Learnbay

Generative AI
& Machine Learning Program

In collaboration with

IBM | Microsoft

Specially designed for **Software Developers and Tech Professionals**

Curriculum inclusive of GenAI and Agentic AI

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How to make an impact with | Learnbay

*This program is especially designed for **tech professionals and Software developers** who want to master Generative AI and ML in depth to become an AI Engineer in top product-based MNCs.*

Project Experience Certificate
Earn project certification from renowned industry partner

Program Certification
Earn a completion certificate from IBM & Microsoft

Dedicated Career Assistance
Personalized 1:1 support to accelerate your career growth.

GenAI and Agentic AI
Learn LangChain, AutoGPT, BabyAGI, CrewAI with hands-on projects.

Program **Summary**

1 **Training Mode**
100% Live Online & Hybrid
(Online + Classroom)

2 **Program Faculty**
Renowned industry experts
from top global MNCs

3 **Program Duration**
8-10 Months Program
Weekday and Weekend Batch

4 **Certification**
IBM & Microsoft

Project Based Learning

Work on domain-specific projects and earn **project certification.**

Why is project-based learning effective?
It gives you hands-on experience, allowing you to apply concepts to real-world problems, sharpening your skills for practical use.

Will the projects be guided?
Yes, you will be assigned a **dedicated project mentor** to provide guidance and support throughout each project.

How does project certification help in career transition?
A project certificate is more valuable than a course completion certificate as it showcases your expertise and practical abilities.

About **Course**

This program is for software developers or programmers who want to deepen their knowledge of Generative AI and Machine Learning. It uses a **project-based approach**, with guidance from industry experts and a dedicated mentor.

The course also covers Data Structures and Algorithms (DSA), System Design, and Generative AI (GenAI) for software developers. By the end, you'll be ready to integrate Generative AI & ML in software development and prepare for AI engineering interviews.

Our Commitment

"We are dedicated to delivering accessible and industry-relevant education that empowers India's workforce to grow and succeed."

We offer flexible learning options, allowing you to choose between **100% online or hybrid modes, which combine online and in-person sessions.**

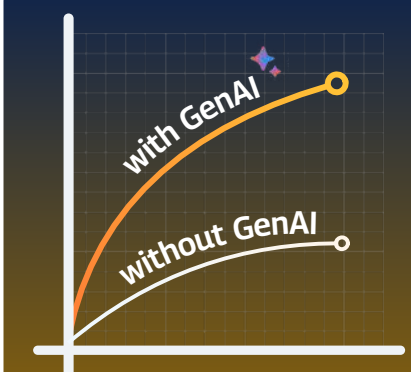
Furthermore, our comprehensive career support services include **interview preparation, resume building, and job placement assistance**, all designed to help you smoothly transition into leadership roles in AI and Machine Learning.

100%
Assured Interview

350+
Hiring Partners

7+
Centers Across India

40k+
Professionals Upskilled



Professional Growth Scale

70%

of companies are likely to adopt GenAI in next 5 years, to

- enhance efficiency,
- automating tasks,
- improving decision-making for better project outcomes.

***By integrating GenAI into our program**, we ensure that our learners are well-prepared to lead and innovate in their respective fields.

Program **Eligibility**

Tech professional with min **1+ Year of Experience**

Minimum of 1 year of professional experience in **technology-related fields** such as software development, IT, data analysis, or engineering.

Basic understanding of any programming language is required.

- **Software Engineer**
- **Executives (IT domain)**

Important Note: This program is not for freshers, fresh grads, students.

Program Outcome: What's in it for you?

Hands-On Experience With Project Certification

Work in an industry like environment and gain practical hands-on experience. Get project certificate from industry to validate your expertise.

AI/ML + DSA + System Design + GenAI

Learn AI/ML along with DSA and System Design to solve real-world problems. Build skills to add AI to software and improve job readiness. Get ready to crack **AI engineering interviews** with GenAI in top MNCs.

Learn GenAI and ML in Depth

Learn GenAI and ML in depth with specialization in Advance Deep Learning, NLP, Computer Vision and GenAI. This program will help you to become **GenAI engineer in top product based MNCs**.

Learnbay

Why choose Learnbay?

A unique program for Tech Professionals!

www.learnbay.co

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1. **Project Based** Learning

Project based learning gives you **hands-on experience** to apply concepts to real-world problems, sharpening your skills for practical use. Unlike traditional methods, our Project based learning approach prepares you for practical, real-life challenges.

Important Note: Our program includes capstone, mini, guided, and domain projects. You'll have a dedicated mentor to guide and evaluate your project work. You can book **unlimited 1-on-1 sessions** with your project mentor for personalized support. Please refer syllabus section for more details.

2. Domain **Specialization**

Make your previous experience count

Select your domain electives and engage in live projects across various industries to gain hands-on experience. This practical approach will deepen your understanding of real-world challenges and enhance your expertise.

3. Capstone **Project Certification**

Earn certificates directly from companies for the capstone projects you work on across different domains. These project certificates are **more valuable** than course completion certificates because they show your real skills and practical experience.

Get Project Certification from a renowned industry.

Important Note: You can choose projects from any two domains, including BFSI, Retail, Supply Chain, HR, Sales, Marketing, or Manufacturing. You'll also receive **one-on-one mentorship** for your projects.

4. **1:1 Doubt** Clearing Session

You can book **personalized doubt classes** for modules or projects with experts.

These tailored sessions will help you understand concepts better and **address any questions or challenges** you might have.

Important Note: Schedule your sessions from 10 AM - 6 PM (Mon-Sat) to secure your preferred time slot.

5. Training **Mode**

You can choose from two flexible training modes according to suit your needs and preferences:

New

100% Live online classes

Hybrid classes

Live Online Mode: In this mode, you attend all sessions and work on projects live online. The classes are instructor-led, allowing you to ask questions in real-time. You'll also have access to online project mentors and career mentors for 1-1 sessions.

Hybrid Mode: You can attend sessions/classes online, but for live project work, you have the option to participate in physical classrooms at our Project Innovation Labs in cities like *Bangalore, Pune, Delhi, Hyderabad, Chennai, and Kolkata*.

6. **Placement** assistance

Resume Optimization

Expert assistance to enhance your professional resume

Interview Preparation

Mock interviews to improve your performance

Interview Opportunities

Scheduled interviews with potential employers

Career Counseling

Professional guidance for your career advancement

7. Inclusive of GenAI and Agentic AI

40% job growth in GenAI & Agentic AI roles by 2027
Secure future-ready career opportunities.

$1.3 trillion GenAI market by 2030
Tap into high-paying roles in AI-powered domains.

90% of businesses to adopt GenAI by 2026
Gain a competitive edge in AI-driven industries.

Agentic AI improves decision accuracy by 85%
Enhance project execution and business strategies.

Automate 60% of repetitive tasks
Use GenAI for emails, reports, and content, and Agentic AI for workflow automation.

80% of professionals use GenAI daily
Leverage AI tools to boost efficiency and productivity at work.

Popular Tools:

GenAI: ChatGPT DALL·E Gemini Midjourney Claude

Agentic AI: LangChain crewai AUTOGPT

Others Vs **Learnbay**

	Learnbay	OTHERS
Training Mode	100% Online & Hybrid (Online + Classroom)	Only recorded class & few live online
Support	24/7 Student Support	Limited Support Hours
Placement	100% Placement Assistance	Limited Placement Support
Curriculum	Included in Latest Curriculum	Often Not Included
Faculty	Experienced Industry Professionals	Academics and Trainers
Real-Time Projects	Practice with Live Projects and Team Management	Simulated Projects

Alumni **Spotlight**

Shravanthi A
Data Scientist

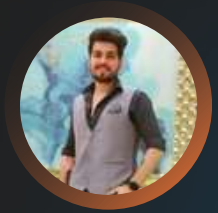
Learnbay has helped me a lot to learn data science applications in the e-commerce industry. The live class concept was really helpful in receiving proper DS training. Thanks to all my mentors and the placement team.

