Lehrstuhl für Bildverarbeitung

RWTH AACHEN UNIVERSITY

Master Thesis: Wavelet Packet based Residual Coding

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Background

Transformation is an important part to achieve compression in video coding. Traditionally the frames of a video are partitioned into rectangular blocks to achieve compression. Intra or inter prediction is applied on the rectangular blocks to decorrelate the signal. But the error signal after prediction is called residual which is then transformed using sinusoidal transformation to decorrelate the signal further. The family of sinusoid transformations (discrete cosine and discrete sinusoid with different boundary conditions) of different lengths is most commonly used for this task. In popular codec, there are options to combine different transformation techniques and also multi-stage transformation to have signal adaptivity. Wavelet packet is a generalized sub-band decomposition based on wavelet packets. A wavelet packet-based coding scheme (e.g. double tree algorithm) might unify all transformation techniques due to its inherent signal-adaptive nature.

Tasks

- Implement an alternate transform coding scheme
- Literature review on wavelet-based coding algorithms, appropriate wavelet filter kernels,
  lifting based implementation, quantization, and entropy coding scheme
- Investigate, implement and evaluate various components of the coding scheme

Requirements:

- Understanding and interest in signal processing
- Background knowledge on advanced topics in signal processing, multimedia communication system, video coding will be helpful
- Experience in programming

If you are interested, please send a short email to priyanka.das@lfb.rwth-aachen.de with your resume and current transcript.