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Data Science

Introduction to Data Science

- Necessity for Data Scientists
- Foundation of Data Science
- Business Intelligence?
- Data Analysis, Data Mining, and Machine Learning?
- Analytics vs Data Science
- Types of Analytics
- Lifecycle Probability
- Analytics Project Lifecycle

Data

- Basis of Data Categorization
- Types of Data
- Data Collection Types
- Forms of Data and Sources
- Data Quality, Changes and Data Quality Issues, Quality Story
- What is Data Architecture
- Components of Data Architecture
- OLTP vs OLAP
- How is Data Stored?

Depths of Data Science

- What is Data Science?
- Why are Data Scientists in demand?
- What is a Data Product
- The growing need for Data Science
- Large-Scale Analysis Cost vs Storage
- Data Science Skills
- Data Science Use Cases and Data Science Project Life Cycle & Stages
- Map-Reduce Framework
- Hadoop Ecosystem
- Data Acquisition
- Where to source data
- Techniques
- Evaluating input data
- Data formats, Quantity and Data Quality
- Resolution Techniques
- Data Transformation
- File Format Conversions
- Anonymization

Python

Introduction to Python, Python Basics

- Features and uses of Python
- Program execution
- Installation of IDE
- Identifiers and keywords
- Types of comments
- Data types
- Variables
- Arithmetic operators
- Assignment operators
- Input and print statements

Strings, Decision Control Statements

- Definition of string
- Operations accessing string elements
- Relational operators
- Logical operators
- Conditional expressions
- If, If..else, If..elif

Repetition Statements and Console InputOutput

- Use of while and for
- