IS&T International Symposium on

Electronic Imaging 2018
SCIENCE AND TECHNOLOGY

28 January – 2 February 2018
Hyatt San Francisco Airport, CA

Where Industry and Academia Meet

Join us

EI10: FUNDAMENTALS OF DEEP LEARNING

Instructors: Allison Gray, Nvidia, and Raymond Ptucha, Rochester Institute of Technology (US) | **Sunday January 28**, 1:30 – 5:45 PM

Course Level: Intermediate. Basic machine learning exposure and prior experience programming using a scripting language helpful.

Fee: Member: $275 / Non-member: $300 / Student: $95 (*prices for all increase by $50 after January 8, 2018)

Deep learning has been revolutionizing the machine learning community winning numerous competitions in computer vision and pattern recognition. Success in this space spans many domains including object detection, classification, speech recognition, natural language processing, action recognition and scene understanding. In some cases, results are on par with and even surpassing the abilities of humans. Activity in this space is pervasive, ranging from academic institutions to small startups to large corporations. This short course encompasses the two hottest deep learning fields: convolutional neural networks (CNNs) and recurrent neural networks (RNNs), and then gives attendees hands-on training on how to build custom models using popular open source deep learning frameworks. This short course describes what deep networks are, how they evolved, and how they differ from competing technologies. Examples are given demonstrating their widespread usage in imaging, and as this technology is described, indicating their effectiveness in many applications.

There are an abundance of approaches to getting started with deep learning, ranging from writing C++ code to editing text with the use of popular frameworks. After understanding how these networks are able to learn complex systems, a hands-on portion provided by Nvidia's Deep Learning Institute, we demonstrate usage with popular open source utilities to build state-of-the-art models. An overview of popular network configurations and how to use them with frameworks is discussed. The session concludes with tips and techniques for creating and training deep neural networks to perform classification on imagery, assessing performance of a trained network, and modifications for improved performance.

Benefits:
- To become familiar with deep learning concepts and applications.
- To understand how deep learning methods, specifically convolutional neural networks and recurrent neural networks work.
- To gain hands-on experience building, testing, and improving the performance of deep networks using popular open source utilities.

Intended Audience: Engineers, scientists, students, and managers interested in acquiring a broad understanding of deep learning. Prior familiarity with basics of machine learning and a scripting language are helpful.

Instructors: **Raymond Ptucha** is an assistant professor in computer engineering at RIT specializing in machine learning, computer vision, robotics, and embedded control. Ptucha worked on computational imaging algorithms as a research scientist at Kodak for 20 years where he was awarded 26 US patents with another 23 applications on file. He was awarded an NSF Graduate Research Fellowship in 2010; his PhD research earned the 2014 Best RIT Doctoral Dissertation Award.

Allison Gray is a solutions architect at Nvidia and supports customers interested in using graphics processing units to help them accelerate their applications. Before coming to Nvidia, she was a research engineer at the National Renewable Energy Laboratory in the Concentrating Solar Power group.

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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