**Artificial Intelligence for Image Processing and Forecasting**

**Title:** Artificial Intelligence AI for Image processing and Forecasting

**Duration:** 3 Days

**Pre-requisite:**

* Basic knowledge of command line Linux editors (VI / nano)
* Basic understanding of Machine Learning
* Python experience as applied to the Data Science/Machine Learning space

**Audience:**

This course is designed for Software Architects, Developers, Data Engineer, Analyst and Machine Learning Engineer.

**Short Description:**

Most of the data collected these days are unstructured data and mainly in image format. To make sense of this data special techniques using Big Data and Artificial Intelligence. With the rise of facial recognition use cases for security, surveillance etc., Image recognition has become critical to make interactions between human and machine. Artificial Intelligence for Image processing and Forecasting gives them a practical level of experience, achieved through a combination of about 50% lecture, 50% demo work with student’s participation.

**Long Description:**

Most of the data collected these days are unstructured data and mainly in image format. To make sense of this data special techniques using Big Data and Artificial Intelligence. With the rise of facial recognition use cases for security, surveillance etc., Image recognition has become critical to make interactions between human and machine. Artificial Intelligence for Image processing and Forecasting gives them a practical level of experience, achieved through a combination of about 50% lecture, 50% demo work with student’s participation.

Artificial Intelligence and Machine Learning course helps in awareness about AI & Machine Learning patterns and use cases in real world. Along the way, you’ll get an understanding of Machine Learning and Artificial Intelligence concepts. Demystify the difference between AI vs ML vs DL along with usage patterns. You would expand your vocabulary in the AI to understand techniques like Classification, Clustering and Regression. Finally, we would do a AI hands-on to illustrate tools for text and NLP processing and next steps.

**Learning Objectives:**

After this course, you will be able to:

* Compare AI vs ML vs DL
* Understand TensorFlow and Keras
* Discuss how to identify which kinds of technique to be applied for specific use case
* Understand CNN and RNN techniques
* Understand Convolutional Neural Networks
* Do image recognition tasks
* Understand usage of tools through a AI Demo and hands-on labs.

**Topic Outline:**

Course Introduction

History and Background of AI and ML

Compare AI vs ML vs DL

Introduction to neural networks

The math behind neural networks

Back propagation

Understanding the intuition behind neural networks

Introducing TensorFlow

TensorFlow intro

TensorFlow Features

TensorFlow Versions

GPU and TPU scalability

Lab: Setting up and Running TensorFlow

The Tensor: The Basic Unit of TensorFlow

Introducing Tensors

TensorFlow Execution Model

Lab: Learning about Tensors

Introducing Perceptrons

Single Layer Linear Perceptron Classifier With TensorFlow

Linear Separability and Xor Problem

Activation Functions

Softmax output

Backpropagation, loss functions, and Gradient Descent

Lab: Single-Layer Perceptron in TensorFlow

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

High-level Tensorflow: tf.learn

Using high-level TensorFlow

Developing a model with tf.learn

Lab: Developing a tf.learn model

Convolutional Neural Networks in Tensorflow

Introducing CNNs

CNNs in Tensorflow

Lab: CNN apps

Introducing Keras

What is Keras?

Using Keras with a Tensorflow Backend

Lab: Example with a Keras

From Deep Neural Networks to Deep Learning

Understanding unstructured data

Image recognition

Introduction to Convolutional Neural Networks (CNN)

Convolutional layers

Pooling layers

Fully-connected layers

Hands-on: Using TensorFlow to create a CNN

Hands-on: Image recognition project

Image processing elements

Convolutions

Pooling

Edge Detection

De-noising

Time series processing and forecasting elements

Traditional Time Series forecasting with ARIMA models

Defining Autocorrelation

Understanding the Dickey-Fuller Test

Forecasting with TensorFlow and Keras

Using RNN and LSTM in time series prediction.

Validation and metrics of Time Series Prediction models

References and Next steps

**Structured Activity/Exercises/Case Studies:**

* TensorFlow Hands-on
* Keras Hands-on
* Using TensorFlow to create an CNN
* Image Recognition project

**Training material provided:** Yes (Digital format)