PURDUE UNIVERSITY | Elmore Family School of Electrical and Computer Engineering

Faculty Candidate Seminar -- Purdue Computes: AI/ML

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10:30 A.M. – 11:30 A.M.
MSEE 112

Learning to See the World in 3D

Abstract

Humans can effortlessly construct rich mental representations of the 3D world from sparse input, such as a single image. This is a core aspect of intelligence that helps us understand and interact with our surroundings and with each other. My research aims to build similar computational models–artificial intelligence methods that can perceive properties of the 3D structured world from images and videos. Despite remarkable progress in 2D computer vision, 3D perception remains an open problem due to some unique challenges, such as limited 3D training data and uncertainties in reconstruction.

In this talk, I will discuss these challenges and explain how my research addresses them by posing vision as an inverse problem, and by designing machine learning models with physics-inspired inductive biases. I will demonstrate techniques for reconstructing 3D faces and objects, and for reasoning about uncertainties in scene reconstruction using generative models. I will then discuss how these efforts advance us toward scalable and generalizable visual perception and how they advance application domains such as robotics and computer graphics.

Bio

Ayush Tewari is a postdoctoral researcher at MIT CSAIL with William Freeman, Vincent Sitzmann, and Joshua Tenenbaum. He previously completed his Ph.D. at the Max Planck Institute for Informatics, advised by Christian Theobalt. His research interests lie at the intersection of computer vision, computer graphics, and machine learning, focusing on 3D perception and its applications. Ayush was awarded the Otto Hahn medal from the Max Planck Society for his scientific contributions as a Ph.D. student.