**Intro to Deep Learning With TensorFlow & Keras**

**Overview**

The abundance of data and affordable cloud scale has led to an explosion of interest in Deep Learning. Google has open sourced a library called TensorFlow which has become the de-facto standard, allowing state-of-the-art machine learning done at scale, complete with GPU-based acceleration.

This course introduces Deep Learning concepts and TensorFlow and Keras libraries to students.

**What you will learn:**

* Introduction to Machine Learning
* Deep Learning concepts
* TensorFlow library
* Writing TensorFlow applications (CNN, RNN)
* Using TF tools
* High-level libraries: Keras

**Duration:**

3 Days

**Audience:**

Developers, Data analysts, data scientists

**Prerequisites:**

* Basic knowledge of Python language and Jupyter notebooks is assumed
* Basic knowledge of Linux environment would be beneficial
* Some Machine Learning familiarity would be nice, but not necessary

**Lab environment:**

Cloud servers will be provided students for installation, administration and lab work. Students would need an SSH client and a browser to access the cluster. Most labs will be in Jupiter notebook format.

**Detailed Course Outline**

1. **Introduction to Machine Learning**
   * Understanding Machine Learning
   * Supervised versus Unsupervised Learning
   * Regression
   * Classification
   * Clustering
2. **Introducing TensorFlow**
   * TensorFlow intro
   * TensorFlow features
   * TensorFlow versions
   * GPU and TPU scalability
   * Lab: Setting up and Running TensorFlow
3. **The Tensor: The Basic Unit of TensorFlow**
   * Introducing Tensors
   * TensorFlow Execution Model
   * Lab: Learning about Tensors
4. **Single Layer Linear Perceptron Classifier With TensorFlow**
   * Introducing Perceptrons
   * Linear Separability and XOR Problem
   * Activation Functions
   * Softmax output
   * Backpropagation, Loss functions, and Gradient Descent
   * Lab: Single-Layer Perceptron in TensorFlow
5. **Hidden Layers: Intro to Deep Learning**
   * Hidden Layers as a solution to XOR problem
   * Distributed Training with TensorFlow
   * Vanishing Gradient Problem and ReLU
   * Loss Functions
   * Lab: Feedforward Neural Network Classifier in TensorFlow
6. **High-level TensorFlow: tf.learn**
   * Using high-level TensorFlow
   * Developing a model with tf.learn
   * Lab: Developing a tf.learn model
7. **Convolutional Neural Networks in TensorFlow**
   * Introducing CNNs
   * CNNs in TensorFlow
   * Lab: CNN apps
8. **Introducing Keras**
   * What is Keras?
   * Using Keras with a TensorFlow Backend
   * Lab: Example with a Keras
9. **Recurrent Neural Networks in TensorFlow**
   * Introducing RNNs
   * RNNs in TensorFlow
   * Lab: RNN
10. **Long Short Term Memory (LSTM) in TensorFlow**
    * Introducing RNNs
    * RNNs in TensorFlow
    * Lab: RNN
11. **Conclusion**
    * Summarize features and advantages of TensorFlow
    * Summarize Deep Learning and How TensorFlow can help
    * Next steps