



WE DON'T JUST TRAIN WE TRANSFORM CAREERS

DATA SCIENCE

CURRICULUM

Online / Offline



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OUR AWARDS & COLLABORATION

 IN PARTNERSHIP WITH
NASSCOM FOUNDATION
futureskills prime

A Unit - NASSCOM Digital Skilling Initiative


 MOST TRUSTED
 INDIAN COMPANY
 AWARDED BY

 BEST DATA
 SCIENCE EDETECH
 IN INDIA
 AWARDED BY

 LEADING
 EDETECH
 COMPANY IN 2023
 AWARDED BY

 BEST
 DATA SCIENCE
 INSTITUTION
 AWARDED BY

350+
 Batches

10,000+
 Career Transformations

500+
 Industry Experts

Online & Offline
 Live Classes

500+
 Hiring Partners

TOOLS COVERED IN THE COURSE


Python

**NumPy
+
pandas**

Statistics

Power BI

RegEx

Keras

LangChain
Hugging Face

Gemini

COURSE OBJECTIVE

- Understand the importance of data analysis for decision-making.
- Master MySQL for data management and querying.
- Proficiently create visualizations and dashboards using PowerBI.
- Analyze data using statistical techniques for insights.
- Develop and deploy machine learning models in Python.
- Process unstructured data and perform text analysis.
- Build deep learning models with TensorFlow and Keras.
- Apply skills to real-world data science projects.
- Foster critical thinking and problem-solving abilities.
- Learn the cutting edge GenAI tools to develop intelligent apps.

KEY HIGHLIGHTS OF THE TRAINING


Duration

6 Months


Instructor-Led LIVE Sessions

Both Online & Offline


Life-time LMS Access

All the course related content


LIVE Doubt Resolution

One-On-One Mentoring session


Topic-wise Assignments

All the Modules


Weekly Quizzes

Evaluate comprehension and application of key concepts, providing timely feedback to enhance learning outcomes.


Monthly Assessments

Mastery of key concepts and practical skills, ensuring readiness for real-world challenges


30+ Use Cases

Providing real-world context for learning


Vibrant Hackathons

Challenging students to solve real-world problems through data-driven solutions


Mock Interviews

Helping students refine their communication and technical skills for professional success


Discord Community Access

Enthusiasts collaborate, share insights, and network with industry professionals


Guaranteed Internship

Extensive in-house 2 to 3 months internship. Gain valuable hands-on experience in real-world settings.


Dedicated Soft Skills

Equipping you with essential communication, teamwork, and leadership abilities for success


Resume Tailoring

Techniques to highlight your skills and experience, increasing your chances of securing job opportunities


100% Job Assistance

Supported by our extensive network of hiring partners and personalized career guidance

INTRODUCTION & WALK THROUGH THE COURSE

Introduction To Data Science

Data Science is a multi-disciplinary field that combines techniques from statistics, mathematics, computer science, and domain-specific knowledge to extract valuable insights and knowledge from data. It involves the use of various methods, algorithms, and systems to analyze and interpret complex data sets.

In this introductory section, we'll explore the fundamental concepts of data science, including its origins, key principles, and the role it plays in solving real-world problems. We'll delve into the importance of data-driven decision-making and how data science contributes to innovation across various domains.

Life Cycle of Data Science

The data science life cycle involves stages from data collection to model deployment and ongoing monitoring, ensuring effective project management.

Skills Required for Data Science

Essential skills include statistical analysis, programming proficiency (Python, R), machine learning, data wrangling, data visualization, domain knowledge, and strong communication skills.

Applications of Data Science

The data science life cycle involves stages from data collection to model deployment and ongoing monitoring, ensuring effective project management.

