Mechanical Engineering Department Seminar

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1130 Mechanical Engineering

State of the Art Computer Vision Algorithms for Real-World Applications

Nikos Papanikolopoulos

Distinguished McKnight University Professor of Computer Science and Engineering, University of Minnesota

Computer vision entails mining information from images and video to extract meaningful information. We encounter state-of-the-art computer vision techniques every day—surveillance camera systems, face detection in our digital cameras, sports analysis, and the recent very popular Kinect system by Microsoft, to name a few. In all of these situations, computer algorithms process images and video to get useful information, so that a human user need not look through, say, hours and hours of surveillance footage. Computer vision research has come a long way over the decades, and today you can take a picture of an object on your cellphone camera and search for it, without typing a word. We will cover some of the cutting-edge computer vision algorithms we are developing at the Distributed Robotics Laboratory at the University of Minnesota. We will see techniques that try to understand the underlying notion of saliency in image information, which is used not only for improved object recognition and classification, but also for identifying peculiar objects—think of spotting the one car among thousands, which does not have a fuel door. Robust algorithms are being developed for everyday applications of identification of human actions such as walking, running, and waving, tracking and identification of persons across large surveillance networks, face detection and recognition, and even cancer recognition from images of tissue samples. These are some of the real-world problems that state-of-the-art computer vision algorithms tackle today.

Bio Nikolaos Papanikolopoulos received his Diploma of Engineering in Electrical and Computer Engineering, from the National Technical University of Athens in 1987. He received his M.S. in 1988 and PhD in 1992 in Electrical and Computer Engineering from Carnegie Mellon University. Professor Papanikolopoulos specializes in robotics, computer vision and sensors for transportation uses. His research interests include robotics, sensors for transportation applications, computer vision, and control systems. As the director of the Center for Distributed Robotics and a faculty member of the Artificial Intelligence and Robotic Vision Laboratory, his transportation research has included projects involving vision-based sensing and classification of vehicles, and the recognition of human activity patterns in public areas and while driving.