

Subjective Video Quality Assessment for Digital Television Systems

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Abstract – In this paper a research of video quality for digital television systems is presented and recommendations are given for improvement of video picture quality on the stage of content preparation and multiplexing.

Keywords – video stream, bitrate, digital television, picture quality, assessment.

I. INTRODUCTION

Due to increasing streams of video information in the modern world requirements are rising constantly to quality of the digital video content. Such task appears both for the producer of video product on the stage of preparation of telecasts and for provider, carrying out delivery of this video product to the spectators by means of digital satellite, cable or IP broadcasting.

II. VIDEO QUALITY ASSESSMENT

Quality of video picture can be measured by means of subjective and objective methods. The subjective methods of quality measurement give a result which closely corresponds to human perception, as they are based on the estimations given by experts in the process of watching the controlled video pictures. In this case it is impossible to change the bitrate on the stage of video content preparation, but such experiments give an opportunity to define correspondence between the quality estimations and bitrate of video stream for the different video scenes which can take place in video broadcasting.

In Table 1 description of nine test video sequences (TVS) is given which are compressed with the algorithm of MPEG-2 using different bitrates of video stream (2, 4, 6 and 8 Mbit/sec). These TVS were used for implementation of the experimental subjective quality assessment. Every TVS shown in Table 1 corresponds to the certain class of video sequence, which is described by some typical features - chromaticity, scaling, panning, presence of motion etc.

Fig. 1 shows the results of the experimental subjective quality assessments on the basis of mean opinion score (MOS) for TVS of different classes. For a subjective assessment the method of Double Stimulus Continuous Quality Scale (DSCQS) is used [1].

Analyzing the results of experiment, it is possible to conclude: 1) MOS fall down with diminishing of bitrate of digital video stream; 2) encoding of video sequences with bitrates less than 4 Mbit/sec causes the considerable degradation of picture quality in most cases; 3) at diminishing of bitrate of digital video stream the most

worsening of quality is observed in those TVSS, which contain dynamic scenes and wide range of colors; 4) the least quality degradation is observed on the artificially created images.

TABLE I
DESCRIPTION OF TVS

TVS class	TVS name	Description of TVS
1	Barcelona	Saturated color and effect of masking colors
2	Harp	Saturated color, scaling of image, light areas, thin details
3	Moving graphics	Critical for Betacam, color, moving text, thin letters, artificial nature of image
4	Canoe	Motion of water, backward motion, many details
5	F1 bolide	Rapid motion, saturated colors
6	In a cafe	Movie film, skin-colored, whip panning
7	Scrolling text	Text with horizontal scrolling
8	Rugby	Motion and colors, background green color
9	Calendar	Motion and colors

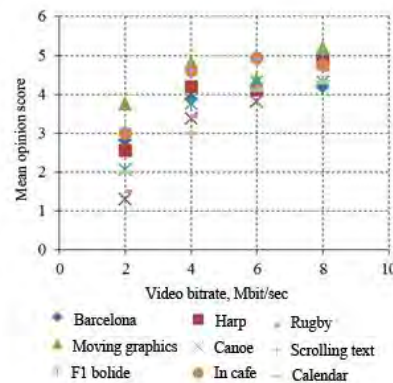


Fig. 1. Experimental results of quality assessment

III. CONCLUSION

Thus, for the improvement of picture video quality on the stages of content preparation and multiplexing, it is possible to redistribute dynamically the bitrates of video streams that form complete multiplexed stream of service provider by objective picture video quality estimation. Such approach can optimize bandwidth usage of transmission channel for digital TV service provider.

REFERENCES

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