NEXT IT CAREER
Moving minds to right place

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Duration: **5 to 6 Months**
Mode of Training: **Online & Offline**

TOPICS TO BE COVERED

Python	NumPy + pandas	matplotlib	seaborn	plotly
Statistics	Power BI	SQL	scikit learn	NLTK
RegEx	jupyter	TensorFlow	Keras	OpenCV
OpenAI	LangChain	Hugging Face	Llama 3	Gemini

PYTHON

1.Getting Started With Python

- Python Overview
- About Interpreted Languages
- Advantages\Disadvantages of Python Pydoc
- Starting Python
- Interpreter PATH
- Using the Interpreter
- Running Python Script
- Using Variables
- Keywords
- Built-in Functions
- Strings Different Literals
- Math Operations and Expressions
- Writing to the Screen
- String Formatting
- Command Line Parameters and Flow Control.

2. Sequences and File Operations

- Lists
- Tuples
- Indexing and Slicing
- Iterating through a Sequence
- Functions for all Sequence
- Using Enumerate()
- Operations and Keywords for Sequences
- The Xrange()function
- List Comprehensions
- Generator Expressions
- Dictionaries and Sets

3. Numpy & Pandas with Matplotlib & Seaborn

- Learning Numpy
- Pllotting using Mataplotlib and Seabron
- Machine Learning application
- Introduction to Pandas
- Creating Data Frames
- GroupingSorting
- Plotting Data
- Creating Functions
- Converting Different Formats
- Combining Data from Various Formats
- Slicing\Dicing Operations

4. Deep Dive-Functions Sorting Errors and Exception Handling

- Function Parameters
- Global Variables
- Variables Scope and Returning Values.Sorting
- Alternate Keys
- Lambda Functions
- Sorting Collections of Collections

- Sorting Dictionaries
- Errors and Exception Handling
- Handling Multiple Exceptions
- The Standard Exception Hierarchy
- Using Modules
- The Import Statement
- Module Search Path
- Package Installation Ways

5. Debugging, Datebases and Projects Skeletons

- Debugging
- Dealing with Errors
- Creating a Database with SQLite 3
- CRUD Operations
- Creating a Database Object

6. Regular Expressionsit's Packages and Object

- Oriented Programming in Python
- The Sys Module
- Interpreter Information
- STDIO
- Lunching External Programs
- Path Directories and Filenames
- Walking Directory Trees
- Math Function
- Random Numbers
- Dates and Times
- Zipped Archives
- Introduction to Python Classes
- Defining Classes
- Initializers
- Inatance Methods
- Properties
- ClassMethods and DataStatic Methods
- Private Methods and inheritance
- Module Aliases and Regular Expressions

7. Python Production level

- What is Process
- What is Multiprocessing
- What is multithreading
- Start
- Join
- Kill
- Terminate
- GIT & GIT HUB

8. Mathematics Basics

- Matrix Algebra
- Vector matrix
- Multiplication matrix
- Eigen values and Eigen vectors
- Regression lines etc

9. Statistics Advanced

- Descriptive Statistics
- Measure of central tendency
- Measure of Dispersion
- Outliers
- Covariance
- Correlation
- Testing
- Hypothesis testing
- Mean
- Median
- Mode etc.

10.Probability

- Conditional probability
- Bayes Rule
- Probability distribution: Discrete and continuous
- Normal distribution etc

1. Data Wrangling

- Data Cleaning
- Missing Values Handling
- Handling categorical and Numerical Features
- Outlier Detection and Imputation
- Exploratory Data Analysis (EDA)
- Decide Suitable Algorithms
- Likelihood
- Types of Naive Bayes Classifier
- Multinomial Naive Bayes
- Bernoulli Naive Bayes and Gaussian Naive Bayes
- Categorical naive bayes
- A Case Study on Navie Bayes

2. What is Machine Learning?

- Supervised Versus Unsupervised Learning
- Approaches of machine learning algorithms
- Decision boundaries
- Data pre-processing
- tabular data pre-processing
- text data pre-processing
- image data pre-processing
- Under fit, optimal fit, over fit
- Sklearn pipeline + model building
- A Case Study on Chatbot with RASA frame work

3. Validation Methods

- Cross-Validation
- The Validation Set Approach Leave-One-Out Cross-Validation
- k -Fold Cross-Validation
- Bias-Variance Trade-Off for k-Fold Cross-Validation

4.Probability Based Approach - Naive Bayes

- Principle of Naive Bayes Classifier
- Bayes Theorem
- Terminology in Naive Bayes
- Posterior probability
- Prior probability of class
- Likelihood
- Types of Naive Bayes Classifier
- Multinomial Naive Bayes
- Bernoulli Naive Bayes and Gaussian Naive Bayes
- Categorical naive bayes
- A Case Study on Navie Bayes

