Course Outline

AI for Text, Images, and Forecasting

Course Summary

Description

Today, there is a great need for the introduction of AI into all aspects of software, making the enterprise software smart. In fact, many companies have declared 2019 to be the “The year of AI for them.”

Much of enterprise software can benefit from AI. The argument one often hears is, “If our smartphones can do it, why can’t my enterprise software?” This course addresses the need for software made smart through the use of AI.

The course is intended for software architects and engineers. It gives them a practical level of experience, achieved through a combination of about 50% lecture, 50% demo work with student’s participation.

(Each delivery is expected to go over NLP, images, and forecasting in general, and then concentrate on a specific application depending upon the needs of the group. This can be determined before the class or at the beginning of delivery.)

Objectives

After taking this course, students will learn:

- A brief history of AI
- Types of AI systems
- Training machine learning models
- Applying models for prediction
- Demos and Labs

Topics

- AI overview
- AI with TensorFlow and Keras

Audience

This course is designed for Software Architects and Developers.

Prerequisites

- Familiarity with any programming language
- Be able to navigate Linux command line
- Basic knowledge of command line Linux editors (VI / nano)
- The working environment will be provided for students. Students would only need an SSH client and a browse.
- Zero Install: There is no need to install software on students’ machines.

Duration

Three Days
Course Outline

I. AI overview
   A. A brief history of AI
   B. Types of AI systems
   C. Training machine learning models
   D. Applying models for prediction
   E. Demos and Labs

II. AI with TensorFlow and Keras
   A. Google democratization of AI with TensorFlow
   B. Introducing TensorFlow
      1. TensorFlow intro
      2. TensorFlow Features
      3. TensorFlow Versions
      4. GPU and TPU scalability
      5. Lab: Setting up and Running TensorFlow
   C. Introducing Perceptrons
      1. Single Layer Linear Perceptron Classifier With TensorFlow
      2. Linear Separability and Xor Problem
      3. Activation Functions
      4. Softmax output
      5. Backpropagation, loss functions, and Gradient Descent
         • Lab: Single-Layer Perceptron in TensorFlow
   D. Hidden Layers: Intro to Deep Learning
      1. Hidden Layers as a solution to XOR problem
      2. Distributed Training with TensorFlow
      3. Vanishing Gradient Problem and ReLU
      4. Loss Functions
         • Lab: Feedforward Neural Network Classifier in TensorFlow
   E. High-level TensorFlow: tf.learn
      1. Using high-level TensorFlow
      2. Developing a model with tf.learn
         • Lab: Developing a tf.learn model
   F. Convolutional Neural Networks in Tensorflow
      1. Introducing CNNs
      2. CNNs in Tensorflow
         • Lab: CNN apps
   G. Introducing Keras
      1. What is Keras?
      2. Using Keras with a TensorFlow Backend
         • Lab: Example with a Keras
   H. Recurrent Neural Networks in Tensorflow
      1. Introducing RNNs
      2. RNNs in Tensorflow
         • Lab: RNN
      3. Long Short-Term Memory (LSTM) in Tensorflow
   I. NLP
      1. TF-IDF
      2. Word2vec
      3. Tokenizers, n-grams
      4. Stopword removal
      5. Text processing pipelines
   J. Image analysis
      1. Convolutions
      2. Pooling
      3. Edge Detection
      4. De-noising
   K. Time series and forecasting
      1. Traditional Time Series forecasting with ARIMA models
      2. Defining Autocorrelation
      3. Understanding the Dickey-Fuller Test
      4. Forecasting with TensorFlow and Keras
      5. Using RNN and LSTM in time series prediction.
      6. Validation and metrics of Time Series Prediction models

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