SUBJECTIVE QUALITY OF SVC-CODED VIDEOS WITH DIFFERENT ERROR-PATTERNS CONCEALED USING SPATIAL SCALABILITY

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► To cite this version:

Yohann Pitrey, Ulrich Engelke, Patrick Le Callet, Marcus Barkowsky, Romuald Pépion. SUBJECTIVE QUALITY OF SVC-CODED VIDEOS WITH DIFFERENT ERROR-PATTERNS CONCEALED USING SPATIAL SCALABILITY. Third European Workshop on Visual Information Processing (EUVIP), Jul 2011, Paris, France. paper number 67. hal-00608300

HAL Id: hal-00608300

<https://hal.science/hal-00608300>

Submitted on 12 Jul 2011

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Subjective quality of SVC-coded videos with different error-patterns concealed using spatial scalability

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EUVIP 2011, Paris

Network impairments and video transmission

- How to minimize visual distortions?
 - Stream protection
 - Error-concealment

SVC-based error-concealment

- 2 SVC spatial layers
 - BL : 320x240
 - EL : 640x480
- Loss only in EL
- Hypothesis
 - No loss in base layer
(base layer protection)

Principle of SVC error-concealment

Snapshot examples

enhancement layer

upscaled base layer

Factors having an impact on perceived quality

Length of impairment

Number of impairments

Interval between impairments

Base Layer Quality

Experimental setup

- Content generation :
 - 9 video contents
12 sec, 30 fps
 - 26 impairment patterns
+ 1 reference
 - SVC reference encoder
JSVM v9.18
 - Lanczos upscaler
QVGA → VGA
 - Impairment simulated on
the decoded videos (YUV)
 - first and last second not
impaired
- Test conditions :
 - ACR 5-levels scale
(ITU-T P.910)
 - Standard viewing conditions
(ITU-R BT.500)
 - 42" reference screen
 - 28 naïve viewers
 - 2 sessions of 45min with
5 min break after 20 min

Impairment patterns

- Systematic approach :
Several conditions for each influence factor
- Considered values for each influence factor :
 - Length : {2,8,16,32,64,128}
 - Number : {1,2,3,4}
 - Interval : {8,16,32,64,128}
 - BL Quality : QP = {38,44}

Experimental results

- Wide and balanced range of qualities
- Statistical significance analysis :
 - Student-t test
 - 95% intervals of confidence (*displayed on next slides*)

Impact of base layer quality

- Significant impact of base layer QP
- Stronger impact for long impairments

Impact of length of impairments

- Significant impact
- Linear decrease of quality / exp. increase of duration
- Slope of the decrease depends on base layer QP

Impact of number of impairments

- Significant but limited impact
- Depends on base layer QP

Impact of interval between impairments

- No significant impact !

Conclusion

- Ordering the influence on quality of the 4 factors :
 1. quality of the base layer
 2. length of impairments
 3. number of impairments
 4. interval between impairments
- Modeling the influence of the parameters
 - Linear decrease with the length of impairments
 - Significant dependence on the base layer coding quality
 - Joint impact of factors
- To be investigated :
 - Influence of the source content
 - Bit-rate constraints
- *Publication of video database*

Thank you for your attention

Questions?

Impact of impairments on perceived quality

Our goal : ***Study the factors that influence visual quality in this context***

4 factors :

- Impairments distribution :
 - Length of impairments (cumulated)
 - Number of impairments
 - Interval between impairments
- SVC error concealment :
 - Quality of the base layer (QP)