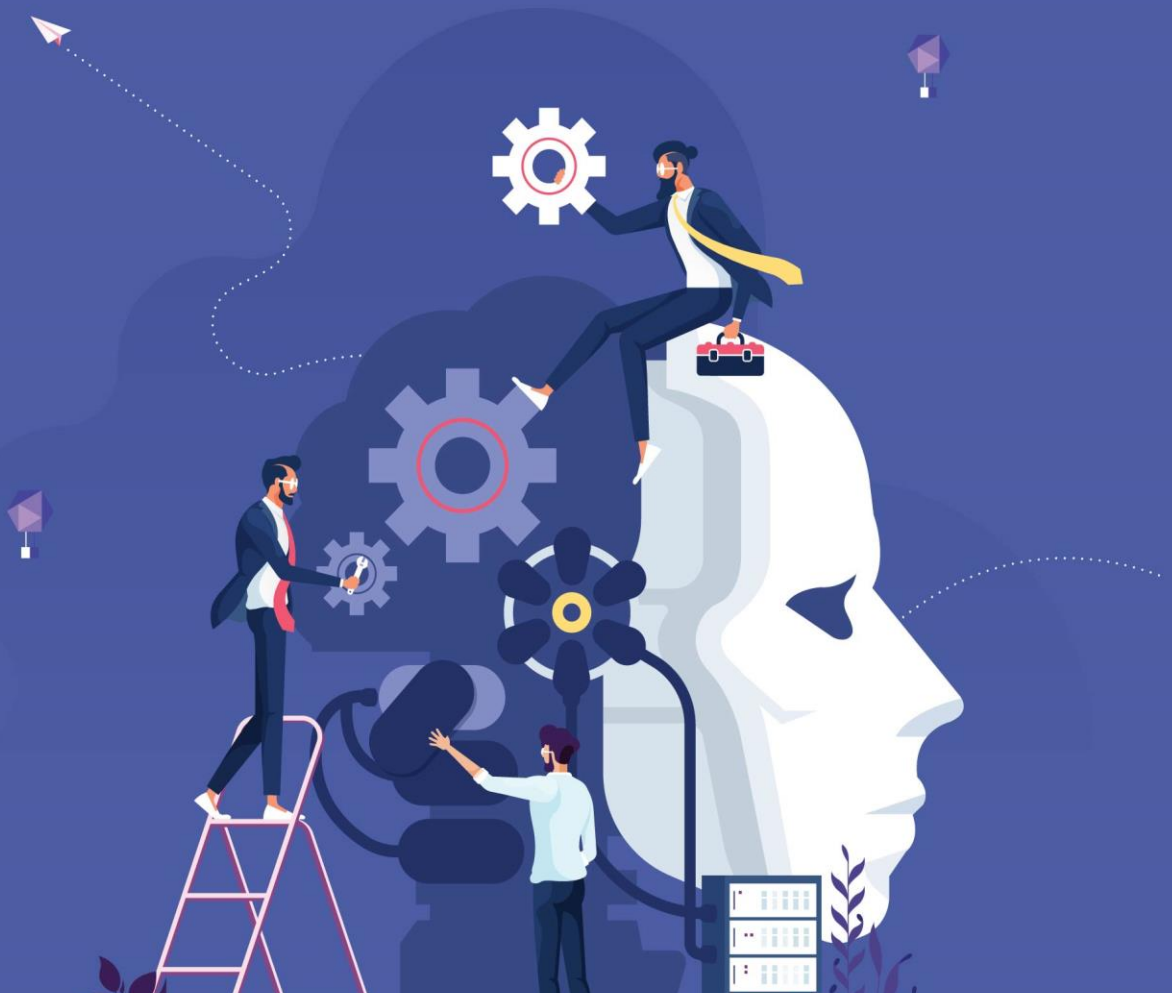
TechBairn®
Let's accelerate the future

SUMMER TRAINING PROGRAM 2023

DATA SCIENCE USING PYTHON

PROGRAM HANDOUT



Name of the Course:

Data Science with Python

What is Data Science?

Data science is a multidisciplinary approach to extracting actionable insights from the large and ever-increasing volumes of data collected and created by today's organizations. Data science encompasses preparing data for analysis and processing, performing advanced data analysis, and presenting the results to reveal patterns and enable stake-holders to draw informed conclusions.

