MOTION ESTIMATION AND COMPENSATION OF H.263 VIDEO VIA FOVEATION

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ABSTRACT

The two factors that limit the use of real-time video communications are network bandwidth and processing resources. The ITU-T H.263 standard [1, 2, 3] for video communication over wireless and wireline networks has high computational complexity. In the H.263 encoder, the most computational complex operation is motion estimation, even when using an efficient diamond search. The human visual system (HVS), however samples the external world with a non-uniform resolution. For example, Figure 1 shows the uniformly sampled original high-resolution image. The corresponding foveated image is shown in Figure 2. Utilizing this property the motion estimation and compensation can be done in a non-uniform way [4, 5, 6]. More bits can be allocated for these parameters in the central foveation area. Research along this direction is presented by Reeves and Robinson *et al.* [7, 8] and by Lee and Bovik *et al.* [9].

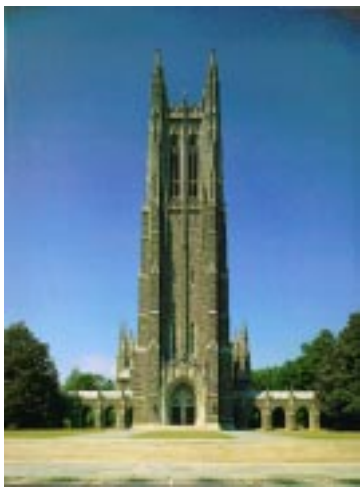

Figure 1: Unfoveated high-resolution image.

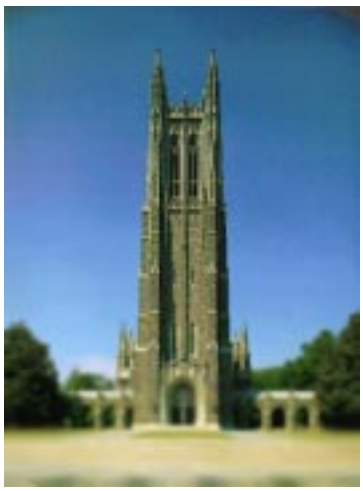

Figure 2: Corresponding foveated image.

The slice structured mode available in the H.263 standard allows various macroblocks in the picture frame to be combined to form a slice structure. Depending on the distance from the foveation center various slices can be formed. The number of bits allocated to each of these slices can be made a function of the distance from the foveation center. The will reduce the total number of bits required compared to unfoveated video. Apart from spatial foveation, we can also to temporal foveation, so that slices away from the foveation center can be updated less often. Since we do this operation based on the principle of foveation, the reconstructed video should appear to be perceptually lossless to the observer. Thus, we can reduce network bandwidth without sacrificing visual quality. In my project I will be implementing the above concept for the H.263 video coding standard.

1. REFERENCES

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