

# WCCI 2014 Tutorial Abstract

## Large Scale Deep Learning

[http://www.cs.wayne.edu/xwchen/deep\\_learning](http://www.cs.wayne.edu/xwchen/deep_learning)

### **Presented by**

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### **Goal of the proposed tutorial**

Deep learning has been receiving great popularity from both academic and industrial communities due to its excellent performance in many practical problems such as speech and phone recognition, computer vision, information retrieval, and human motion modeling. The current sequential implementation of most deep learning algorithms, however, limits their applications to large-scale datasets due to their high memory requirement and huge time complexity. This is particularly true for Big Data applications.

The goal of this tutorial is to introduce recent developments of various deep learning methods for large-scale machine learning. Our main focus is on methods leveraging current computation power of multiprocessors (e.g., GPU) in parallel and distributed computing. We will introduce large-scale deep learning models, parallel and distributed computing, as well as large-scale data analysis using deep learning. We will also highlight some applications in different domains.

### **Outline of the covered material and the proposed format**

The tutorial will consist of two parts: parallel computing and GPU, implementation for large-scale deep learning:

#### Part I: Parallel Computing and GPU

- Basic parallel computing concepts
- Parallel Computing Models
- Parallel Computing Designs
- Shared Memory and Messages Passing
- General Purpose Computing on GPU (GPUPU)

- GPU Programming (CUDA programming model, memory hierarchy etc.)
- Performance Analysis and Optimizations

### Part III: GPU-based Implementation Issues for Large-scale Deep Learning

- Overview of the field (GPU-based large-scale deep learning)
- Data parallelism
- Parameter parallelism
- Other implementation issues
- Applications

### **Potential audience**

- Researchers working in deep learning and application areas
- Researchers working with large data analysis
- Researchers interested in big data analytics
- Industry scientists interesting in implementing large-scale learning
- Students interested in deep learning

### **Timeliness of the given tutorial**

The tutorial will last for about two hours.