EE771: Project Intent

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1 Tentative title

Compressed sensing and dictionary learning to alleviate tradeoff between temporal and spatial resolution

2 Research material to be consulted

1. "Video from a Single Coded Exposure Photograph using a Learned Over-Complete Dictionary", Y. Hitomi, J. Gu, M. Gupta, T. Mitsunaga and S.K. Nayar, IEEE International Conference on Computer Vision (ICCV), Nov. 2011.

2. "Efficient Space-Time Sampling with Pixel-wise Coded Exposure for High Speed Imaging", D. Liu, J. Gu, Y. Hitomi, M. Gupta, T. Mitsunaga and S.K. Nayar, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 36, No. 2, pp. 248260, Feb. 2014.

Some of the references within these papers will also be consulted as per requirement.

3 Abstract

The paper presents the fundamental tradeoff between temporal and spatial resolution for video acquisition. Efficient sampling and sparse representation of space-time volume can be used effectively to generate high-resolution high-speed video from a single exposure coded image. The coded image can be regarded as the compressed acquisition of the video data. Sampling matrices are chosen suitably for compressed sensing approach. An overcomplete dictionary capable of providing a sparse representation of videos is learned from video patches, available offline for training. For reconstruction of the video from the coded image, orthogonal matching pursuit algorithm is used. The method is shown to effectively alleviate the spatio-temporal tradeoff.

4 Summary of goals

1. Implementation of the method proposed in the paper

2. Suggest and experiment with possible modifications (eg. other sampling schemes)

3. Summarize experiments and results