5. Introduction And Linear Algebra

- Introduction to Matrices
- Vector spaces, including dimensions, Euclidean spaces, closure properties and axioms
- Eigenvalues and Eigenvectors, including how to find Eigenvalues and the corresponding Eigenvectors

6. Distance Based Approach - K Nearest Neighbors

- K-Nearest Neighbor Algorithm
- Eager Vs Lazy learners
- How does the KNN algorithm work?
- How do you decide the number of neighbors in KNN?
- Weighted knn, ball tree, kd tree, lsh forest, cosine hashing
- Curse of Dimensionality
- Pros and Cons of KNN
- How to improve KNN performance
- Hyper parameters of knn
- A Case Study on k Nearest Neighbors

7. Rule / Decession Boundary Based Approach - Decision Trees

- Decision Trees (Rule Based Learning):
- Basic Terminology in Decision Tree
- Root Node and Terminal Node
- Classification Tree
- Regression tree
- Trees Versus Linear Models
- Advantages and Disadvantages of Trees
- Accuracy Estimation using Decision Trees
- Hyper parameter tuning using random search, grid search + cross validation, kfold cv
- A Case Study on Decision Tree using Python

8. Boundary Based Linear Model - Linear Regression

- Simple Linear Regression:
- Estimating the Coefficients
- Assessing the Coefficient Estimates

9. Multiple Linear Regression

- Estimating the Regression Coefficients
- OLS Assumptions
- Multicollinearity
- Feature Selection
- Gradient Discent
- A Case Study on Multiple Linear Regression

10. Evaluation Metrics for Regression Techniques

- Homoscedasticity and Heteroscedasticity of error terms
- Residual Analysis
- Q-Q Plot
- Identifying the line of best fit
- R Squared and Adjusted R Squared
- M SE and RMSE

11. Polynomial Regression

- Why Polynomial Regression
- Creating polynomial linear regression
- Evaluating the metrics

- ➢ Gini Index
- ➢ Over fitting and Pruning
- ➢ Stopping Criteria

12. Regularization Techniques

- ➢ Lasso Regularization
- ➢ Ridge Regularization
- ➢ Elastic Net Regularization
- ➢ Case Study on Linear, Multiple Linear Regression, Polynomial, Regression using Python.

13. Logistic regression

- ➢ An Overview of Classification
- ➢ Difference Between Regression and classification Models.
- ➢ Why Not Linear Regression?
- ➢ Logistic Regression:
- ➢ The Logistic Model
- ➢ Estimating the Regression Coefficients and Making Predictions
- ➢ Logit and Sigmoid functions
- ➢ Setting the threshold and understanding decision boundary
- ➢ Logistic Regression for >2 Response Classes
- ➢ Evaluation Metrics for Classification Models:
  - ✓ Confusion Matrix
  - ✓ Accuracy and Error rate
  - ✓ TPR and FPR
  - ✓ Precision and Recall, F1 Score
  - ✓ AUC – ROC
- ⇨ A Case Study on Logistic Regression

14. Support Vector Machines

- ➢ The Maximal Margin Classifier
- ➢ HyperPlane
- ➢ Support Vector Classifiers and Classification with Non-linear Decision Boundaries
- ➢ Kernel Trick
- ➢ Polynomial and Radial
- ➢ Tuning Hyper parameters for SVM
- ➢ Gamma, Cost and Epsilon
- ➢ SVMs with More than Two Classes
- ⇨ A Case Study on SVM using Python

PROJECT: A project on a use case will challenge the Data Understanding, EDA, Data Processing and above Classification Techniques.

15. Ensemble Methods in Tree Based Models Random Forest

- ➢ What is Ensemble Learning?
- ➢ What is Bootstrap Aggregation Classifiers and how does it work?
- ➢ Series vs parallel ensemblers

16. Random Forest

- ➢ What is it and how does it work?
- ➢ Variable selection using Random Forest

17. Boosting: Adaboost, Gradient Boosting, XG Boosting:

- ➢ What is it and how does it work?
- ➢ Hyper parameter and Pro's and
- ⇨ Ensemble Methods - Random Forest Techniques using Python.