Mechanical Domain → **Data Scientist @** Ford — **230%** Salary Hike

Preksha Mishra
Lead Data Scientist

The course structure is excellent with emphasis on concept building and tools & software at the same time. The support team is excellent and supportive and quite agile to respond to doubts.

Telecom Domain → **Data Scientist @** HCL — **140%** Salary Hike



Karan Chawala

xceedance → EXL

Data Scientist

Jaya Sinha

Aditya Birla Group → Infosys

Senior Analyst

Shubham Dev

Sapient → brillio

Lead Data Analyst

Mohd. Israr
Data Scientist

Thanks to the Learnbay data science course & excellent guidance, I was able to ace the TCS interview and secure a job with a 210% pay raise. The real-world time projects helped me develop my concepts as a data scientist.

Mechanical Domain → **Data Scientist @** TCS **230% Salary Hike**

Saurabh Kumar
Data Scientist

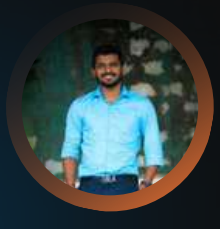
When I joined Learnbay I did not have any knowledge apart from the very basics. I gradually build my concept via various trainers and get trained in data science with strong knowledge/concepts.

Mathematics Professor → **Data Scientist @** Teleperformance **135% Salary Hike**

Aravind

TheMathCompany → CATERPILLAR

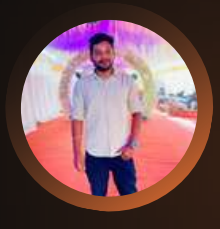
Data Scientist



Ritesh Kumar

unacademy → Capgemini

Senior Analyst

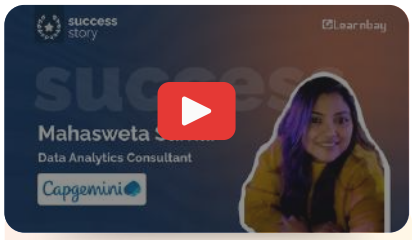


Ramki

cognizant → ANBSYSTEMS

Data Analyst

Success **Story**



Mahasweta Sarkar

Data Analytics Consultant

Capgemini

Manoj Kuna

Data Analysis Engineer

general motors

Bhavin Shah

Data Analyst

KPMG

Arvind K.

Sr. Data Scientist

TheMathCompany

Nandini Devi Muthu

Data Analyst

Rajashree B

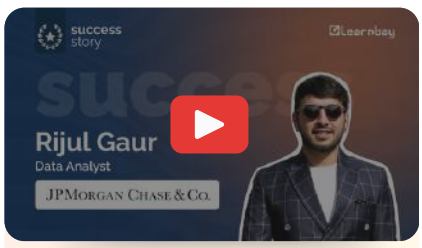
Data Quality Analyst

DATA POEM

Pinky Bhansali

Process Lead

AXA



Rahul Gaur

Data Analyst

JPMorgan Chase & Co.

Jaya Sinha

Data Scientist

amazon

Get certified

and accelerate your career growth

IBM Course Completion Certificate

Achieve an **industry-recognized IBM certification**, showcasing your proficiency in **AI and Machine Learning**

Microsoft Certificate in Azure AI Fundamentals

Gain an **internationally recognized Microsoft certification**, proving your expertise in **cloud technologies.**

Add On

Capstone Project Certificate

This certification boosts your credibility in the **IT sector** and enhances your **career prospects**.

Note: The certification is granted upon the successful completion of two capstone projects.

Program Fee

Live online classes

Benefits:

- All classes are covered in live interactive mode
- Schedule doubt clearing session with industry expert
- Online capstone project session
- 1 on 1 Job assistance with online resume build up and mock interview sessions

Program Fee

₹ 1,20,000 + 18% GST

Hybrid Classes

Benefits:

- All the benefits of Live OnLine Classes
- Offline 1:1 classroom doubt sessions on weekends
- Offline Mock Interviews with 3-5 members panel
- Offline Classroom Capstone projects in Pune, Delhi, Bangalore, Chennai, Hydrabad and Mumbai

Program Fee

₹ 1,35,000 + 18% GST

Payment Plan: **No Cost EMI Available**
For 6, 9 and 12 Months

Structured Admission Process

1. **Apply Online**
   Complete and submit your application with required details.
2. **Profile Review**
   Our team evaluates your application for eligibility.
3. **Enroll**
   Confirm your admission and start the program journey.

Learnbay

Program Curriculum

A unique program for Tech Professionals!

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Journey to **Upskilling**

Module 0 8 hrs

Python Bootcamp for Non-Programmers

Develop fundamental Python programming skills, including basic syntax, control structures, and data handling.

Tools: Python

Term 1 40 hrs

Python for AI & Machine Learning

Learn to manipulate and visualize data using core Python libraries such as NumPy, Pandas, and Matplotlib for effective data analysis.

Tools: NumPy pandas Matplotlib

Term 2 70 hrs

Statistics and Machine Learning

Apply statistical methods and machine learning algorithms to solve data problems.

Tools: Statistics Machine Language

Term 3 50 hrs

Generative AI and Agentic AI

Master GenAI for content generation, data analysis, and NLP, and Agentic AI for automation, decision-making, and workflow optimization.

ChatGPT DALL·E AUTOGPT LangChain

Term 4 60 hrs

Data Management, Visualization and Analysis

Master SQL, NoSQL, and Power BI for efficient data management, querying, and visualization of complex datasets.

Tools: Power BI SQL Tableau Big data

Term 5 70 hrs

AI Tools + Deployment

Build and deploy advanced AI models, including deep learning, NLP, CV and Reinforcement Learning using cloud-based MLOps tools for real-world applications.

Tools: NLP MLOps CV RL

Term 6 30 hrs

Data Structure and Algorithm

We will cover data structures and algorithms using popular languages like Python and Java. You'll understand concepts such as arrays, linked lists, trees, sorting, and searching algorithms.

Tools: Java NetworkX

270+ hours of Learning | **32+** Practical Projects | **Triple** Certification

Module 0 Python Bootcamp for Non-Programmers

The Python Bootcamp is designed for **professionals who are new to programming.** It covers basics at a slow pace and you'll get **1-1 doubt sessions and special classes**. These sessions are recommended for non programmers. Programmers may skip this module

Topics Covered

Installation & Setup

- Installing Python and setting up IDEs (Jupyter, VSCode).
- Overview of the Python environment and running basic scripts.
- Introduction to Jupyter Notebook for interactive coding.

Basic Syntax & I/O

- Understanding variables, data types (integers, floats, strings, booleans).
- Input and output operations using the input() and print() functions.
- Performing basic arithmetic operations.

Control Structures

- Conditional logic using if, else, and elif statements.
- Looping with for and while loops to iterate over data.

Basic Data Structures

- Introduction to lists, tuples, and dictionaries.
- Accessing, modifying, and iterating through collections.
- Understanding how to use indexing and slicing with lists and tuples

MINI PROJECT **DURATION** 1.5 HRS **FOR BEGINNERS**

Simple Calculator Application

Description: Create a console-based calculator that takes user input for two numbers and performs mathematical operations (add, subtract, multiply, divide)

Tools/Functions covered: Python basics (Control structures, basic I/O)

TERM 1 Python for Data Science

We will cover Python basics and data analytics using popular libraries like **NumPy, Pandas, Matplotlib, and Seaborn**. You'll work on several **guided projects** in python and gain hands-on experience throughout this module.

