VITEQ: A GENERIC FRAMEWORK FOR NO-REFERENCE QUALITY EVALUATION OF VIDEO TESTIMONIALS

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ABSTRACT

This paper proposes a generic framework for no-reference quality evaluation of video testimonials. The global quality of the video testimonials is estimated by fusing the individual scores of a selection of spatial, temporal, audio and content-related metrics. Based on the global quality score, feedback is given to the user and the video/audio quality improver can be activated. Experiments on a large set of video testimonials show that the proposed objective evaluation closely matches the perception of users.

***Index Terms*—** Gamification**,** no-reference, quality analysis, user-generated content, video testimonials.

1. INTRODUCTION

Video testimonials are a fairly new trend. They are used to set up brand campaigns and video contests, or to give more personalized feedback on products, services and events. These user-generated videos (UGV) are, in general, short video clips that are authentic, attention-getting, and attractive. In addition, they can be more easily digested than written testimonials. Similar to other video-based social media applications, the success of testimonials, however, is highly dependent on the video/audio quality. As these UGVs are usually shot by untrained users in non-professional environments, most of them are not quality-controlled. Hence, these videos suffer from blurring, blocking, undesirable camera motion, and so on. All of these artifacts significantly affect the perception of the videos. Therefore, it is desirable to explore a visual quality assessment (VQA) framework for video testimonials.

Measuring the quality of video is a highly complex problem. Most of the work in this domain focuses on how closely the video resembles a reference. For testimonials, however, reference information is not available. In this case, no-reference (NR) or blind reference metrics should be used. These metrics have usually been designed for some specific types of distortions, such as blockiness [1] or sharpness [2]. Some of them, however, concentrate more on the generalized objective quality. Within our VIdeo TEstimonial Quality (VITEQ) framework, both types of NR quality assessment are supported.

2. PROPOSED FRAMEWORK

The flow chart of the proposed video testimonial evaluation framework is illustrated in Fig. 1. First, the video/audio capturing of the end user(s), i.e., the UGV, is evaluated within each of the four NR quality modules. These modules analyze the spatial, temporal, content and audio quality characteristics of the UGV. To what extent and which characteristics each module checks is defined in the content descriptor, which is delivered by the content manager(s). The content descriptor can, for example, include a content-related 'rule' to find faces in frontal position.

For each of the quality rules that are defined by the content managers, the NR evaluation outputs an individual quality score. In the next step of the evaluation framework, the quality fusion combines these individual scores into a global quality score. How much each of the individual scores weights is based on the content managers' dynamic weighting vector, the artifacts' perceptual strength and user-based quality ratings of similar testimonials. Finally, the global quality score is used to automatically rank and filter the testimonials, or to 'guide' the quality improver and the gamification module.

3. NO-REFERENCE QUALITY METRICS

Our current approach uses spatial, temporal, content and audio-related metrics to predict the quality perceived by the users. First, we have studied the effectiveness of which were defined as the 3 most important spatial factors: blur/sharpness, colorfulness and exposure.

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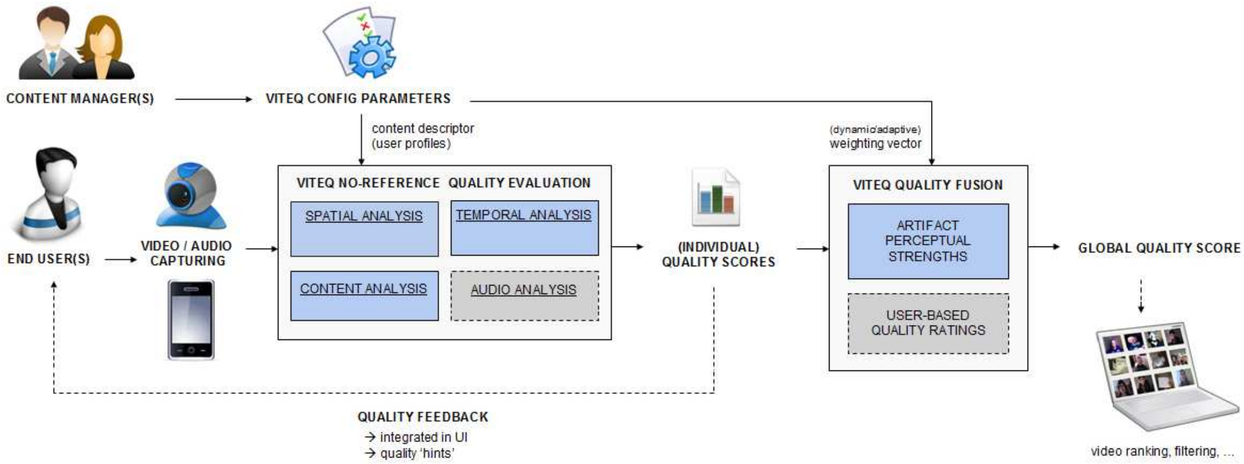

Figure 1: VITEQ video testimonial evaluation framework

Based on the NR perceptual blur metric in [3], we implemented a novel 2-step low-pass blurring metric which focuses on the loss of high frequency components of the video images. The colorfulness metric [4] examines the distribution of pixels in the HSV color space. The exposure metric is related to the intensity contrast and analyzes the distribution and spread of pixel values within the video image.

Compared with a static image, video also has temporal characteristics, e.g. camera motion and freezing. Currently, only the 'jerkiness' metric is incorporated in the VITEQ framework. In order to detect jerkiness (and frame freezing) it is sufficient to monitor the standard deviation σ_G of the temporal gradient between consecutive video images.

Finally, we also incorporated a number of content-related metrics. The most important of these metrics is our novel face-saliency metric, which uses negative/positive saliency based weighting in non-face/face regions. Only if a face appears in the most salient region of a video, it gets a high face-saliency score. Otherwise, for example in case of high motion in the background, the score will be low.

It is also important to remark that, although the main focus of our work is on visual quality analysis, VITEQ also contains a number of existing audio metrics. These metrics investigate the volume pattern, analyze the background noise and perform a frequency analysis.

4. POST-PROCESSING VITEQ MODULES

Based on the global quality score of the video testimonial, which is retrieved by fusing the 'weighted' individual scores, several post-processing modules can be activated. Currently, VITEQ supports a video quality improver and a face detection-based gamification module. Using this latter module, several game elements and animations can be overlayed on top of the user's facial key features (e.g., eyes, nose and mouth) in real time.

5. TEST SETUP AND EVALUATION

In order to test the proposed evaluation framework, we randomly selected videos from the BUBOBOX database [5]. For each of the selected testimonials, we gathered subjective quality scores of users and video experts, and subsequently compared these subjective scores to our global VITEQ quality scores. As shown by the demo results, VITEQ is able to accurately predict the subjective quality scores, i.e., we can estimate the user's perception of the quality of the video testimonials with an accuracy of 92%.

The demo setup also shows that the proposed framework is simple in use and that the proposed framework can easily be adjusted to the needs of the content provider. Furthermore, as each of the metrics has a low computational cost, VITEQ also runs at a high speed.

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