18. Machine Learning Applications for Data Analysis

- ➢ Missing Value imputation using Machine Learning Algorithms
- ➢ Outlier and Anomalies detection using Machine Learning Algorithms

Support Vector Machines

- Hard and Soft Margin Classification

19. UN-SUPERVISED LEARNING

- Why Unsupervised Learning
- How it Different from Supervised Learning
- The Challenges of Unsupervised Learning

20. Dimensionality Reduction Techniques - PCA & t-SNE

- Introduction to Dimensionality Reduction and it's necessity
- What Are Principal Components?
- Demonstration of 2D PCAand 3D PCA
- EigenValues, EigenVectors and Orthogonality
- Transforming Eigen values into a new data set
- Proportion of variance explained in PCA
- t-Distributed stochastic neighbor embedding (t-sne)

⇨ Case Studies on PCA and t-sne using python.

21. K-Means Clustering

- Centroids and Medoids
- Deciding optimal value of 'k' using Elbow Method
- Linkage Methods
- Clustering metrics - Silhouette score

22. Hierarchical Clustering

- Divisive and Agglomerative Clustering
- Dendrograms and their interpretation
- Applications of Clustering
- Practical Issues in Clustering

⇨ A Case Study on clustering's using Python.

23. Deployment with Flask

1.Introduction to Deep Learning

- Intro To AI , ML AND DL
- Difference between ML and DL
- When to use ML and DL
- History Of Deep Learning
- Intro to Biological Neuron

2. Neural Network Architecture and Activation Functions

- Introducing Google Colab
- Tensorflow basic syntax
- Tensorflow Graphs
- Tensorboard

3. Forward and Backward Propogation

- MLPArchitecture
- Defining the Notation for MLP
- Working of MLP(Forward Propagation
- How To Train Single Neuron Model
- Backpropagation -1 (chain rule)
- Backpropagation -2 (chain rule+ memorization)
- Hyperparameter In MLP
- Bias and Variance Trade-off In MLP
- Why Deep Neural Network Failed
- Activation Function -1 (Sigmoid)
- Activation Function -2 (Tanh)
- Exploding Gradient Problem
- Activation Function -3 (ReLU and ReLU Variants Linear and Non Linear Variants) [Leaky
- ReLU, parametric ReLU, ELU, SELU]
- Dropouts
- Weight Initialization Techniques (pros and cons)
- Batch Normalization
- Early Stopping
- Tensor Board

4. Optimizers

- Convex Function And Non Convex Functions ,Saddle Point
- SGD with Momentum
- NAG
- Rmsprop
- Ada Delta
- Ada Grad
- ADAM
- NADAM

5. Neural Network Architecture and Activation Functions

- Introducing Google Colab
- Tensorflow basic syntax
- Tensorflow Graphs

- Vanishing Gradient Problem

6. Keras Hands-on - Regression and Classification

- Intro To Tensorflow and Keras
- Project on Classification by using MLP
- Project on Regression by using MLP

CNN & COMPUTER VISION

1.Intro to Images and Image Preprocessing with OpenCV

- Intro To Images
- How Images are formed and stored in machines
- Color Spaces
- Intro To OpenCv
- read, write, save image
- Converting to Different Color Spaces
- Building Histograms for Images

2. Image Preprocessing with OpenCV

- Read videos
- Capturing images with web camera
- Manipulating videos with opencv
- Drawing on images and videos
- Bitwise Operators On Images and Videos
- Affine and Non-Affine Transformation
- Object Detection

3. Intro to Convolutional Neural Network

- Intro To CNN
- Why CNN over MLP
- How does Convolution works on images

4. CNN Architecture

- Tensorboard
- LeNet5
- Alex Net
- Vgg 16 and Vgg 19
- Inception Net
- ResNet
- Xception
- Mobile Net
- Efficient Net
- Pre trained Model Introduction

5. Image Classification Case Study

- Face Mask Detection
- Bone fracture Multi region detection

6. Transfer Learning

- Intro To Transfer Learning
- Transfer learning Concepts (When and Why)
- Transfer Learning Coding
- Hyper Parameter Tuning [Random Search, Hyperband, Bayesian optimization]

7. Case Study with Transfer Learning

- Plant Diseases Prediction using Transfer Learning
- Cifar using Transfer Learning
- Improving Face Mask Detection Model using Transfer Learning

8. Object Detection

- Intro To object Detection
- R-CNN
- Fast R-CNN
- Faster R-CNN # Show why Faster R CNN is faster than R CNN (no Need of Maths)
- Intro to Yolo

- Padding, Stride, Pooling
- Detail on YOLO
- Implementation of Yolo V7 / V8 using Ultralytics
- Yolo Algorithm (How it works) - More

9. YOLO - Case Study

- Helmet Detection using Yolo

10. Open CV

- Image reading and writing
- Image resizing
- Image rotation
- Image translation
- Image filtering
- Edge detection
- Contour detection
- Color detection
- Image thresholding
- Geometric transformations
- Image Blending
- Feature detection
- Object tracking
- Face detection
- Video processing