Module Duration:
40-50 hrs of live Instructor-led classes.
5 hrs of **on demand 1-1 session** for topics where you need help.

Number of Projects with dedicated mentor
4 practice projects
2 python projects on real data

Section 1 - Core Python Basics

- **Python Environment Setup**
  - Setting up Python environments using Anaconda and Jupyter.
  - Installing and managing virtual environments using conda/pip.
- **Python Syntax and Code Structure**
  - Writing and running Python scripts.
  - Best practices for writing clean and readable code (PEP 8).
  - Understanding Python functions and scopes.
- **Data Types and Control Flow**
  - Primitive data types: integers, floats, strings, and booleans.
  - Control flow statements (if, else, elif) for decision making.
  - Loops: for, while, do while, break, continue, pass
- **Data Structures**
  - Introduction to basic data structures (lists, tuples, dictionaries).
  - Manipulating collections: Adding, removing, and modifying elements.
  - List comprehension and dictionary comprehension for concise code.
- **Functions And Modules**
  - Introduction To Functions Defining & Calling Functions
  - Functions With Multiple Arguments
  - Anonymous Functions - Lambda Using Built-In Modules,
  - User-Defined Modules, Module Namespaces, Iterators And Generators

GROUP PROJECT | **DURATION** 2 HRS | BFSI DOMAIN

Banking System Simulation

Description: Simulate a simple banking system where users can create accounts, deposit, withdraw, and check balances.

Tools/Functions covered: Python (Data structures, functions)

MINI PROJECT | **DURATION** 1.5 HRS | FINANCE DOMAIN

Expense Tracker

Description: Build a simple expense tracker where users can record and manage their daily expenses.

Functions used: Python data structures, Functions.

Section 2 - Data analytics Using Python

- **File I/O An d Exceptional Handling and Regular Expression**
  - open Function, file Object Attributes
  - close() Method, Read, write, seek.
  - Exception Handling, try-finally Clause
  - Regular Expression- Search and Replace
  - Regular Expression Modifiers
  - Regular Expression Pattern
- **Basic Web Scraping for Data Analytics**
  - Definition and use cases in data analytics
  - Tools for scraping: requests and BeautifulSoup
  - Parsing HTML content using BeautifulSoup
  - Finding elements by tag, class, or attributes
  - Extracting text, links, and attributes from elements

- **Data Analysis using Numpy**
  - Introduction to Numpy. Array Creation, Printing Arrays, Basic Operation - Indexing, Slicing and Iterating, Shape Manipulation - Changing shape, stacking and splitting of array
  - Vector stacking, Broadcasting with Numpy, Numpy for Statistical Operation
- **Data Analysis using Pandas**
  - Pandas : Introduction to Pandas
  - Importing data into Python
  - Pandas Data Frames, Indexing Data Frames ,Basic Operations With Data frame, Renaming Columns, Subsetting and filtering a data frame.

- **Data Visualization using Matplotlib**
  - Introduction, plot(), Controlling Line Properties, Subplot with Functional Method, Multiple Plot, Working with Multiple Figures, Histograms
- **Data Visualization using Seaborn**
  - Introduction to Seaborn and Visualizing statistical relationships , Import and Prepare data. Plotting with categorical data and Visualizing linear relationships.

PORTFOLIO PROJECT **DURATION** 2 HRS **HR DOMAIN**

Employee Attrition Analysis

Description: Analyze employee attrition (churn) to identify patterns related to factors like salary, job satisfaction, department, and years of service.

Tools/Functions Covered: Pandas, Numpy and Matplotlib

DOMAIN PROJECT **DURATION** 2 HRS **SALES DOMAIN**

Sales Performance Dashboard

Description: Create a sales performance dashboard to track sales revenue, number of units sold, and performance by region, product, or salesperson.

Tools/Functions Covered: Pandas, Numpy and Matplotlib

Capstone Project

DOMAIN-SPECIFIC PROJECT | DURATION 2 HRS | FINANCE DOMAIN

Stock Price Analysis with Web Scraping

Description: Use web scraping to collect real-time stock price data from a financial website. Analyze stock prices over time to identify trends, calculate returns, and visualize stock volatility.

Seaborn pandas Web Scraper

DOMAIN-SPECIFIC PROJECT | DURATION 2 HRS | BFSI DOMAIN

Customer Transaction Analysis

Description: In this project, you'll analyze customer transaction data from a bank to gain insights into customer behavior. You will use only Pandas for data manipulation and Seaborn for data visualization.

Seaborn pandas

TERM 2 Statistics and Machine Learning

We will cover statistical methods and explore advanced topics like **regression analysis, hypothesis testing, EDA** and **machine learning algorithms**. Practice all the topics with real time projects and case studies.

Module Duration:
70-75 hrs of live Instructor-led classes.
5 hrs of **on demand** 1-1 session for topics where you need help.

Number of Projects with dedicated mentor
6 practice projects
2 python projects on real data

Section 1 - Statistics

- **Fundamentals of Math and Probability**
  - Probability distributed function & cumulative distribution function. Conditional Probability, Baye's Theorem
  - Problem solving for probability assignments
  - Random Experiments, Mutually Exclusive Events, Joint Events, Dependent & Independent Events
- **All about Population & Sample**
  - Population vs Sample, Sample Size
  - Simple Random Sampling, Systematic Sampling, Cluster Sampling, Stratified Sampling, Convenience Sampling, Quota Sampling, Snowball Sampling and Judgement Sampling
- **Introduction to Statistics, Statistical Thinking**
  - Variable and its types
  - Quantitative, Categorical, Discrete, Continuous,
  - *all with examples
  - Five Point Summary and Box Plot
  - Outliers, Causes of Outliers, How to treat Outliers, I-QR Method and Z-Score Method
- **Descriptive Statistics**
  - Measures of Central Tendency – Mean, Median and Mode
  - Measures of Dispersion – Standard Deviation, Variance, Range, IQR (Inter-Quartile Range)
  - Measure of Symmetricity/ Shape – Skewness and Kurtosis
- **Inferential Statistics**
  - Central Limit Theorem
  - Point estimate and Interval estimate
  - Creating confidence interval for population parameter
  - Characteristics of Z-distribution and T-Distribution.
  - Type of test and rejection region.
  - Type of errors in Hypothesis Testing

GROUP PROJECT **DURATION** 1.5 HRS

Exam Score Statistical Analysis

Description: Perform descriptive and inferential statistics on a sample of student exam scores to understand performance trends.

Tools covered: Sampling methods, variable types, measures of central tendency and dispersion, five-point summary, box plots, outlier detection using IQR and Z-score methods, confidence intervals, hypothesis testing errors.

MINI PROJECT **DURATION** 2 HRS **MANUFACTURING DOMAIN**

Probability Analysis in Quality Control

Description: Analyze the probability of defects in a manufacturing process using probability theories and Bayes' Theorem.

Tools covered: Probability distribution and cumulative distribution functions, conditional probability, Bayes' Theorem, mutually exclusive and joint events, dependent and independent events.

