HUMANITY CENTERED ROBOTICS INITIATIVE

BROWN

Kostas Daniilidis
University of Pennsylvania

"Geometry-aware Deep Learning: 3D Inference from Monocular Images and Event-Streams"

Thursday, October 4, 2018
12:00-12:50
CIT 477 Lubrano

Abstract: Traditional convolutional networks have shown unprecedented success in supervised classification yet they are still vulnerable to 3D geometric transformations in their inputs. While data augmentation might alleviate the intrinsic lack of invariance it leads to networks of unprecedented model complexity. We will start this talk by showing that we can achieve equivariance by performing group convolution either by using canonical coordinates or by working in the spectral domain. When we want to infer 3D pose from 2D images, annotation is hardly possible and we have to rely on minimal supervision or geometry constraints. We show that ordinal depth annotation or geometric consistency loss suffices for superior performance in 3D inference tasks. Last, we will switch to event-based cameras, a new vision paradigm, where self-supervised geometry-aware learning can enable optical flow computation and 3D odometry.

Kostas Daniilidis is the Ruth Yalom Stone Professor of Computer and Information Science at the University of Pennsylvania where he has been faculty since 1998. He is an IEEE Fellow. He was the director of the GRASP laboratory from 2008 to 2013, Associate Dean for Graduate Education from 2012-2016, and Faculty Director of Online Learning since 2016. He obtained his undergraduate degree in Electrical Engineering from the National Technical University of Athens, 1986, and his PhD in Computer Science from the University of Karlsruhe, 1992. He is co-recipient of the Best Conference Paper Award at ICRA 2017 and Best Student Paper Finalist at RSS 2018. His most cited works have been on visual odometry, omnidirectional vision, 3D pose estimation, 3D registration, hand-eye calibration, structure from motion, and image matching. Kostas' main interest today is in geometric deep learning, data association, and event-based cameras, as applied to vision based manipulation and navigation.

Host: Stefanie Tellex/HCRI