MODULE 1 PYTHON PROGRAMMING

Introduction

- What is Python?
- Why does Data Science require Python?
- Installation of Anaconda
- Understanding Jupyter Notebook (IDE), Colab Notebook
- Basic commands in Jupyter Notebook
- Understanding Python Syntax
- Identifiers and Operators

Data Types & Data Structures

- Variables, Data Types, and Strings
- Lists, Sets, Tuples and Dictionaries

Control Flow & Conditional Statements

- Conditional operators, Arithmetic Operators and Logical Operators
- if, elif and else statements
- range
- while loops and control flow
- for loops and nested loops
- pass, break and continue
- Nested loops and list and dictionary comprehensions

Functions and Modules

- What is function and types of functions
- Code optimization and argument functions
- Lambda functions
- map, filter and reduce
- Manual higher order functions & nested functions
- Importing a module
- Namespace & scope of a variable
using help() and dir() aliasing or renaming
- **Some Important Modules In Python:**
math module, random module, datetime and os module

Class and Objects

- Create A Class And Objects
- __init__(), self parameter
- Class Properties, Instance Properties & Static Properties
- Modifying Object Properties
- Delete Object
- Pass Statements
- 4 pillars of oop
- Inheritance, Encapsulation, Polymorphism, & Abstraction
- Multiple dispatch & abc modules

File Handling

- Errors and Exception Handling
- Create, Read, Write files and Operations in File Handling

MODULE 2

DATA ANALYSIS USING PYTHON

Numpy - Numerical Python

- ▶ Introduction To Array
- ▶ Creation & Printing Of An Array
- ▶ Basic Operations In Numpy
- ▶ Mathematical Functions Of Numpy
- ▶ Numpy With Images
- ▶ Advance Numpy Functions
- ▶ Numpy Vectorization, Vectorization Vs Loops
- ▶ Descriptive Stats Using Numpy

Data Manipulation with Pandas

- ▶ Series and DataFrames
- ▶ Data Importing and Exporting through Excel, CSV Files
- ▶ Data Understanding Operations
- ▶ Indexing and slicing and More filtering with Conditional Slicing
- ▶ Groupby, Pivot table and Cross Tab
- ▶ Concatenating and Merging Joining
- ▶ Descriptive Statistics
- ▶ Removing Duplicates
- ▶ String Manipulation
- ▶ Date Time Manipulations
- ▶ Other Forms Of Data
 - xls, html & json files
 - json normalization
- ▶ Missing Data Handling
 - mcar, mar & mnar
 - Visualization Of Missing Data
 - Imputation Of Missing Data Using Pandas
- ▶ Merges & Joins
- ▶ Window Functions

Case Study: A Case Study on Data Manipulation with Pandas

DATA VISUALIZATION

Data Visualization Using Matplotlib And Seaborn

- ▶ Introduction to Matplotlib
- ▶ Basic Plotting
- ▶ Properties of plotting
- ▶ About Subplots
- ▶ Line plots
- ▶ Pie Chart And Bar Graph
- ▶ Histograms
- ▶ Box and Violin Plots
- ▶ Scatterplot
- ▶ Joint Plot
- ▶ Cat Plot

■ **Case Study:** A Case Study on Data Visualization Using Matplotlib And Seaborn

Exploratory Data Analysis (EDA)

- ▶ What is EDA?
- ▶ Uni - Variate Analysis
- ▶ Bi - Variate Analysis
- ▶ More on Seaborn Based Plotting Including Pair Plots, Catplot, Heat Maps, Count plot along with matplotlib plots.

■ **Case Study:** A Case Study on EDA

UNSTRUCTURED DATA PROCESSING

Regular Expressions

- ▶ Structured Data and Unstructured Data
- ▶ Literals and Meta Characters
- ▶ How to Regular Expressions using Pandas?
- ▶ Inbuilt Methods
- ▶ Pattern Matching
- ▶ flags



Project On Web Scraping : Data Collection And Exploratory Data Analysis

- ▶ Data Collection (web - scraping)

This project starts completely from scratch which involves collection of raw data from different sources and converting the unstructured data to a structured format to analyze the data for generating insights.
- ▶ This project covers the main four steps of data science life cycle which involves
 - ▶ Data Collection
 - ▶ Data Mining
 - ▶ Data Preprocessing
 - ▶ Data Visualization
 ex: text, csv, tsv, excel files, matrices, images

