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Evaluation of Video Quality Metrics and Performance Comparison on Contents Taken from Most Commonly Used Devices

Authors : Pratik Dhabal Deo, Manoj P.

Abstract : With the increasing number of social media users, the amount of video content available has also significantly increased. Currently, the number of smartphone users is at its peak, and many are increasingly using their smartphones as their main photography and recording devices. There have been a lot of developments in the field of Video Quality Assessment (VQA) and metrics like VMAF, SSIM etc. are said to be some of the best performing metrics, but the evaluation of these metrics is dominantly done on professionally taken video contents using professional tools, lighting conditions etc. No study particularly pinpointing the performance of the metrics on the contents taken by users on very commonly available devices has been done. Datasets that contain a huge number of videos from different high-end devices make it difficult to analyze the performance of the metrics on the content from most used devices even if they contain contents taken in poor lighting conditions using lower-end devices. These devices face a lot of distortions due to various factors since the spectrum of contents recorded on these devices is huge. In this paper, we have presented an analysis of the objective VQA metrics on contents taken only from most used devices and their performance on them, focusing on full-reference metrics. To carry out this research, we created a custom dataset containing a total of 90 videos that have been taken from three most commonly used devices, and android smartphone, an IOS smartphone and a DSLR. On the videos taken on each of these devices, the six most common types of distortions that users face have been applied on addition to already existing H.264 compression based on four reference videos. These six applied distortions have three levels of degradation each. A total of the five most popular VQA metrics have been evaluated on this dataset and the highest values and the lowest values of each of the metrics on the distortions have been recorded. Finally, it is found that blur is the artifact on which most of the metrics didn’t perform well. Thus, in order to understand the results better the amount of blur in the data set has been calculated and an additional evaluation of the metrics was done using HEVC codec, which is the next version of H.264 compression, on the camera that proved to be the sharpest among the devices. The results have shown that as the resolution increases, the performance of the metrics tends to become more accurate and the best performing metric among them is VQM with very few inconsistencies and inaccurate results when the compression applied is H.264, but when the compression is applied is HEVC, SSIM and VMAF have performed significantly better.

Keywords : distortion, metrics, performance, resolution, video quality assessment
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