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SCALABLE TRANSCODING FOR DYNAMIC VIDEO RATE ADAPTATION (108 pp.)

Director of Thesis: Javed I Khan

This research investigates techniques for extreme scalable video communication. With the advent of more dynamic and heterogeneous network it seems rate transcoding is also becoming increasingly important. In network delivery of digital video, if the bandwidth required for a video is not available, the video has to be served at a reduced bit rate. Adaptation is also required if digital video have to be served to terminals with varying memory, processing power and display sizes. It is also highly desirable that the transcoding be carried out in real time while maintaining reasonable image quality. Besides speed and quality, another important challenge is the transcoding ratio. Current transcoding techniques use variants of quantization-based method and achieve transcoding ratio less than 1:10. But there is a need of larger compression ratio of digital video due to the advent of very low bit rate handheld devices. Hence approximately transcoding ratio of 1:50 on average is required. This ratio is predicted to deepen further in the future.

In this thesis we investigate a fast transcoding technique for expanding the transcoding ratio beyond the current state of the art. We propose a technique, which combines traditional quantization based technique with tiling. We also show how to determine the optimum operation point between the quantization step size and tile size. We also show technique for corresponding motion vector inference that can avoid costly motion vector estimation and achieve faster transcoding. We have implemented an MPEG-2 ISO/IEC 13818-2 complaint transcoding scheme using this technique. The system achieves a transcoding ratio of

approximately 1:60 on average. The thesis will present the technique and performance characteristics of this new transcoding system.