Section 2 - Advance Statistics

- **Hypothesis Testing**
  - Type of test and Rejection Region
  - Type o errors-Type 1 Errors, Type 2 Errors. P value method, Z score Method. The Chi-Square Test of Independence.
  - Regression. Factorial Analysis of Variance. Pearson Correlation Coefficients in Depth. Statistical Significance
  - Null and Alternative Hypothesis One-tailed and Two-tailed Tests, Critical Value, Rejection region, Inference based on Critical Value
  - Binomial Distribution: Assumptions of Binomial Distribution, Normal Distribution, Properties of Normal Distribution, Z table, Empirical Rule of Normal Distribution & Central Limit Theorem and its Applications

Linear Algebra

- Dot Product, Projecting Point on Axis.
- Matrices in Python, Element Indexing, Square Matrix, Triangular Matrix, Diagonal Matrix, Identity Matrix, Addition of Matrices, Scalar Multiplication, Matrix Multiplication, Matrix Transpose, Determinant, Trace

- T-Test, Analysis of Variance (ANOVA), and Analysis of Covariance (ANCOVA) Regression analysis in ANOVA

- **Data Processing & Exploratory Data Analysis**
  - What is Data Wrangling
  - Data Pre-processing and cleaning?
  - How to Restructure the data?
  - What is Data Integration and Transformation
- **EDA**
  - Understand EDA's role in A workflow.
  - Load and inspect data using Pandas.
  - Using Z-scores to Find Outliers.
  - Clean data by handling missing values and outliers.
  - Perform feature engineering for better modeling
  - Finding and Dealing with Missing Values.
  - Bivariate Analysis, Scatter Plots and Heatmaps.
  - Summarize data with descriptive statistics.
  - Visualize patterns using Matplotlib and Seaborn.
  - Introduction to Multivariate Analysis

MINI PROJECT **DURATION** 2 HRS **ECOMMERCE DOMAIN**

Hypothesis Testing on Website Conversion Rates

Description: Test if a new website design leads to a significantly higher conversion rate compared to the old design.

Tools covered: Binomial distribution assumptions, Z-test, P-value method, Type I and II errors, one-tailed test using SciPy and Pandas.

RESEARCH PROJECT **DURATION** 2 HRS

Linear Algebra in Image Transformation

Description: Apply matrix operations to perform transformations on images, such as rotations and scaling.

Tools/Libraries: NumPy matrices, matrix multiplication, matrix transpose, identity matrix, determinant, dot product.

MINI PROJECT DURATION 2 HRS

EDA and Data Cleaning on Titanic Dataset

Description: Perform exploratory data analysis and data cleaning on the Titanic dataset to prepare it for modeling.

Tools covered: Data wrangling with Pandas, handling missing values, outlier detection using Z-scores, feature engineering, bivariate and multivariate analysis, data visualization using Matplotlib and Seaborn.

Section 3 - Machine Learning

- **Machine Learning Introduction**
  - Definition of ML Elements: Algorithm, Model, Predictor Variable, Response Variable, Training - Test Split, Steps in Machine Learning,
  - ML Models Type: Supervised Learning, Unsupervised Learning and Reinforcement Learning
- **Data Preprocessing**
  - Encoding the data: Definition, Methods: OneHot Encoding, Mean Encoding, Label Encoding, Target Guided Ordinal Encoding
  - Types of Missing values (MCAR, MAR, MNAR) , Methods to handle missing values
  - Outliers, Methods to handle outliers: IQR Method, Z Method
  - Feature Scaling: Definition , Methods: Absolute Maximum Scaling, Min-Max Scaler , Normalization, Standardization, Robust Scaling
- **Logistic Regression Model**
  - Definition. Why is it called the “Regression model”?
  - Sigmoid Function, Transformation & Graph of Sigmoid Function
- **Evaluation Metrics for Classification model**
  - Confusion Matrix, Accuracy, Misclassification, TPR, FPR, TNR, Precision, Recall, F1 Score, ROC Curve, and AUC. Using Python library Sklearn to create the Logistic Regression Model and evaluate the model created
- **K Nearest Neighbours Model**
  - Definition, Steps in KNN Model, Types of Distance: Manhattan Distance, Euclidean Distance, ‘Lazy Learner Model’.
  - Confusion Matrix of Multi Class Classification
  - Using Python library Sklearn to create the K Nearest Neighbours Model and evaluate the model

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Customer Churn Prediction with Logistic Regression

Description: Predict whether customers will leave a service using logistic regression.

Tools covered: Data encoding (OneHot, Label Encoding), handling missing values (MCAR, MAR, MNAR), outlier treatment (IQR, Z-score methods), feature scaling, logistic regression with scikit-learn, evaluation metrics

RESEARCH PROJECT **DURATION** 2 HRS

Handwritten Digit Classification using K-Nearest Neighbors

Description: Classify handwritten digits into categories using the KNN algorithm.

Tools covered: Data preprocessing, KNN implementation with scikit-learn, distance metrics (Euclidean, Manhattan), feature scaling, evaluation with multi-class confusion matrix.

Section 4 - Advance Machine Learning Concepts

- **Decision Tree Model**
  - Definition, Basic Terminologies, Tree Splitting Constraints, Splitting Algorithms:
  - CART, C4.5, ID3, CHAID
  - Splitting Methods:
  - GINI, Entropy, Chi-Square, and Reduction in Variance
  - Using Python library Sklearn to create the Decision Tree Model and evaluate the model created
- **Random Forest Model**
  - Ensemble Techniques: Bagging/bootstrapping & Boosting.
  - Definition of Random Forest, OOB Score
  - K-Fold Cross-Validation
- **Hyperparameter Tuning**
  - GridSearchCV, Variable Importance.
  - Using Python library Sklearn to create the Random Forest Model and

evaluate the model created.

- **Naive Baye's Model**
  - Definition, Advantages, Baye's Theorem Applicability, Disadvantages of Naive Baye's Model, Laplace's Correction, Types of Classifiers: Gaussian, Multinomial and Bernoulli
  - Using Python library Sklearn to create the Naive Baye's Model and evaluate the model created
- **K Means and Hierarchical Clustering**
  - Definition of Clustering, Use cases of Clustering
  - K Means Clustering Algorithm, Assumptions of K Means Clustering
  - Sum of Squares Curve or Elbow Curve
- **Hierarchical Clustering**
  - Dendrogram, Agglomerative Clustering, Divisive Clustering, Comparison of K Means Clustering and Hierarchical Clustering
  - Using Python library Sklearn to create and evaluate the clustering model
- **Principal Component Analysis(PCA)**
  - Definition, Curse of Dimensionality, Dimensionality Reduction Technique, When to use PCA,
  - Use Cases
  - Steps in PCA, EigenValues and EigenVectors, Scree Plot.
  - Using Python library Sklearn to create Principal Components
- **Support Vector Machine(SVM)**
  - Model: Definition, Use Cases, Kernel Function, Aim of Support Vectors, Hyperplane, Gamma Value, Regularization Parameter
  - Using Python library Sklearn to create and evaluate the SVM Model
- **XGBoost Model**
  - Definition and advantages; enhances gradient boosting with regularization, handling missing values, and parallel processing.
  - Implementing XGBoost in Python for model creation and evaluation; hyperparameter tuning using GridSearchCV.

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Credit Risk Prediction with Decision Trees and Random Forests

Description: Predict credit default risk using Decision Tree and Random Forest models, enhancing performance through hyperparameter tuning.

Tools covered: Scikit-learn Decision Trees, Random Forests, GridSearchCV for hyperparameter tuning, K-Fold Cross-Validation.

RESEARCH PROJECT **DURATION** 2 HRS

Customer Segmentation using K-Means Clustering and PCA

Description: Cluster customers based on purchasing behavior using K-Means and Hierarchical Clustering, incorporating dimensionality reduction with PCA.

Tools covered: Scikit-learn K-Means Clustering, model evaluation.

Capstone Project

GROUP PROJECT **DURATION** 3 HRS

Predictive Maintenance for Industrial Machinery

Description: Develop a predictive maintenance model using machine learning and statistical analysis to predict equipment failures. Combine EDA, statistical methods, and supervised learning models for failure prediction.