Pre-requisites:-

1. Decent knowledge of a Programming Language
2. High School Mathematics

Syllabus:

1. Who are we, What is Machine Learning - Introduction

- Who are we?
- Course objective
- Course outline
- Machine Learning, it's applications, scope
- Artificial Intelligence, Machine Learning & Deep Learning
- Current Landscape of the field --- what has happened, what's happening, where are we heading

2. Python - Basic Language Features

- Installation
- Basic objects - Strings, Integers & Floats, Booleans
- Complex Objects - Lists, Tuples and Sets
- Dictionary
- Conditionals - if/else/elif
- Iterations - For/While
- Functions

- List Comprehension
- Importing library
- Anaconda
- Jupyter Notebook
- Conda - Package Manager

3. Python Libraries - NumPy, Pandas, Matplotlib

- Numpy Arrays
- Subsetting Numpy Arrays
- 2-D Numpy Arrays
- Subsetting 2-D Numpy Arrays
- 2-D Arithmetic
- Basic Statistics
- Pandas Series
- Pandas DataFrame
- Pandas - Reading from flat files
- Matplotlib - Basic Plotting

4. Math Refresher

- Matrices and Vectors
- Matrix Multiplication
- Calculus - Differentiation, Integration
- Statistics
- Probability

5. Supervised Learning - Regression

- What is Supervised Learning?
- What is Unsupervised Learning?
- Linear Regression
- Linear Regression - Model Representation
- Linear Regression - Cost Function
- Gradient Descent

Project 1: Temperature Prediction Model

6. Neural Network

- Quick intro without brain analogies
- Feed-Forward Neural Network
- Back Propagation
- Activation Function

7. PyTorch - Basics

- What is PyTorch?
- Torch Tensor
- Autograd - Automatic Differentiation
- Neural Network in PyTorch
- Training Neural Network in PyTorch

8. PyTorch - Image Classification

- Convolution Neural Network
- Image Classifier
- Transfer Learning
- Loading and Saving Models

Project 2: House Price Prediction

Project 3: Training an Image Classifier - on your own data

9. Git & GitHub

- Git
- Add, Commit, Push, Pull
- GitHub
- Clone, Remote, Repo

10. Deployment

- API
- Flask
- Flask Application, Routes
- GET, POST Methods
- Web App
- Hosting a local Application to the Web
- Creating an API for Image Classifier
- Deploying it on Azure App Service/Heroku

Project 4: Handwritten Text Recognition

Project 5: Face Emotion Recognition

Final Project: Building a full-fledged Machine Learning WebApp

Project Description

Project 1: Build a Linear Regression Algorithm from scratch, and use this algorithm to train a Regression Model which will predict the temperature.

Project 2: Use a test-driven approach to build a Linear Regression model using Python from scratch and you will use your trained model to predict house sale prices and extend it to a multivariate Linear Regression.

Project 3: Training an Image classification model to solve an Image Classification task of your own Interest. You will have to prepare your own Data. The aim is to learn about Dataset Preparation and Data Gathering along with Model Training in this Project.

Project 4. This project seeks to classify an individual handwritten word so that handwritten text can be translated into a digital form.

Project 5: Facial expression recognition is the task of classifying the expressions on facial images into various categories such as anger, fear, surprise, sadness, happiness and so on.

Project 6: You have already learnt to Train a Machine Learning Model, Save the weights. Now it's time to make your Idea/Project accessible to other people around the web so that they can use your project. You need to build an API and then Deploy it to the Web for that. All these steps will be done in this Project.

Certification Criteria:

-Peer-to-peer interaction.
-Discipline & behaviour.
-Weekly assignments- submission of the repositories of the above projects (result evaluated in 4 days)
-Complete and submit a final project in a team of 2 for a discussed project idea from a listof ideas.
-Top 3 teams will be declared based on Code Quality

Marking scheme:

Activity	Marks
Peer to Peer interaction	10
Discipline & Behaviour	10
Weekly assignments	30
Final Project	50

Internship and Job Opportunities After Program Completion:

After successful completion of the program, students will get an internship or Full-time offers from our 25+ hiring partners. We do in-house recruitment as well.

Eligibility:

Anyone with a laptop (Minimum- i3, 4gb RAM) & an eagerness to learn.

Program Outcome:

1. Industry-ready Machine Learning Developer with a good number of projects to showcase.
2. Internship and Full-Time Opportunity with our Hiring Partner.

Contact Details:

E-Mail- query@techbairn.com
Phone- +91-8789726459
Website- www.techbairn.com

Social Media-

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