**DATA SCIENCE**

* Introduction
* Programming languages
* Mathematics and Statistics
* Data Wrangling and Cleaning
* Exploratory Data Analysis
* ML&DL
* Evaluation & Validation
* Feature Engineering

**INTRODUCTION**

* Definition
* Lifecycle
* Data Types
* Data Acquisition
* Data Cleaning and Preprocessing
* Exploratory Data Analysis(EDA)
* Descriptive & Inferential Statistics
* Ethical Considerations

**PROGRAMMING LANGUAGES**

**Python**

* Numpy
* Pandas
* Matplotlib and Seaborn

**MATHEMATICS & STATISTICS**

**Statistics:**

* Descriptive Statistics
* Probability Theory
* Inferential Statistics
* Regression Analysis

**Mathematics:**

* Linear Algebra
* Calculus
* Optimization
* Probability Theory

**DATA WRANGLING**

* Data Acquisition
* Data Cleaning
* Data Transformation
* Data Integration
* Data Reduction

**EXPLORATORY DATA ANALYSIS**

* Data Summarization
* Data Visualization
* Identifying Patterns and Trends
* Handling Missing Values and Outliers
* Hypothesis Generation

**ML & DL**

* Supervised Learning
* **Unsupervised Learning**
* Neural Networks Basic
* Deep Learning Architectures
* Deep Learning Frameworks
* Deployment and Scalability

**EVALUATION & VALIDATION**

* Bias and Fairness Evaluation
* ErrorAnalysis

**FEATURE ENGINEERING**

* Feature Selection
* Feature Creation
* Feature Transformation
* Handling Missing Values
* Iterative Process

**Introduction**

**Data Science**:

It combines the two Key elements

Data: it refers to the input that is collected stored and processed.

Science: it is refers to the systematic study and investigation.

**what is data science?**

Turning data into information

Analysing data to get insights

Identifying Trends patterns and correlations

Contextualizing applying and understanding

**Applications**

**Online shopping**: In our daily lives when we shop online recommendation systems powered by data science suggest products based on our browsing and purchase history making our shopping easy and more personalized.

**Social Media:** social media platforms like Facebook Instagram use data science to personalize our news feed ,shows adds,and suggest people to connect.

**Weather Forecasting**: Weather forecasting relies heavily on data science techniques to analyze vast amounts of meteorological data and predict our future weather conditions accurately.

**Smart Home Devices**: Devices like smart thermostats or lighting systems use data science to learn our behavior patterns and optimize energy usage.

**Life Cycle**

**Problem Definition**: We have to start by clearly understanding what we're trying to achieve. This involves asking the right questions and defining the goals of the project.

**Data Acquisition**: Next, we gather all the data that we'll need to solve the problem. This could be from various sources like databases, files, or even sensors.

**Data Preparation:** Data is rarely perfect straight from the source. We need to clean it up, organize it, and make sure it's in a format that we can work with effectively.

**Exploratory Data Analysis (EDA):** Now it's time to get to know our data better. We explore its characteristics, look for patterns, and gain insights that will guide our analysis.

**Feature Engineering:** To build accurate models, we need to select the right features (or variables) from our data or create new ones that will help our models perform better.

**Model Development:** This is where the magic happens. We use various algorithms and techniques to build predictive models that can make sense of our data and help us solve the problem at hand.

**Model Evaluation**: Once we've built our models, we need to see how well they perform. We evaluate them using metrics and techniques to ensure they're accurate and reliable.

**Model Deployment:** Once we have a model that we're happy with, it's time to put it to work. We deploy it into production so that it can make predictions on new data and help us make better decisions.

**Monitoring and Maintenance**: But our work doesn't end there. We need to keep an eye on our model, making sure it continues to perform well over time. If things change, we may need to update or retrain our model to keep it accurate and relevant.

**Feedback Loop**: Finally, we close the loop by taking feedback from our model's performance and using it to improve our process. This could involve refining our models, gathering more data, or adjusting our approach based on what we've learned.

**Data Types**

**Numbers:** Data can be numbers. There are two main types here

Whole Numbers: Like counting numbers without any fractions, such as 1, 2, 3.

Decimal Numbers: These have parts after the dot, like 3.14 or 5.5.

**Text and Categories**: Sometimes, instead of numbers, we deal with words or labels.

Text: This includes words, sentences, or any other written stuff.

Categories: These are labels used to group things together. For example, "red" and "blue" could be categories for colors.

**True or False**: We often deal with yes-or-no questions or conditions.

True: Means something is right or valid.

False: Means something is not true or invalid.

**Time and Dates**: Data can also be about when things happen.

Dates: Specific days like "January 1, 2023."

Time: The moment during a day, like "12:30 PM."

**How Data Looks**: Sometimes, data is nicely organized, while other times, it's all over the place.

Organized Data: Neatly arranged in rows and columns, maybe in a spreadsheet.

Messy Data: No clear structure, like a pile of papers thrown together.

**Data acquisition**

Data acquisition is like gathering ingredients for cooking. We find where to get our data, collect it, clean out any bad stuff, combine it if needed, and store it safely until you're ready to use it. Just like cooking, you want to make sure everything's clean, organized, and ready to go before you start!