**Artificial Intelligence for Image Processing and Forecasting**

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

**Duration:** 3 Days

**Pre-requisite:**

* Python experience
* Basic understanding of Machine Learning

**Audience:**

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

**Short Description:**

A large part of all data collected today is in the form of images. A vitally important use of AI and Deep Learning is for computer vision and image processing. Convolutional Neural Networks (CNNs) specialize in processing visual data. This course will teach you how to build a Convolutional Neural Network (CNN) and apply it to image data.

**Long Description:**

A large part of all data collected today is in the form of images. A vitally important use of AI and Deep Learning is for computer vision and image processing. Convolutional Neural Networks (CNNs) specialize in processing visual data. This course will teach you how to build a Convolutional Neural Network (CNN) and apply it to image data. Image data can be anything that can be visualized including music and voice data (in the form of a spectrogram). This enables CNNs to be used for a variety of key applications including face recognition, radiology scans and music recommendations. You will build Convolutional Neural Networks using Keras/TensorFlow. You will learn Keras/TensorFlow by initially building a shallow neural network and then sequentially building various Deep Learning architectures, with a focus on building models which specialize in visual detection and recognition tasks. Much of what you’ll learn is done through hands-on exercises.

**Learning Objectives:**

After this course, you will be able to:

* Compare AI vs ML vs DL
* Understand TensorFlow and Keras
* Discuss image processing technique applications for AI
* Understand Convolutional Neural Networks (CNNs)
* Apply CNNs to a variety of image processing tasks
* Understand the fundamental techniques through AI Demos and hands-on labs

**Topic Outline:**

Course Introduction

Compare AI vs ML vs DL

Introduction to neural networks

The math behind neural networks

Activation functions

Vanishing gradient problem and ReLU

Loss functions

Gradient descent

Back propagation

Understanding the intuition behind neural networks

Introducing Perceptrons

Single Layer linear classifier

Step Function

Updating the weights

Linear separability and XOR problem

Hidden Layers: Intro to Deep Neural Networks and Deep Learning

Hidden Layers as a solution to XOR problem

The architecture of deep learning

Introducing Keras/TensorFlow

What is Keras?

Using Keras with a TensorFlow Backend

Lab: Using Keras to implement a neural network

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

Computer Vision

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

Convolutional Neural Networks in TensorFlow

Building a CNN in TensorFlow

Preparing the data

Hyperparameter selection

Hands-on: Using TensorFlow to create a CNN

Lab: Build a CNN for image recognition

References and Next steps

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

* Keras Hands-on
* TensorFlow Hands-on
* Using TensorFlow to create a CNN
* Image recognition project

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