Tutorial

Session: Tutorial 3
Time: Wednesday, December 16, 09:00 – 12:20
Place: Room Y304

Introduction to Deep Learning and its applications in Computer Vision

Speakers: Wanli Ouyang, Xiaogang Wang, Department of Electronic Engineering, The Chinese University of Hong Kong (Hong Kong)

Abstract
Deep learning has become a major breakthrough in artificial intelligence and achieved amazing success on solving grand challenges in many fields including computer vision. Its success benefits from big training data and super parallel computational power emerging in recent years, as well as advanced model design and training strategies. In this talk, I will try to introduce deep learning and explain the magic behind it with layman terms. Through concrete examples of computer vision applications, I will illustrate four key points about deep learning. (1) Different than traditional pattern recognition systems, which heavily rely on manually designed features, deep learning automatically learns hierarchical feature representations from data and disentangles hidden factors of input data through multi- level nonlinear mappings. (2) Different than existing pattern recognition systems which sequentially design or training their key components, deep learning is able to jointly optimize all the components and crate synergy through close interactions among them. (3) While most machine learning tools can be approximated with neural networks with shallow structures, for some tasks, the expressive power of deep models increases exponentially as their architectures go deep. (4) Benefitting the large learning capacity of deep models, we also recast some classical computer vision challenges as high-dimensional data transform problems and solve them from new perspectives. The introduced applications of deep learning in computer vision will focus on object detection, segmentation, and recognition. Some open questions related to deep learning will also be discussed in the end.

Biographies
Wanli Ouyang received the PhD degree in the Department of Electronic Engineering, The Chinese University of Hong Kong, in which he is now a Research Assistant Professor. His research interests include image processing, deep learning, computer vision, and pattern recognition. He is a member of the IEEE. He served as the program chair in ACCV 2014 Workshop on deep learning on visual data. He is in the program committee for many prestigious conferences such as CVPR, ICCV, ECCV.

Xiaogang Wang received his Bachelor degree in Electrical Engineering and Information Science from the Special Class of Gifted Young at the University of Science and Technology of China in 2001, M. Phil. degree in Information Engineering from the Chinese University of Hong Kong in 2004, and PhD degree in Computer Science from Massachusetts Institute of Technology in 2009. He is an

assistant professor in the Department of Electronic Engineering at the Chinese University of Hong Kong since August 2009. He received the Outstanding Young Researcher in Automatic Human Behaviour Analysis Award in 2011, Hong Kong RGC Early Career Award in 2012, and Young Researcher Award of the Chinese University of Hong Kong. He is the associate editor of the Image and Visual Computing Journal. He was the area chair of ICCV 2011, ECCV 2014 and ACCV 2014. His research interests include computer vision, deep learning, crowd video surveillance, object detection, and face recognition.