4 Weeks on AI & ML Using Python and IoT Course Content

2 Weeks Machine Learning & Artificial Intelligence Course Contents

Days	Topics
Day 1	**Introduction to Data Manipulation and Data Visualization** Introduction to Data Science, Flow of Data Science, Numpy, Pandas, Matplotlib **Lab**: Data Manipulation using Numpy and Pandas, Data Visualization Using Matplotlib on different types of Graphs.
Day 2	**Introduction to Machine Learning** Introduction, Types of Machine Learning: Supervised, Unsupervised and Reinforcement learning, Applications, Classification vs Prediction Problems, Linear Regression Algorithm (Prediction Problem), Mean Square Error, R2 Score **Lab**: Employee Salary Prediction using Linear Regression
Day 3	**Introduction to KNN** Introduction to KNN (K Nearest Neighbor), Working of KNN, Decide the value of K, Confusion Matrix, Accuracy Score **Lab**: IRIS Flower Classification using KNN
Day 4	**Introduction to Web Scraping** What is web scraping, Need of Web Scraping, Web Scraping Basics **Lab**: Scraping Amazon Website / Flipkart Website Product User Reviews
Day 5	**Introduction to NLP** Natural Language Processing: Introduction, Stages in natural language Processing, Application of NLP in Real world applications **Lab**: Sentiment analysis using Natural Language Toolkit (NLTK), Live Twitter Tweets Sentiment Analysis, Amazon Product Review, Sentiment Analysis

Days	Topics
Day 6	**Introduction to Image Processing (Open CV)** Introduction to Open CV, Reading Image, ROI **Lab**: Reading and Converting image to Array, Image Processing, Displaying Images , Drawing Different Shapes on Images, Converting image to different filters.
Day 7	**Introduction to Face Detection** Haarcascade Concept , Face Detection, Working with Webcam, **Lab**: Face/Smile/Eyes Detection through Image and Live Webcam, Object Detection by Color
Day 8	**Introduction to Artificial Intelligence** Artificial Intelligence: Introduction, Typical Applications, Keras API.Artificial Neural Networks (ANNs): Concept, Activation Functions, Feed Forward Neural Networks and Back Propagation **Lab**: Creating Simple Neural Network From Scratch
Day 9	**ANN for Image Classification** MNIST Data Set, Different types of MNIST Dataset, Importing Image Samples from MNIST Dataset, Analyzing samples of images in MNIST Dataset. **Lab**: Hand-written digit recognition using Neural networks Using Tensorflow Library
Day 10	**Introduction to Convolutional Neural Network (CNN)** Introduction, Working of CNN, Convolutional Layer, Pooling, Flatten, Image recognition techniques and feature Extraction fundamentals. **Lab**: Image identification and classification project (Cats Vs Dogs) Using CNN

2 Weeks IoT Using AWS Course Contents

INTRODUCTION TO IOT

- What is IOT?
- Basics of IOT
- IOT in home automation
- IOT Industrial Applications
- How large is the IOT Market
- Latest updates in the IOT industry.
- Available IOT alliances details and the standards that are getting evolved
- Multiple IOT applications and solutions available in market
- Multiple IOT platform (hardware) example Ras-pi, Arduino, NodeMcu etc., comparison and usage

INTRODUCTION TO NODE MCU

- What is Node MCU?
- What is Open Source Microcontroller Platform?
- Node GPIO Pins
- Basics of Electronics.
- Sensors.

