

University of Rochester
Department of Electrical and Computer Engineering
Colloquia Series

Perceptual Texture Similarity and Structurally Lossless Image Compression

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2:00PM – 3:15PM
Gavett Hall, 202

Abstract: Texture is an important visual attribute both for human perception and image analysis systems. We present new structural texture similarity metrics and applications that critically depend on such metrics, with emphasis on image compression and content-based retrieval. The new texture similarity metrics account for human visual perception and the stochastic nature of textures. They rely entirely on local image statistics and allow substantial point-by-point deviations between textures that according to human judgment are similar or essentially identical. We also present new subjective testing procedures for objective texture similarity metrics. We identify three operating domains for evaluating the performance of such metrics, each of which has different performance goals and requires different testing procedures. Based on the new metrics, we present matched-texture coding, a new texture-based compression approach that is able to exploit texture redundancies for significant compression gains without loss of visual quality. We argue that it achieves structurally lossless compression, whereby the original and the compressed image may have visible point-by-point differences, but have similar quality and both could be considered as original images.

Bio: Thrasyvoulos Pappas received the Ph.D. degree in electrical engineering and computer science from MIT in 1987. From 1987 until 1999, he was a Member of the Technical Staff at Bell Laboratories, Murray Hill, NJ. He joined the EECS Department at Northwestern in 1999. His research interests are in human perception and electronic media, and in particular, image and video quality and compression, image and video analysis, content-based retrieval, model-based halftoning, and tactile and multimodal interfaces. Prof. Pappas is a Fellow of the IEEE and SPIE. He has served as editor-in-chief of the IEEE Transactions on Image Processing (2010-12), elected member of the Board of Governors of the Signal Processing Society of IEEE (2004-07), chair of the IEEE Image and Multidimensional Signal Processing Technical Committee (2002-03), and technical program co-chair of ICIP-01 and ICIP-09. Since 1997 he has been co-chair of the SPIE/IS&T Conference on Human Vision and Electronic Imaging.

Light refreshments will be provided.