MODULE 3 ADVANCED STATISTICS

Introduction to Statistics and Data Types

- ▶ What is Statistics?
- ▶ How is Statistics used in Data Science?
- ▶ Population and Sample
- ▶ Parameter and Statistic
- ▶ Data Types

Descriptive Statistics

- ▶ What is Data, Its type and Data Measures.
- ▶ What is Univariate and Bi Variate Analysis?
- ▶ Measures of Central Tendencies - Mean, Median, & Mode
- ▶ Measures of Dispersion - Variance, Standard Deviations, Range, & Interquartile Range
- ▶ Covariance and Correlation
- ▶ Box Plots and Outliers detection
- ▶ Skewness and Kurtosis

Probability Distribution

- ▶ Probability And Limitations
- ▶ Axioms Of Probability
- ▶ Conditional Probability
- ▶ Random Variable
- ▶ Discrete Probability Distributions - Probability Mass Functions
- ▶ Bernoulli, Binomial Distribution, Poisson Distribution
- ▶ Continuous Probability Distributions - Probability Density Functions
- ▶ Normal Distribution, Standard Normal Distribution

Data Gathering Techniques

- ▶ Data Collection Techniques
- ▶ Sampling Techniques:
- ▶ Convenience Sampling, Simple Random Sampling
- ▶ Stratified Sampling, Systematic Sampling and Cluster Sampling

Inferential Statistics

- ▶ Sampling variability and Central Limit Theorem
- ▶ Confidence Intervals
- ▶ Hypothesis Testing, A/B testing
- ▶ parametric vs non-parametric tests
- ▶ test for normality
- ▶ Z-test, t-test
- ▶ Chi-Square Test
- ▶ F-Test and ANOVA

Case Study: A Case Study with Advanced Statistical Tests

MODULE 4 **DATA BASE (SQL) + REPORTING TOOL (POWER BI)**

Introduction to SQL

- ▶ Data
- ▶ What is Database
- ▶ DBMS
- ▶ RDBMS
- ▶ SQL vs MYSQL
- ▶ SQL vs NoSQL
- ▶ CRUD operations
- ▶ Pandas vs SQL

Data Exploration and Data Filtering (DQL and OPERATORS)

- ▶ Client Server Architecture
- ▶ Workbench introduction
- ▶ Select (retrieve)
- ▶ Data Exploration
 - Selecting columns
 - Performing (limit,distinct,aggregation values,indexing and slicing using offset)
- ▶ Data Filtering
 - Filtering data based of conditions (with all operators(Like,Regexp,Between))

Clauses

- ▶ GROUP BY(Aggregate Function)
- ▶ HAVING (corelating with get_group in pandas)
- ▶ ORDER BY
- ▶ CASE
- ▶ Order of execution

■ **Case Study:** A Case Study of Clauses

Multiple Tables

- ▶ Multiple Tables
 - Primary key
 - Composite key
 - Foreign key
- ▶ Types of relationships in SQL
- ▶ ER diagram

Joins, Unions And Subquery

- ▶ Types of Joins
 - Inner join
 - Outer join
 - Left
 - Right
 - Cross Join
 - Self join
- ▶ Set operations
 - UNION
 - UNION ALL
- ▶ Subquery
 - Scalar Subquery
 - Multiple Subquery
 - Correlated Subquery

Temporary Tables

- ▶ Dervied table
- ▶ CTE
- ▶ Inbuilt Functions
- ▶ Window Functions

■ **Case Study:** A Case Study of Temporary Tables

SQL Fundamentals

- ▶ Types of SQL Commands
- ▶ Data types
- ▶ Constraints(PRIMARY KEY/auto_increment, NOT NULL, UNIQUE, DEFAULT, CHECK)
- ▶ Creating table with constraints
- ▶ DDL(CREATE, ALTER, DROP, TRUNCATE)
- ▶ DML(Insert, Update, Delete)

SQL Database Objects

- ▶ Views
- ▶ Stored Procedure
- ▶ Functions

Advance Topics

- ▶ Transaction Control Language
 - ACID properties
 - (COMMIT, ROLLBACK, Savepoint)
- ▶ Triggers



This module will end up with a Project.