XGBoost Matplotlib Numpy pandas learn

DOMAIN-SPECIFIC PROJECT **DURATION** 2 HRS

Customer Segmentation and Churn Prediction

Description: Perform customer segmentation using clustering techniques and predict customer churn with logistic regression. Use statistics for EDA and apply machine learning for churn classification.

Matplotlib Seaborn pandas learn statsmodels

Term 3 Generative AI and Agentic AI

Master advance GenAI tools like **TensorFlow, PyTorch, OpenAI APIs, and LangChain**, frameworks, and real-world applications to lead AI-driven projects confidently.

50 Hours instructor-led
6-10 real time GenAI & Agentic AI Projects

Section 1: Generative AI

Fundamentals of Generative AI

- Overview of **generative models** and their real-world applications, highlighting differences from traditional AI.

Use Cases of GenAI in Various Industries and Domains

- **Finance:** Fraud detection, automated report generation, and investment insights.
- **Healthcare**: Drug discovery, medical image analysis, and personalized treatment,
- **Retail and E-commerce:** Personalized recommendations, inventory management, and customer service automation.
- **Manufacturing**: Quality control, predictive maintenance, and process optimization.

Deep Learning Foundations for GenAI

- **Neural networks and deep learning basics**, Backpropagation and optimization techniques
- Overview of popular deep learning frameworks (**TensorFlow, PyTorch**).
- Hands-on Project: Build a basic image classifier using CNNs with TensorFlow or PyTorch, applying optimization techniques learned.

Prompt Engineering and optimisation

- Strategies for crafting effective **prompts** to optimize AI responses and improve user interaction
- **Techniques for prompt optimization** and prompt chaining.

Transformers and Attention Mechanisms

- Introduction to transformers and self-attention, **BERT, GPT**, and other transformer-based architectures, **Hands-on exercise:** Fine-tuning a transformer model for text generation.
- **Hands-on Project:** Fine-tune a transformer model on a custom text dataset for a text classification or summarization task.

Large Language Models (LLMs)

- Overview of LLMs like **GPT-3, ChatGPT, and LLaMA**
- **Fine-tuning LLMs** for specific use cases, Applications in chatbots, summarization, and sentiment analysis.

- **Hands-on exercise:** Design and deploy a conversational AI model that simulates a customer service assistant for a chosen domain (e.g., retail or tech support).

Integration of OpenAI APIs

- Techniques for effectively integrating **OpenAI APIs,** including authentication and best practices for data handling. Rate limits and error handling.

- **Hands-on Project:** Develop a web app that uses OpenAI's API for content generation based on user inputs, including authentication and error handling.

Building Applications with LangChain

- Overview of **LangChain's** functionality for large language models.
- **Chain concepts:** sequential, memory, and conditional chains, Creating custom prompts and workflows.

- **Hands-on Project:** Personalized Financial Advice - Based on customer profiles (age, income, risk appetite), offer tailored financial advice or investment recommendations.

Utilizing Hugging Face

- Accessing and deploying **Hugging Face** pre-trained models, Fine-tuning models on custom datasets, Using Hugging Face's pipelines for **rapid deployment**, Introduction to Hugging Face's Model Hub and Transformers library.

- **Hands-on Project**: Fine-tune a Hugging Face model for a sentiment analysis task and deploy it using the Hugging Face API.

GANs (Generative Adversarial Networks)

- Fundamentals of **GANs** and their components (Generator and Discriminator).
- Variants of GANs **(DCGAN, StyleGAN, CycleGAN).**
- Applications of GANs in image synthesis, art creation, and more.

- **Hands-on exercise:** Building a simple GAN for image generation.
- **Hands-on Project:** Build and train a DCGAN to generate new images from a specific dataset, such as handwritten digits or facial images.

Variational Autoencoders (VAEs)

- Introduction to **VAEs** and their architecture
- Comparison of VAEs with GANs, Applications in anomaly
- detection and data compression.
- **Hands-on exercise:** Building a VAE for image reconstruction.

Retrieval-Augmented Generation (RAG)

- Introduction to **RAG**.
- How RAG combines generative and retrieval-based techniques, Implementing a basic RAG model for a knowledge-based task.

- **Hands-on Project:** Build a RAG-based FAQ Assistant to answer customer questions by retrieving information from a domain-specific FAQ dataset, merging retrieval and generation for clear, concise responses

Section 2: Agentic AI

Understanding Agentic AI and Autonomous Agents

- Core principles of agentic systems (Autonomy, Goal-oriented behavior, Decision-making)
- **Use cases in business and technology**

Introduction to Agentic AI

- **Task Management** and Automation
- Planning, Execution, and Optimization
- Decision-making frameworks
- **Practical demonstration** using LangChain

Key Components of Agentic AI

- **LangChain:** Introduction and hands-on exercises
- **AutoGPT**: Setup and practical application
- **BabyAGI**: Basic usage and task automation
- **CrewAI**: Introduction and practical demonstrations

Essential Tools for Agentic AI

- Integrating agents with OpenAI APIs
- Building custom agents for specific tasks
- **Hands-on session** with OpenAI's GPT models

Agentic AI Integration

- Integrating agents with **OpenAI APIs**
- Building custom agents for specific tasks
- **Hands-on session** with OpenAI's GPT models

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Build an autonomous assistant to automate content generation and social media posting using AutoGPT and LangChain.

PORTFOLIO PROJECT **DURATION** 2 HRS

Develop an intelligent customer support agent that autonomously handles FAQs and escalates complex queries using BabyAGI and GPT API.

PORTFOLIO PROJECT **DURATION** 1.5 HRS

Create collaborative workflows and team-based tasks automation using CrewAI.

GenAI Copilot, Deployment and Ethical Considerations in GenAI

- Learn **Model Deployment for Generative AI**, covering deployment techniques, best practices, API setup, and scaling infrastructure.
- Explore **GenAI Copilot Tools** for Coding, including GitHub Copilot, Tabnine, Amazon CodeWhisperer, Replit Ghostwriter, and Codex.
- Gain insights into **Ethical Considerations in GenAI**, addressing bias, privacy, and responsible AI development.

TERM 4 Data Visualization & Data Analysis

We will cover data visualization and data analysis including **interactive dashboards, statistical analysis, data mining, and predictive modeling** using tools like **Tableau, Power BI, Python (Matplotlib, Seaborn), and SQL.**

Module Duration:
80-85 hrs of live Instructor-led classes.
8 hrs of **on demand 1-1 session** for topics where you need help.

Number of Projects with dedicated mentor
7 practice projects
2 capstone projects on real data

Section 1 - SQL and Databases

- **SQL and RDBMS**
  - RDBMS And SQL Operations.

- Single Table Queries - SELECT, WHERE,
- ORDER BY, Distinct, And, OR
- Multiple Table Queries: INNER, SELF,
- CROSS, and OUTER, Join, Left Join, Right
- Join, Full Join, Union

- **Advance SQL**
  - Advance SQL Operations
  - Data Aggregations and summarizing the data
  - Ranking Functions: Top-N Analysis
  - Advanced SQL Queries for Analytics
- **NoSQL, HBase & MongoDB**
  - NoSQL Databases
  - Introduction to HBase
  - HBase Architecture, HBase
  - Components, Storage Model of HBase
  - HBase vs RDBMS
  - Introduction to Mongo DB, CRUD
  - Advantages of MongoDB over RDBMS
- **JSON Data & CRUD**
  - Basics and CRUD Operation
  - Databases, Collection & Documents
  - Shell & MongoDB drivers
  - What is JSON Data
  - Create, Read, Update, Delete
  - Finding, Deleting, Updating, Inserting Elements
  - Working with Arrays
  - Understanding Schemas and Relations
- **Programming with SQL**
  - Mathematical Functions
  - Variables
  - Conditional Logic
  - Loops
  - Custom Functions
  - Grouping and Ordering
- **Programming with SQL**
  - Partitioning
  - Filtering Data
  - Subqueries

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Patient Medical Data Analysis with Advanced SQL

Description: Utilize advanced SQL queries to analyze patient records and identify trends in healthcare outcomes.