11. Computer Vision

- SAM Model
- GAN's
- Diffusion Models
- CUDA
- Viola Jones
- HOG
- Yola V1
- Yola V2
- Yola V3
- Yola V4
- Yola V7
- Yola V8
- Unet Segmentation
- V7 Segmentation
- POS Estimation
- Deployment with Flask

1.Introduction to text and Text Preprocessing with nltk and spacy

- Intro to NLP
- Text Preprocessing Steps
- Tokenization
- Special Character
- Stop words
- Stemming & Lemmatization

2. Vectorization Techniques

- BOW
- TF-IDF
- Coding for BOW and TF-IDF using nltk
- Word2Vec
- How Word2Vec algorithm works (Skip-Gram & CBOW)
- Glove
- Fast Text
- Understanding of working of Image captioning

3. Project - Text Classification

- Word2Vec, Glove & FastText

- Bi-Directional RNN

4. RNNs

- Intro to RNN
- Why RNN ?
- How RNN Works
- Training RNN
- Types of RNN

5. Project - Sequence Tagging

- NER and POS Tagging case study

6. LSTMs

- Intro to LSTM
- Why LSTM
- LSTM algorithm
- Grus

7. Auto Encoders

- Encoder Decoder Architecture
- Introduction to auto encoders
- Types of auto encoders

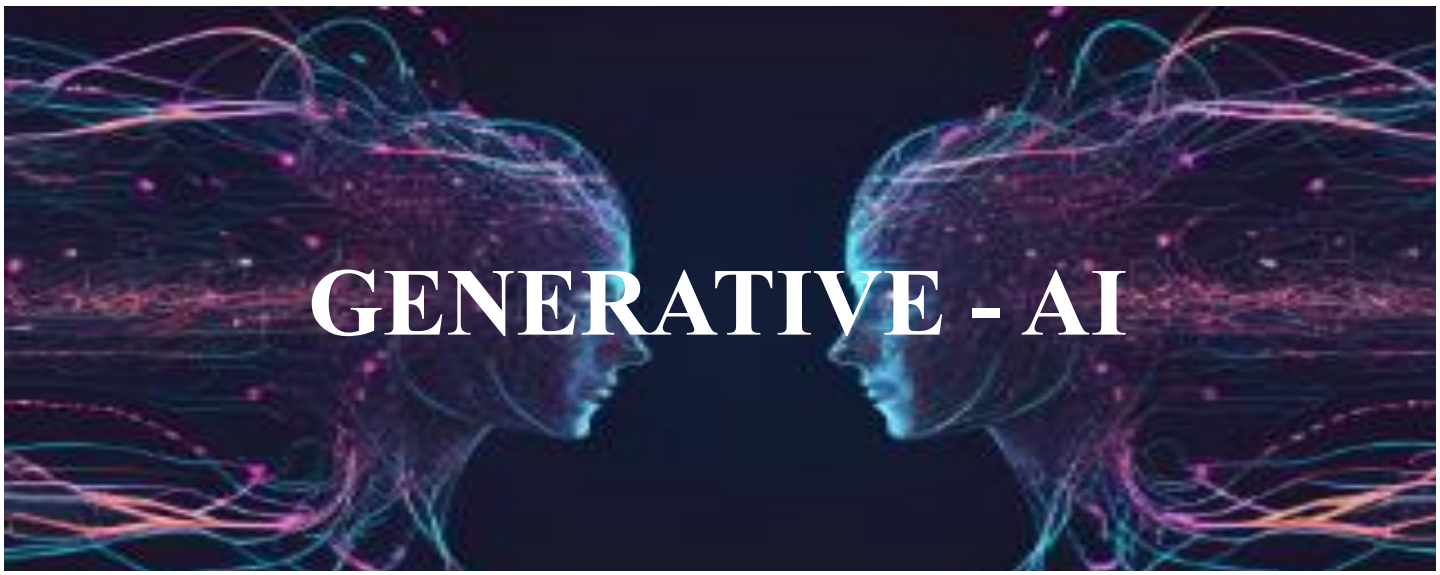
8. Project - Auto Encoders

- Case study for Encoder decoder and autoencoder for image compression and
- reconstruction on MNISTImages

10. BERT

9. Transformer and Attention

- Intro to Transformers and Attention Models
- How does Transformers works
- How does Attention works
- Coding For Transformers and Attention Models
- Intro to BERT
- How does BERT works
- Coding For Transformers and Attention Models
- A Case Study on Text Classification With BERT



