

Join us

E111: PERCEPTUAL METRICS FOR IMAGE AND VIDEO QUALITY IN A BROADER CONTEXT: FROM PERCEPTUAL TRANSPARENCY TO STRUCTURAL EQUIVALENCE**Instructors:** Sheila Hemami, Draper, and Thrasyvoulos Pappas, Northwestern University (US) | **Sunday January 28, 1:30 – 5:45 PM****Course Level:** Intermediate (Prerequisites: Basic understanding of image compression algorithms; background in digital signal processing and basic statistics: frequency-based representations, filtering, distributions.) | **Fee:** Member: \$275/ Non-member: \$300 / Student: \$95
(*prices for all increase by \$50 after January 8, 2018)

The course examines objective criteria for the evaluation of image quality that are based on models of visual perception. The primary emphasis will be on image fidelity, i.e., how close an image is to a given original or reference image, but we will broaden the scope of image fidelity to include structural equivalence. Also discussed is no-reference and limited-reference metrics. An examination of a variety of applications with special emphasis on image and video compression is included. We examine near-threshold perceptual metrics, which explicitly account for human visual system (HVS) sensitivity to noise by estimating thresholds above which the distortion is just-noticeable, and supra-threshold metrics, which attempt to quantify visible distortions encountered in high compression applications or when there are losses due to channel conditions. The course also considers metrics for structural equivalence, whereby the original and the distorted image have visible differences but both look natural and are of equally high visual quality. This short course takes a close look at procedures for evaluating the performance of quality metrics, including database design, models for generating realistic distortions for various applications, and subjective procedures for metric development and testing. Throughout the course we discuss both the state of the art and directions for future research.

Benefits:

- Gain a basic understanding of the properties of the human visual system and how current applications attempt to exploit these properties.
- Gain an operational understanding of existing perceptually-based and structural similarity metrics and ways to evaluating their performance as noted above.

Intended Audience: Image and video compression specialists who wish to gain an understanding of how performance can be quantified. Engineers and scientists who wish to learn about objective image and video quality evaluation. Managers who wish to gain a solid overview of image and video quality evaluation. Students who wish to pursue a career in digital image processing. Intellectual property and patent attorneys who wish to gain a more fundamental understanding of quality metrics and the underlying technologies. Government laboratory personnel who work in imaging.

Instructors: **Thrasyvoulos N. Pappas** received SB, SM, and PhD in electrical engineering and computer science from MIT, after which he worked at Bell Laboratories. He is currently a professor in the department of electrical and computer engineering at Northwestern University. He is a chair of the HVEI Conference. Pappas is a Fellow of IEEE and SPIE. He is currently serving as Vice President-Publications for the Signal Processing Society of IEEE.

Sheila S. Hemami received her MSEE and PhD from Stanford; she is currently Director, Strategic Technical Opportunities, at Draper. Before that she was professor and chair of the electrical engineering and computer science department at Northeastern University, with HP Labs, and Cornell University. She is a Fellow of the IEEE and has received numerous university and national teaching awards.

SYMPOSIUM PLENARY TALKS

Monday: Overview of Modern Machine Learning and Deep Neural Networks – Impact on Imaging and the Field of Computer Vision, **Greg Corrado, co-founder of Google Brain and Principal Scientist at Google**

Tuesday: Fast, Automated 3D Modeling of Buildings and Other GPS Denied Environments, **Avideh Zahkor, Qualcomm Chair & Professor at UC Berkeley**

Wednesday: Ubiquitous, Consumer AR Systems to Supplant Smartphones, **Ronald T. Azuma, Intel Labs Researcher and Augmented Reality Pioneer**

SYMPOSIUM HIGHLIGHTS

- 18 conferences featuring 30 keynote talks by world reknown experts
- 3D Theatre
- Tours of Stanford University Labs
- Industry Exhibition
- Meet the Future: Showcase of Student and Young Professional Research
- Demonstration Session
- Poster Session
- Welcome Reception
- Women in Electronic Imaging Breakfast
- Human Vision in Electronic Imaging 30th Year Banquet

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