COMPARATIVE STUDY OF COMPRESSION TECHNIQUES FOR SYNTHETIC VIDEOS

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ABSTRACT

We evaluate the performance of three state of the art video codecs on synthetic videos. The evaluation is based on both subjective and objective quality metrics. The subjective quality of the compressed video sequences is evaluated using the Double Stimulus Impairment Scale (DSIS) assessment metric while the Peak Signal-to-Noise Ratio (PSNR) is used for the objective evaluation. An extensive number of experiments are conducted to study the effect of frame rate and resolution on codecs' performance for synthetic videos. The evaluation results show that video codecs respond in different ways to frame rate and frame resolution change. H.264 shows superior capabilities compared to other codecs. Mean Opinion Score (MOS) results are shown for various bitrates, frame rates and frame resolutions.

KEYWORDS

CIF, DSIS, H.264, MOS, MPEG, QCIF, VP-8

1. INTRODUCTION

Synthetic videos are used by a wide variety of applications such as virtual reality tours, cartoons and games. Virtual reality tours require good compression techniques since they are often used in real time and require environment details to be shown. Online gaming has grown to become one of the largest entertainment sectors. More and more gamers upload videos of their games to video sharing websites or stream them live via online platforms such as Twitch TV. Therefore, video compression techniques are required to reduce the bitrate of gamers' video streams without compromising the quality. This study will investigate and compare the performance of the most popular standard video codecs on game and virtual reality videos. The compression of synthetic videos is a new research area. There are no specific studies on video codecs performance for synthetic videos.

In [1], a comparative study between H.264 and Motion JPEG2000 for high definition video coding was conducted. In [2], the performance of H.264, MPEG-4, H.263 and MPEG-2 were studied. The codecs were compared using (Peak Signal-to-Noise Ratio) PSNR and subjective measurements. In [3], an evaluation study of H.264 performance was conducted. The trade-off between coding efficiency and error resilience for network applications was considered, in addition to the end-to-end delay. In [4], an evaluation of perceptual visual quality under various settings and requirements was conducted. The subjective assessment tests were analyzed to study the influence of the different dimensions on the subjective evaluation. The considered dimensions are: encoder type, video content, bitrate, frame size and frame rate, where the only codecs used in the study were H.264 and H.263. In [5], a methodology was devised to evaluate the video

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