels)
- professional live TV content: sport, dancing, theater, rock



Protocol: ITU-R recommendation

❑ Observers & Viewing conditions

- 25 non-expert viewers with fine and dynamic stereopsis and normal visual acuity
- 47” LG LCD, full HD 3D monitor (1920x1080)
- 400cd/m² maximum brightness
- viewing distance =3x the screen sizes

❑ Statistical analysis

- MOS and its 95% confidence limits

❑ Methodology

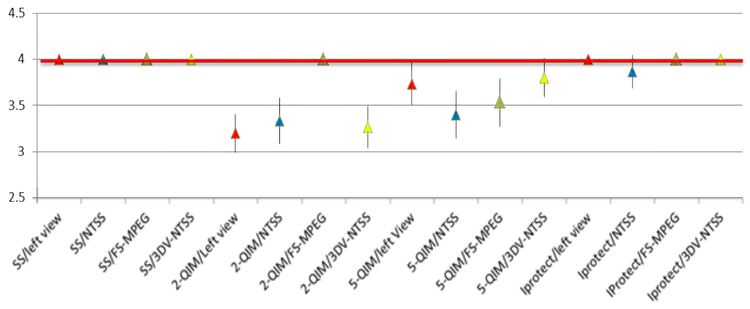
- double stimulus continuous quality scale
- 5 level quality scale (Bad=1, Excellent=5)

❑ Watermarking insertion

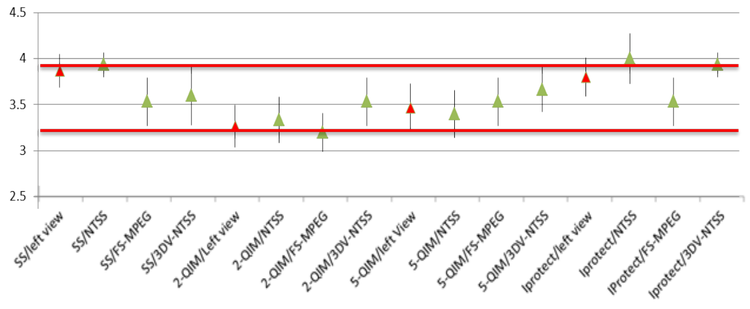
- domain (view-based, disparity-based: NTSS, FS-MPEG, 3DV-NTSS)
- technique (Spread Spectrum, 2-QIM, 5-QIM, IProtect)

Results:

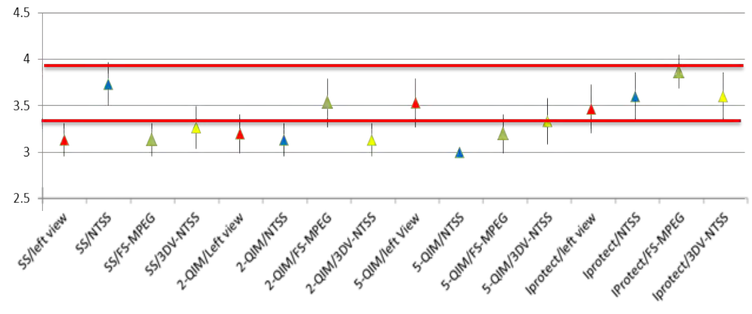
❑Image quality



❑Depth perception



❑Visual comfort



MOS & 95% confidence limit for each embedding technique/domain

Conclusions

❑ IProtect/3DV-NTSS

- visual quality equal to the original video
- depth perception better than the original video
- visual comfort close to original video

❑ Need for updating the ITU-Recommendations

- statistical relevance
- training session
- modified quality level scale

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