Electrical & Computer Engineering

S E M I N A R

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New Results on Full-reference, Reduced-reference and No-reference Image Quality Assessment

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Abstract—Image quality assessment research aims to provide objective measures that can automatically predict perceived image quality. An image quality measure can play an important role in a wide variety of image processing applications, for system benchmarking, quality monitoring, and algorithm optimization purposes. This talk summarizes a number of our recent works on full-reference (FR), reduced-reference (RR) and no-reference (NR) image quality assessment. Specifically, we introduce an adaptive linear system framework for FR image distortion analysis. The major difference from standard linear analysis systems (such as Fourier and wavelet systems) is that the basic components are not fixed, but adaptively computed from the image signals being analyzed. For RR quality assessment, we propose a wavelet domain information distance measure based on a natural image statistic model. This gives an efficient RR method that works effectively for a wide range of distortion types. Finally, we show that complex wavelet transforms can be used to characterize the local phase structural regularity of natural images. This provides a novel theory that may explain how an image is perceived to be sharp or blurred, and implies a new NR algorithm for the detection and correction of space-variant blur.

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