REPORTING TOOL (POWER BI)

Introduction To Power BI

- ▶ What is Business Intelligence?
- ▶ Power BI Introduction
- ▶ Quadrant report
- ▶ Comparison with other BI tools
- ▶ Power BI Desktop overview
- ▶ Power BI workflow

Data Import And Data Visualizations

- ▶ Data import options in Power BI
- ▶ Import from Web (hands on)
- ▶ Why Visualization?
- ▶ Visualization types
- ▶ Categorical data visualization
- ▶ Trend Data viz

- ▶ Visuals for Filtering
- ▶ Slicer details and use
- ▶ Formatting visuals
- ▶ KPI visuals
- ▶ Tables and Matrix

Power Queries

- ▶ Power Query Introduction
- ▶ Data Transformation - its benefits
- ▶ Introducing ribbons
- ▶ Queries panel
- ▶ M Language briefing
- ▶ Power BI Datatypes
- ▶ Changing Datatypes of columns
- ▶ Filtering
- ▶ Inbuilt column Transformations
- ▶ Inbuilt row Transformations
- ▶ Combine Queries
- ▶ Merge Queries

Power Pivot And Introduction To Dax

- ▶ Power Pivot
- ▶ Intro to Data Modeling
- ▶ Relationship and Cardinality
- ▶ Relationship view
- ▶ Calculated Columns vs Measures
- ▶ DAX Introduction and Syntax

Data Analysis Expressions

- ▶ DAX logical functions
- ▶ DAX text functions
- ▶ DAX math and statistical Functions
- ▶ DAX aggregation function
- ▶ DAX filter function
- ▶ DAX time intelligent function
- ▶ Creating a Date Dimension table
- ▶ Related aspects with tables

Login, Publish To Web And RLS

- ▶ Power BI services
- ▶ Dashboard creation
- ▶ Web Content, Image, Text Box
- ▶ Dashboard formatting
- ▶ Sharing your dashboard
- ▶ RLS introduction

Miscellaneous Topics

- ▶ Visual Interactions
- ▶ Drill Through
- ▶ Drilldown
- ▶ Conditional Formatting
- ▶ Creating buttons in Power BI reports
- ▶ Creating Python Script Visuals



This module will end up with a project.

MODULE 5 MACHINE LEARNING

Introduction

- ▶ 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

Case Study: A Case Study on Chatbot with RASA frame work

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



This module will end up with a project.

SUPERVISED LEARNING

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

■ **Case Study:** A Case Study on Navie Bayes

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

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

■ **Case Study:** A Case Study on k Nearest Neighbors

Rule / Decection 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
- ▶ Gini Index
- ▶ Overfitting and Pruning
- ▶ Stopping Criteria
- ▶ Accuracy Estimation using Decision Trees
- ▶ Hyper parameter tuning using random search, grid search + cross validation, kfold cv

Case Study: A Case Study on Decision Tree using Python

Boundary Based Linear Model - Linear Regression

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

Multiple Linear Regression

- ▶ Estimating the Regression Coefficients
- ▶ OLS Assumptions
- ▶ Multicollinearity
- ▶ Feature Selection
- ▶ Gradient Descent

Case Study: A Case Study on Multiple Linear Regression

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
- ▶ MSE and RMSE

Polynomial Regression

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

Regularization Techniques

- ▶ Lasso Regularization
- ▶ Ridge Regularization
- ▶ ElasticNet Regularization

■ **Case Study on** Linear, Multiple Linear Regression, Polynomial, Regression using Python.

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

■ **Case Study:** A Case Study on Logistic Regression

Support Vector Machines

- The Maximal Margin Classifier
- HyperPlane
- Support Vector Classifiers and Support Vector Machines
- Hard and Soft Margin Classification
- 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

■ **Case Study:** 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.

Ensemble Methods in Tree Based Models

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

Random Forest

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

Boosting: Adaboost, Gradient Boosting, XG Boosting:

- What is it and how does it work?
- Hyper parameter and Pro's and Con's

■ **Case Study:** Ensemble Methods - Random Forest Techniques using Python.

