Abstract

In today's world, with advanced technology and easily available portable gadgets as enabler, video has become an important medium of communication. While the standard H.264/AVC has produced extremely good results, it has not been suitable for this application domain due to its computation intensive algorithms in the encoder. Specially in portable platform, power and complexity are important issues. Distributed Video Coding (DVC) is targeted towards a simple encoder, possibly at the cost of a complex decoder. The idea is based on Slepian-Wolf and Wyner-Ziv's information-theoretic results from the 1970s.

In this context, our approach is to find out a novel approach in DVC, to reduce encoder complexity further, using Local Rank Transform (LRT). LRT relies on the relative ordering of local intensity values, rather than the intensity values themselves for application on visual correspondence problem. It is thus immune to contrast and illumination variations, observed frequently in video frames. Application of LRT in the domain of DVC, to the best of our knowledge, has not been reported in literature before.

First, we have developed techniques for image reconstruction using LRT and then design a DVC codec using LRT. Our contributions in this work are

1. Image reconstruction algorithms using LRT.
2. Application of LRT in DVC encoding and decoding.
3. Designing efficient model for the computation and studying its complexity targeting efficient power usage in an embedded system.

The software simulation results show LRT based DVC encoder to be much faster than standard DVC encoder (LDPCA in Stanford architecture) available, though it suffers in PSNR. We show that, in power-rate-distortion model, LRT encoder outperforms LDPCA encoder in specific conditions.

Keywords: Distributed Video Coding, Local Rank Transform, LDPC, Image reconstruction.