Course Description
The abundance of data and affordable cloud scale has led to an explosion of interest in Deep Learning. Google has released an excellent library called TensorFlow to open-source, allowing state-of-the-art machine learning done at scale, complete with GPU-based acceleration. This course introduces Deep Learning concepts and TensorFlow library to students. Tired of shallow courses that just show code without explaining more? We strive to provide a fundamental understanding of Deep Learning concepts and how TensorFlow implements them.

Learning Objectives
You will learn:
+ Introduction to Machine Learning
+ Deep Learning concepts
+ TensorFlow library
+ Writing TensorFlow applications (CNN, RNN)
+ Using TF tools
+ High level libraries : Keras

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 a SSH client and a browser to access the cluster. Most labs will be in jupyter notebook format.

Who Should Attend
+ Developers
+ Data Analysts
+ Data Scientists
Course Content

1. Introduction to Machine Learning
   + Understanding Machine Learning
   + Supervised vs. 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

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