Machine Learning Applications for Data Analysis

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



This module will end up with a project.

UN-SUPERVISED LEARNING

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

Dimensionality Reduction Techniques - PCA & t-SNE

- ▶ Introduction to Dimensionality Reduction and it's necessity
- ▶ What Are Principal Components?
- ▶ Demonstration of 2D PCA and 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: Case Studies on PCA and t-sne using python.

K-Means Clustering

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

Hierarchical Clustering

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

Case Study: A Case Study on clusterings using Python.

Developing ML Application using streamLit

MODULE 6

DEEP LEARNING

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

Neural Network Architecture and Activation Functions

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

Forward and Backward Propagation

- ▶ MLP Architecture
- ▶ 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)
- ▶ Vanishing Gradient Problem
- ▶ 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

Optimizers

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

Neural Network Architecture and Activation Functions

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

Keras Hands-on - Regression and Classification

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



This modules will end up with a project.

MODULE 7 CNN & COMPUTER VISION

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

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

Intro to Convolutional Neural Network

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

CNN Architecture

- Padding, Stride, Pooling
- LeNet5
- Alex Net
- Vgg 16 and Vgg 19
- Inception Net
- ResNet
- Xception
- Mobile Net
- Efficient Net
- Pre trained Model Introduction

Image Classification Case Study

- Face Mask Detection
- Bone fracture Multi region detection

Transfer Learning

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

Case Study with Transfer Learning

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

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
- ▶ Yolo Algorithm (How it works) - More Detail on YOLO
- ▶ Implementation of Yolo V7 / V8 using Ultralytics

YOLO - Case Study

- ▶ Helmet Detection using Yolo



This module will end up with a project.

MODULE 8

NATURAL LANGUAGE PROCESSING

Introduction to text and Text Preprocessing with nltk and spacy

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

Vectorization Techniques

- ▶ BOW
- ▶ TF-IDF
- ▶ Coding for BOW and TF-IDF using nltk
- ▶ Word2Vec
- ▶ How Word2Vec algorithm works (Skip-Gram & CBOW)
- ▶ Glove
- ▶ FastText

Project - Text Classification

- Word2Vec, Glove & FastText

RNNs

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

Project - Sequence Tagging

- NER and POS Tagging case study

LSTMs

- Intro to LSTM
- Why LSTM
- LSTM algorithim
- Grus
- Bi-Directional RNN
- Understanding of working of Image captioning

Auto Encoders

- Encoder Decoder Architecture
- Introduction to autoencoders
- Types of autoencoders

Project - Auto Encoders

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

Transformer and Attention

- Intro to Transformers and Attention Models
- How does Transformers works
- How does Attention works
- Coding For Transformers and Attention Models

BERT

- ▶ Intro to BERT
- ▶ How does BERT works
- ▶ Coding For Transformers and Attention Models

| **Case Study:** A Case Study on Text Classification With BERT



This module will end up with a project.

MODULE 9 GEN AI

Intro To Gen AI

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

Intro To LLM

- ▶ History of NLP
- ▶ Into to large language Models
- ▶ What is Large Language Model
- ▶ Types of Large Language Model

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 for text generation.
- ▶ Understanding DALL-E and its capabilities in image generation.
- ▶ Hands-on project to generate images from textual descriptions.

| **Case study:** Creating a project with LLM

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.

| **Case study:** Creating a project with Open AI

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

| **Case study:** Creating a project with Gemini

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.
- ▶ Discussion on model sizes and capabilities.
- ▶ Environment setup: Installing necessary libraries and tools
- ▶ Accessing LLaMA models: Overview of the download process and setup on local machines or cloud platforms (Meta LLaMa).
- ▶ Intro to the architecture of LLaMA models
- ▶ Understanding the differences between LLaMA model variants (8B, 13B, 30B, and 70B parameters)
- ▶ Implementing text generation using LLaMA

| **Case study:** Creating a project with LLaMA

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

| **Case study:** Creating a project with LangChain



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