Deep Learning With TensorFlow and Keras

Course Summary

Description
This course introduces Deep Learning concepts and TensorFlow library to students.
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.

Objectives
After taking this course, students will have learned:
- Introduction to Machine Learning
- Deep Learning concepts
- TensorFlow library
- Writing TensorFlow applications (CNN, RNN)
- Using TF tools
- High level libraries: Keras

Topics
- Introduction to Machine Learning
- Introducing TensorFlow
- The Tensor: The Basic Unit of TensorFlow
- Single Layer Linear Perceptron Classifier With TensorFlow
- Hidden Layers: Intro to Deep Learning
- High level TensorFlow: tf.learn
- Convolutional Neural Networks in TensorFlow
- Introducing Keras
- Recurrent Neural Networks in TensorFlow
- Long Short Term Memory (LSTM) in TensorFlow
- Conclusion

Audience
This course is designed for Developers, Data analysts, and 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.

Duration
Three Days
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Course Outline

I. Introduction to Machine Learning
   A. Understanding Machine Learning
   B. Supervised versus Unsupervised Learning
   C. Regression
   D. Classification
   E. Clustering

II. Introducing Tensorflow
   A. Tensorflow intro
   B. Tensorflow Features
   C. Tensorflow Versions
   D. GPU and TPU scalability
   E. Lab: Setting up and Running Tensorflow

III. The Tensor: The Basic Unit of Tensorflow
   A. Introducing Tensors
   B. Tensorflow Execution Model
   C. Lab: Learning about Tensors

IV. Single Layer Linear Perceptron Classifier With Tensorflow
   A. Introducing Perceptrons
   B. Linear Separability and Xor Problem
   C. Activation Functions
   D. Softmax output
   E. Backpropagation, loss functions, and Gradient Descent
   F. Lab: Single-Layer Perceptron in Tensorflow

V. Hidden Layers: Intro to Deep Learning
   A. Hidden Layers as a solution to XOR problem
   B. Distributed Training with Tensorflow
   C. Vanishing Gradient Problem and ReLU
   D. Loss Functions
   E. Lab: Feedforward Neural Network Classifier in Tensorflow

VI. High level Tensorflow: tf.learn
   A. Using high level tensorflow
   B. Developing a model with tf.learn
   C. Lab: Developing a tf.learn model

VII. Convolutional Neural Networks in Tensorflow
   A. Introducing CNNs
   B. CNNs in Tensorflow
   C. Lab: CNN apps

VIII Introducing Keras
   A. What is Keras?
   B. Using Keras with a Tensorflow Backend
   C. Lab: Example with a Keras

IX. Recurrent Neural Networks in Tensorflow
   A. Introducing RNNs
   B. RNNs in Tensorflow
   C. Lab: RNN

X. Long Short Term Memory (LSTM) in Tensorflow
   A. Introducing RNNs
   B. RNNs in Tensorflow
   C. Lab: RNN

XI. Conclusion
   A. Summarize features and advantages of Tensorflow
   B. Summarize Deep Learning and How Tensorflow can help
   C. Next steps

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