Tools covered: SQL (SELECT, WHERE, ORDER BY, GROUP BY, HAVING, INNER and OUTER JOINS, Aggregate Functions, Ranking Functions, Subqueries, Conditional Logic).

RESEARCH PROJECT **DURATION** 2 HRS

Student Academic Performance Tracking using SQL and MongoDB

Description: Manage and analyze student data to monitor academic progress and attendance using SQL and NoSQL databases.

Tools covered: SQL (CRUD operations, JOINS, Subqueries, Variables, Conditional Logic), MongoDB (CRUD operations, Collections, Documents, JSON data handling).

Section 2 - MongoDB

- **Introduction to MongoDB**
  - What is MongoDB
  - Characteristics and Features
  - MongoDB Ecosystem
  - Installation process
  - Connecting to MongoDB database
  - Introduction to NoSQL
  - Introduction of MongoDB module
  - What are Object Ids in MongoDB
- **MongoDB (Advance)**
  - MongoDB Use cases
  - MongoDB Structures
  - MongoDB Shell vs MongoDB Server
  - Data Formats in MongoDB
  - MongoDB Aggregation Framework

- Aggregating Documents
- Working with MongoDB Compass & exploring data visually
- Understanding Create, Read, Update, Delete
- Schemas & Relations
- Document Structure
- Working with Numeric Data
- Working on Scheme Designing

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Marketing Campaign Analytics with MongoDB

Description: Use MongoDB to store and analyze customer interactions and engagement data from marketing campaigns.

Tools covered: MongoDB (CRUD operations, aggregation framework), handling unstructured data, MapReduce functions, querying nested documents.

RESEARCH PROJECT **DURATION** 2 HRS

E-commerce Product Catalog Management

Description: Design and implement a MongoDB database to manage and query a dynamic product catalog for an e-commerce platform.

Tools covered: MongoDB (CRUD operations, collections, documents, indexing), handling JSON data, aggregation pipeline.

Section 3 - PoweBI

- **Getting Started With Power BI**
  - Installing Power BI Desktop and Connecting to Data
  - Overview of the Workflow in Power BI Desktop
  - Introducing the Different Views of the Data Mode
  - Query Editor Interface
  - Working on Data Model
- **Programming with Power BI**
  - Working with Time Series

- Understanding aggregation and granularity
- Filters and Slicers in Power BI Maps
- Scatterplots and BI Reports
- Connecting Dataset with Power BI Creating a Customer Segmentation Dashboard Analyzing the Customer Segmentation Dashboard

- **Assignments**
  - Create Bar charts
  - Create Pie charts
  - Create Tree maps
  - Create Donut Charts
  - Create Waterfall Diagrams
  - Creating Table Calculations for Gender

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Music Streaming Trends Dashboard

Description: Create a dashboard to track and display music streaming statistics across different artists and genres.

Tools covered: Power BI Desktop, Data Modeling, DAX functions, Visualizations (area charts, pie charts, filters).

RESEARCH PROJECT **DURATION** 2 HRS

University Enrollment Trends Dashboard

Description: Create a dashboard to track and display student enrollment trends across different faculties over time.

Tools covered: Power BI Desktop, Data Modeling, DAX functions, Visualizations (line charts, pie charts, time slicers).

Section 4 - BigData and Spark Analytics

- **Introduction To Hadoop & Big Data**
  - Distributed Architecture - A Brief Overview. Understanding Big Data
  - Introduction To Hadoop, Hadoop Architecture
  - HDFS, Overview of MapReduce Framework
  - Hadoop Master: Slave Architecture
  - MapReduce Architecture
  - Use cases of MapReduce
- **What is Spark**
  - Introduction to Spark RDD
  - Introduction to Spark SQL and Data frames
  - Using R-Spark for machine learning
- **Hands-on:**
  - Installation and configuration of Spark
  - Using R-Spark for machine learning programming

Section 6 - Time Series

- **Introduction to Time Series Forecasting**
  - Basics of Time Series Analysis and Forecasting
  - Method Selection in Forecasting
  - Moving Average (MA) Forecast Example
  - Different Components of Time Series Data
  - Log Based Differencing, Linear Regression for Detrending
- **Introduction to ARIMA Models**
  - ARIMA Model Calculations, Manual ARIMA Parameter Selection
  - ARIMA with Explanatory Variables
  - Understanding Multivariate Time Series and their Structure
  - Checking for Stationarity and Differencing the MTS

HANDS-ON LAB PROJECT **DURATION** 1.5 HRS

Time Series Forecasting of Retail Sales using Apache Spark

Description: Analyze historical retail sales data to predict future sales trends using Spark's time series capabilities.

Tools covered: Apache Spark (PySpark), Spark MLlib, Time Series

Analysis libraries, DataFrames.

Section 6 - Tableau

- Dashboard and Stories
- Visual Analytics
- Custom Geocoding
- Polygon Maps
- WMS and Background Image
- Assignments
  - Connecting data source
  - Working with various charts
  - Deployment of Predictive model in visualization

Capstone Project

DOMAIN-SPECIFIC PROJECT **DURATION** 2 HRS

Employee Performance and Feedback Management System

Description: Design a system that stores employee performance data in SQL and feedback records in MongoDB. Use SQL queries for performance analysis and MongoDB for sentiment analysis of feedback. Present insights using a Power BI dashboard with advanced DAX calculations.

Tools covered: MySQL, MongoDB, Power BI, DAX

PostgreSQL mongoDB. Power BI DAX

DOMAIN-SPECIFIC PROJECT **DURATION** 2 HRS **DATA ANALYSIS**

E-Commerce Data Warehouse and Reporting System

Description: Create an end-to-end data warehouse for an e-commerce company using SQL databases to store transactional data and MongoDB for customer feedback data. Develop a Power BI dashboard to visualize sales, customer trends, and feedback analysis.

Tools covered: PostgreSQL, MongoDB, Power BI, DAX

PostgreSQL mongoDB. Power BI DAX

TERM 5 AI Tools and Deployment

We will cover AI tools fundamentals and advanced features including **machine learning frameworks**, **natural language processing**, and **computer vision applications**.

Module Duration:
70-75 hrs of live Instructor-led classes.
10 hrs of **on demand 1-1 session** for topics where you need help.

Number of Projects with dedicated mentor
7 practice projects
2 capstone project to work on real data

Section 1 - Deep Learning using TensorFlow

- **Introduction to Deep Learning and TensorFlow**
  - Neural Network
  - Understanding Neural Network Model
  - Installing TensorFlow
  - Simple Computation, Constants, and Variables
  - Types of file formats in TensorFlow
  - Creating A Graph – Graph Visualization
  - Creating a Model – Logistic Regression
  - Model Building using tensor flow
- **TensorFlow Classification Examples**
  - Introduction to TensorFlow
  - Installing TensorFlow
  - Simple Computation, Contents
  - and Variables
  - Types of file formats in TensorFlow
  - Creating A Graph - Graph Visualization
  - Creating a Model - Logistic Regression Model Building
  - TensorFlow Classification Examples
- **Understanding Neural Networks With TensorFlow**
  - Basic Neural Network
  - Single Hidden Layer Model
  - Multiple Hidden Layer Model
  - Backpropagation – Learning Algorithm and visual representation
  - Understand Backpropagation – Using Neural Network Example
  - TensorBoard