HANDS-ON WITH NODE MCU

- About Arduino IDE (Your First Arduino Sketch)
- First Program on Arduino IDE
- Digital Output as LED glow
- Digital Input Using Switch
- Control Output using Digital Input

SENSORS INTERFACING

- Serial Input & Serial Output
- Analog Input & Analog Output
- What are Sensors?
- Sensor Feature.
- Types of sensors
- Interfacing Sensor With Node Mcu
- Reading From Sensors

PWM

- Introduction to PWM
- PWM Hands-on-Practical

USING DIFFERENT SENSORS

- DHT 11 Temperature & Humidity Sensor
- Ultrasonic Sensor
- IR Sensor

WIFI MODULE

- Introduction to Esp8266
- Scanning WiFi Networks and connecting to WiFi Network

WEB SERVER

- Creating a Webserver using NodeMCU and ESP Module
- Connect with WiFi network
- Access the IP address assigned to ESP8266 and Node Mcu
- Creating a Web page and control Home Appliances through Wifi

IMPLEMENTAION OF IOT

- Create a local server using Node MCU
- What are cloud Servers
- Cloud computing and IOT
- Popular Cloud Servers
- Cloud platform introduction
- Creating Channel for live data feed
- Program Node MCU to read and update sensor data over cloud

THINGSPEAK APPS

- Creating account on ThingSpeak
- Connect temperature and humidity sensor
- Continuously monitor sensor reading through internet
- Generate API and program Node MCU

CREATING TWITTER APP ON THINGSPEAK

- How to create apps on ThingSpeak?
- Create a twitter API
- Trigger an action of twitting through Node MCU
- Make ESP8266 and Node MCU to tweet the sensor value

BLYNK APP

- Installing Blynk Android App and creating account
- Creating UI for controlling Home Appliance
- Controlling Home Appliance Using Blynk Android App

IFTTT – IF THIS THEN THAT

- Creating account on IFTTT
- Creating Applets on IFTTT
- Controlling Home Appliance Using Google Assistant

ADAFRUIT IO

- MQTT protocol
- HTTP vs MQTT
- Creating Adafruit account
- Using Adafruit to read sensors value and send data to Node MCU

AMAZON AWS

- How to create account on Amazon Aws and create EC2 Instance
- Installing Ubuntu Server on Aws Ec2 Instance
- Installing Apache Server and Php on Ubuntu
- Install and Configure MySql on Ubuntu
- Installing PhpmyAdmin
- Using Putty and FileZilla
- Using Elastic IP to make server IP static
- Login to Ubuntu Server Using Putty

MySQL

- Creating MySql database and tables to store sensor values
- Creating MySql User authenticated with Password

PHP

- Introduction to Php and its Basic Syntax
- Creating API to read sensor data and send to Aws Cloud
- Creating API to send data to NodeMcu from Cloud

ESP8266 HTTP CLIENT

- Using Http Client to send sensor data to Aws Cloud
- Using HTTP Client to receive data from Cloud to Node MCU

Projects: -

- Digital Input/output for Node MCU
- Analog Input/output for Node MCU
- Integrating Sensors & Reading Environmental Physical Values
- Using IR Sensor to detect object.
- Using LDR
- PWM application to control LED Brightness
- Using Relay as an Electronic Switch
- Home Automation Project on a local and Live Server
- Create a localhost server
- Use Node MCU to upload free data from Environmental Sensors to Cloud Server.
- Automatically Tweet Sensor Data on Twitter.
- Control Home devices from self-hosted webpage on Amazon AWS.
- Controlling Home Appliance using Google Assistant
- Calculating Distance using Ultrasonic Sensor
- Fetching Humidity and Temperature using DHT 11 Sensor
- Using ThingSpeak, Adafruit and Blynk IOT Platforms.

Hardware Requirements

Here is the list of hardware we are going to use in the training. If you can arrange or purchase the hardware then you can do the practical side by side, otherwise we will be demonstrating the practical through video and will be sharing the video and images for your further reference and will support you in case you get any problem in interfacing the hardware.

- Node MCU V3 Development Board
- Micro USB Cable
- LED and 1k Resistors
- DHT 11 Sensor Module
- Ultrasonic Sensor
- IR Sensor Module
- Breadboard
- 5V Relay Module
- Jumper/Connecting Wires (Male to Female and Female to Female)
- Light Dependent Resistor