1.Intro To Gen AI

- Introduction to Generative AI
- Overview of generative AI technologies.
- Applications and case studies across industries

2. Intro To LLM

- History of NLP
- Into to large language Models for text generation.
- Understanding DALL-E and its capabilities in image generation.
- Hands-on project to generate images from textual descriptions.
- What is Large Language Model
- Types of Large Language Model

3. Prompt Engineering and Working with LLM

- Intro To Open AI
- Utilizing OpenAI APIs
- Setting up and authenticating API usage.
- Practical exercises using GPT-3/GPT-4
- Discussion on model sizes and capabilities.
- Environment setup: Installing necessary libraries and tools
- Accessing LLaMA models: Overview of

- Creating a project with LLM

4. Open AI

- Intro To Open AI
- Utilizing OpenAI APIs
- Setting up and authenticating API usage.
- Practical exercises using GPT-3/GPT-4 for text generation.
- Understanding DALL-E and its capabilities in image generation.
- Hands-on project to generate images from textual descriptions.
- Creating a project with Open AI

5. Gemini

- Getting Started with Gemini
- How to obtain an API key for Gemini.
- Overview of the Gemini API and accessing its features.
- Detailed exploration of different Gemini models.
- Selecting and initializing the right model for specific tasks.
- Step-by-step project to create an AI-powered chatbot using Gemini

6. LLaMA

- Introduction of LLaMA.
- Comparison with other large language models like GPT-3 and GPT-4.
- Key features and capabilities of LLaMA
- Understanding the Model Architecture of LLaMA.
- the download process and setup on local
- machines or cloud platforms (Meta LLaMa) .
- Intro to the architecture of LLaMAmodels
- Understanding the differences between LLaMA model variants (8B, 13B, 30B, and 70B
- parameters)
- Implementing text generation using LLaMA
- Creating a project with LLaMA

7. LangChain

- Introduction to the LangChain framework
- Understanding the purpose and core components of LangChain Framework
- LangChain Setup and necessary dependencies
- Basic configuration and setup for development
- Step-by-step guide to creating a simple application using LangChain Framework
- Detailed walkthroughs of real-world applications built with LangChain
- Creating a project with LangChain

8. Processing Data

- Text Data
- Image Data

1.Structured Query language (SQL)

- SELECT statement
- FROM clause
- WHERE clause
- JOINs INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- FULL JOIN
- GROUP BY clause
- HAVING clause
- ORDER BY clause
- Aggregate functions (SUM AVG COUNT MIN MAX)
- Subqueries (Nested queries)
- UNION and UNION ALL
- Views (CREATE VIEW ALTER VIEW DROP VIEW)
- Indexes (CREATE INDEX DROP INDEX)
- Transactions BEGIN TRANSACTION
- COMMIT
- ROLLBACK
- Constraints PRIMARY KEY
- FOREIGN KEY
- UNIQUE
- CHECK
- Data manipulation INSERT
- UPDATE
- DELETE
- DMl operations
- DQL Operations
- DDl Operations
- Alter
- drop
- sprename
- truncate

2. Power BI

- Data Visualization
- Power Query
- DAX (Data Analysis Expressions)
- Power BI Desktop
- Power BI Service
- Data Modeling
- DirectQuery and Import Mode
- Advanced Visualization Techniques
- Power BI Mobile App
- Data Connectivity
- Collaboration and Sharing

3. Tableau

- Data Visualization
- Tableau Desktop
- Tableau Server
- Tableau Online

- Data Connectors
- Calculated Fields (Tableau Calculations)
- Parameters and Sets
- Dashboards
- Maps and Spatial Analysis
- Filters and Actions
- Hierarchies
- Tableau Public
- Ad-Hoc Analysis
- Collaboration and Sharing

4. Advance Excel

- Formulas and Functions
- math formulas
- LOOKUP
- INDEX-MATCH
- PivotTables (Creating Filtering Grouping)
- Charts and Graphs
- Column chart
- Line chart
- Pie chart etc
- Conditional Formatting
- Data Validation
- Named Ranges
- Excel Tables
- Functions for Text Manipulation
- LEFT
- RIGHT
- CONCATENATE etc
- Functions for Date and Time
- DATE
- TODAY
- MONTH etc
- Data Import and Export

5.WebScrapping

- Python request Modules
- html content

Key Points in Our Training

- Instructor-Led LIVE Sessions
- LIVE Doubt Resolution
- Monthly Assessments
- Topic-wise FAQ's
- 20+ Use Cases
- Project Guidance
- Resume Tailoring
- 100% Job Assistance