- **Convolutional Neural Network (CNN)**
  - Convolutional Layer Motivation
  - Convolutional Layer Application
  - The architecture of a CNN
  - Pooling Layer Application
  - Deep CNN
  - Understanding and Visualizing a CNN
- **Introducing Recurrent Neural Networks skflow: RNNs in skflow**
  - Application use cases of RNN
  - Manual Creation of RNN Long Short-Term Memory (LSTM) And GRU theory Restricted Boltzmann Machine(RBM)
  - Autoencoders Collaborative Filtering with RBM Dimensionality Reduction with Linear Autoencoder
- **Understanding Of TFLearn APIs**
  - Getting Started With TFLearn
  - High-Level API usage -Layers
  - Built-in Operations
  - Training and Evaluation- Customizing the Training Process
  - Visualization APIs Sequential And Functional Composition Fine-tuning
  - Using TensorBoard with TFLearn
- **Understanding Keras API for implementing Neural Networks**
  - Getting Started With Keras APIs Keras Model
  - Sequential And Functional Model, shared layers
  - Composing a Model with Keras API
  - Batch Normalization
  - Tensor Board With Keras
  - Installing Pytorch Matrices
  - Torch to NumPy Bridge
  - Variables, Gradients.
  - PyTorch Autograd Module
  - Linear Regression With PyTorch
  - Logistic Regression With Pytorch
  - CNN in PyTorch
  - Use PyTorch to build CNN
  - Build RNN with PyTorch
- **Understanding Keras API for implementing Neural Networks**
  - Build RNN with PyTorch
  - LSTM in PyTorch
  - LSTM from CPU to GPU in PyTorch

HACKATHON PROJECT **DURATION** 1.5 HRS

Image Classification with CNN

Description: Train a CNN on a dataset (e.g., CIFAR-10 or MNIST) to classify images. Utilize transfer learning with a pre-trained model like ResNet or VGG to improve accuracy.

Tools covered: TensorFlow, Keras, Python.

GROUP PROJECT **DURATION** 2.5 HRS

Time Series Forecasting with LSTM

Description: Build and train an LSTM model to forecast time-series data, such as stock prices or weather trends. Evaluate the model's performance using metrics like RMSE or MAE.

Tools covered: TensorFlow, Keras, Pandas, NumPy

Get **personalized 1:1 mentorship** on real-time practical projects for deeper understanding and skill enhancement.

Section 2 - Natural Language Processing (NLP)

- **Natural Language Processing**
  - Text Analytics
  - Introduction to NLP
  - Use cases of NLP algorithms
  - NLP Libraries
  - Need for Textual Analytics
  - Applications of NLP
  - Word Frequency Algorithms for NLP Sentiment Analysis
- **Text Analysis**
  - Distance Algorithms used in Text Analytics
  - String Similarity
  - Cosine Similarity Mechanism -
  - The similarity between two text documents

- Levenshtein distance - measuring the difference between two sequences

- **KNN**
  - Information Retrieval Systems
  - Information Retrieval - Precision, Recall,F- score TF-IDF
  - KNN for document retrieval
  - K-Means for document retrieval
  - Clustering for document retrieval
- **Text Pre Processing Techniques**
  - Need for Pre-Processing
  - Various methods to Process the Text data
  - Tokenization, Challenges in Tokenization
  - Stopping, Stop Word Removal
- **Stemming**
  - Stemming - Errors in Stemming
  - Types of Stemming Algorithms - Table
  - Lookup Approach
  - N-Gram Stemmers

GROUP PROJECT **DURATION** 2.5 HRS

Sentiment Analysis on Social Media Data

Description: Perform sentiment analysis on Twitter data using RNN or BERT to classify sentiments.

Tools covered: TensorFlow, Hugging Face, NLTK

CAPSTONE PROJECT **DURATION** 2.5 HRS

GPT-3 Based Text Generation

Description: Fine-tune GPT-3 to generate domain-specific text, such as legal documents or technical reports.

Tools covered: OpenAI GPT-3, Hugging Face Transformers

Section 3 - Computer Vision

- **Computer Vision overview**
  - Historical Perspective
  - Introduction to the four R's of Computer Vision
  - OpenCV Installation
  - Python API Drawing shapes
  - Image Processing
  - Image Rotation and Thresholding
- **Image Filtering**
  - Gaussian Blur
  - Median Blur Feature Detection - Canny Edge Detector
  - Use of Neural Network in CV
  - Multi-Layer Perceptron
- **Image Processing**
  - Histogram equalization
  - Thresholding and Convolution
  - Sharpening and edge detection
  - Morphological transformations
  - Image pyramid
- **Image Classification and segmentation**
  - Data-Driven approach
  - K-nearest Neighbour
  - Linear Classification
  - Contours and segmentation

CAPSTONE PROJECT **DURATION** 2.5 HRS

Object Detection with YOLO

Description: Implement YOLO (You Only Look Once) for real-time object detection on an image dataset. Train the model to detect multiple objects and label them with bounding boxes

Tools covered: TensorFlow, Darknet, OpenCV

Section 4 - Reinforcement Learning

- **What is Reinforcement Learning - Basics**
  - Setting up Environment & Installing OpenAI Gym.
  - OpenAI Gym Basics.
  - Terminology & Environment.
  - Dynamic Programming - Prediction, Control, and Value Approximation
- **Approximation Methods for Reinforcement Learning**
  - RBF Networks with CartPole
  - TD Lambda and Policy Gradient Algorithms.
  - Temporal difference learning. N-Step Methods
  - TD lambda, Policy Gradient Methods Policy Gradient in TensorFlow for CartPole. Mountain Car Continuous using Tensorflow
  - Building Blocks of Reinforcement Learning
  - OpenAI Gym Tutorial Random Search
  - Markov Decision Processes
  - Monte Carlo Methods

CAPSTONE PROJECT **DURATION** 2.5 HRS

Autonomous Driving Simulation with Deep Q-Network (DQN)

Description: Develop an autonomous driving agent using a Deep Q-Network to learn optimal driving strategies within a simulated environment. Train the model to avoid obstacles and maximize the reward.

Tools covered: Python, TensorFlow/PyTorch, OpenAI Gym.

Hands-On Experience: Gain practical skills by working on real-world assignments under expert supervision.

Section 5 - Deployment AWS+Azure

- **Introduction to AWS and Azure Machine Learning Services**
  - Overview of AWS SageMaker and Azure Machine Learning
  - Key features and benefits of using these platforms
  - Understanding different types of machine learning algorithms and use cases
- **Setting up the Environment**
  - Creating AWS and Azure accounts
  - Configuring the required tools and SDKs (e.g. AWS CLI, Azure CLI, Azure PowerShell)
  - Understanding the infrastructure requirements for training and deploying models (e.g. EC2 instances, GPU instances, Azure ML Compute)
- **Data Preparation and Feature Engineering**
  - Understanding the data requirements for machine learning models (e.g. structured vs unstructured data, data size, data quality)
  - Data cleaning and preprocessing techniques (e.g. missing value imputation, feature scaling, encoding categorical variables)
  - Feature selection and engineering techniques (e.g. PCA, feature importance)
- **Model Training and Evaluation**
  - Choosing the right machine learning algorithm and model (e.g. regression, classification, clustering)
  - Training models using AWS SageMaker and Azure Machine Learning (e.g. using built-in algorithms, custom code)
  - Evaluating model performance and tuning hyperparameters (e.g. cross-validation, hyperparameter optimization)

GROUP PROJECT **DURATION** 2.5 HRS

Game Environment Solver with Q-Learning

Description: Implement a Q-Learning algorithm to train an agent to solve a grid-world or maze environment using OpenAI Gym.

Tools covered: Python, OpenAI Gym, TensorFlow/PyTorch

Capstone Project

DOMAIN-SPECIFIC PROJECT **DURATION** 2 HRS

AI-Powered Customer Support Chatbot

Description: Build a chatbot using GPT-3 for query handling and RNN-based sentiment analysis. Deploy the model on AWS SageMaker with a Flask API for real-time interactions.

Tools covered: OpenAI GPT-3, TensorFlow , Flask, SageMaker, Docker

DOMAIN-SPECIFIC PROJECT **DURATION** 2 HRS

E-Commerce Image Classification and Sales Forecasting

Description: Create a system that classifies product images using CNN (ResNet) and forecasts sales trends using LSTM. Deploy on AWS with CI/CD pipelines.

Tools covered: TensorFlow , Flask, AWS SageMaker, Docker, Jenkins

Completing the **capstone project** helps you understand AI tools better and showcase your skills. It also strengthens your **portfolio** and supports your **career growth.**

Note: You can attain the project session in **2 modes**

1. **Live Online** with industry-led session
2. **Offline session** in 7+ cities (Instructor-Led)

TERM 6 Data Structure and Algorithm

We will cover data structures and algorithms using popular languages like **Python and Java.** You'll understand concepts such as **arrays, linked lists, trees, sorting, and searching algorithms.**

Module Duration:
40-50 hrs of live Instructor-led classes.
4 real time projects to practice all the concepts

Section 1: Fundamentals of Data Structures

- **Introduction to Data Structures**
  - Arrays, Linked Lists (Singly, Doubly, Circular)
  - Stacks and Queues: Implementation and Applications
- **Hands-On Lab**:
  - Implement a dynamic array and stack using Python.

CAPSTONE PROJECT **DURATION** 2.5 HRS

Library Management System using Stacks and Queues

Description: Build a basic library management system using stacks for book logs and queues for customer requests.

Tools covered: Python/Java

Section 2: Advanced Data Structures

- **Trees**
  - Binary Trees, Binary Search Trees, AVL Trees, and B-Trees
  - Tree Traversals (In-order, Pre-order, Post-order, Level-order)
- **Graphs**
  - Graph Representations: Adjacency Matrix, Adjacency List
  - Depth-First Search (DFS), Breadth-First Search (BFS), Shortest Path Algorithms (Dijkstra, Bellman-Ford)
- **Hands-On Lab**:
  - Implement BFS and DFS on a graph.

CAPSTONE PROJECT DURATION 2.5 HRS

City Navigation System using Graph Algorithms

Description: Implement a city navigation system that finds the shortest path between locations using Dijkstra's algorithm.

Tools covered: Python, NetworkX

Section 3: Sorting and Searching Algorithms

- **Sorting Algorithms**
  - Bubble Sort, Merge Sort, Quick Sort, Heap Sort
  - Time Complexity Analysis
- **Searching Algorithms**
  - Binary Search, Linear Search, Hashing Techniques
- **Hands-On Lab**:
  - Implement Quick Sort and Merge Sort, compare their time complexities.

CAPSTONE PROJECT DURATION 2.5 HRS

E-Commerce Product Search Engine

Description: Build a product search engine that allows searching and sorting products using various algorithms.

Tools covered: Python/Java

Section 4: Dynamic Programming and Greedy Algorithms

- **Dynamic Programming**
  - Introduction, Memoization, Tabulation
  - Popular Problems: Longest Common Subsequence, Knapsack

- Problem, Matrix Chain Multiplication
- **Greedy Algorithms**
  - Introduction and Key Concepts
  - Popular Problems: Fractional Knapsack, Activity Selection
- **Hands-On Lab**:
  - Solve the Knapsack problem using dynamic programming and greedy techniques.

CAPSTONE PROJECT **DURATION** 2.5 HRS

Optimization Problem Solver

Description: Develop an optimization solver that uses dynamic programming and greedy algorithms for cost optimization scenarios in logistics.

Tools covered: Python/Java

Capstone Project

DOMAIN-SPECIFIC PROJECT **DURATION** 3.5 HRS

Scalable Ride-Sharing Application

Objective: Build a scalable ride-sharing platform using efficient data structures and system design principles.

Description: Design a ride-sharing system that matches users with drivers in real-time using data structures like Hash Maps and Heaps. Implement scalable architecture with microservices, load balancing, and route optimization using Graph algorithms for efficient navigation.

Tools Covered: Java/Python, Hash Maps, Heaps, Graph Algorithms, Microservices, Load Balancers, Caching.

Real-time **Industrial Projects**

#1

Predictive Maintenance for Electric Vehicles

Implement a predictive maintenance system to forecast and prevent potential failures in electric vehicle components.

Tools: Apache Spark, hadoop

Outcome: Reduced maintenance costs and downtime, improved vehicle reliability and customer satisfaction.

#2

Supply Chain Optimization

Analyze and optimize supply chain operations to reduce costs and improve efficiency using historical sales and logistics data.

Tools: tableau, python

Outcome: Streamlined supply chain processes, reduced operational costs, and improved product availability.

#3

Customer Purchase Prediction

Develop a machine learning model to predict customer purchase behavior based on historical data and browsing patterns

Tools: TensorFlow, Amazon SageMaker

Outcome: Enhanced marketing strategies and personalized recommendations, leading to increased sales and customer satisfaction

#4

Drug Discovery Acceleration

Utilize AI and machine learning to accelerate the drug discovery process by predicting the efficacy of potential compounds

Tools: R, IBM Watson

Outcome: Faster time-to-market for new drugs and significant cost savings in research and development.

Real-time **Industrial Projects**

#5

Microsoft

Employee Productivity Analysis

Analyze employee performance data to identify factors that impact productivity and develop strategies to enhance efficiency

Tools: Power BI, Azure, python

Outcome: Improved employee performance and productivity, leading to higher overall organizational effectiveness.

#6

NETFLIX

Content Recommendation Engine Enhancement

Enhance the recommendation engine to provide more accurate and personalized content suggestions to users

Tools: python, kafka, Apache Spark

Outcome: Increased user engagement and retention, leading to higher subscription rates.

#7

JPMorgan Chase & Co.

Fraud Detection System

Implement an advanced fraud detection system to identify and prevent fraudulent transactions in real-time

Tools: TensorFlow 2.0, python

Outcome: Reduced financial losses due to fraud and increased customer trust and security.

#8

Uber

Dynamic Pricing Optimization

Develop a dynamic pricing model that adjusts fares based on demand, supply, and other external factors

Tools: MATLAB, HIVE

Outcome: Maximized revenue and improved service availability during peak times.

Real-time **Industrial Projects**

#9

Google

Ad Spend Optimization

Develop a data-driven strategy to optimize ad spend across different channels by analyzing performance metrics and customer behavior

Tools: Google Big Query, python

Outcome: Increased ROI on advertising campaigns and more effective allocation of marketing budgets.

#10

facebook

User Sentiment Analysis

Analyze user posts and comments to gauge public sentiment and identify trends and patterns

Tools: python, NLTK, STORM

Outcome: Better understanding of user preferences and improved content and advertising strategies.

#11

CapitalOne

AI-based Financial Portfolio Optimization

Develop a system that uses AI to optimize financial portfolios by analyzing market trends, risk factors, and investor preferences

Tools: TensorFlow 2.0, python

Outcome: A web app suggesting tailored financial portfolios for CapitalOne clients based on risk tolerance and goals.

#12

headspace

AI tool for monitoring mental health

Develop an AI tool to monitor user engagement with meditation and mental health content to offer personalized well-being suggestions

Tools: Flutter, React Native, NLP

Outcome: Tracks user interactions, sentiment, and usage patterns to offer personalized mental health advice, detect distress signs, and suggest interventions.

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Thank you!

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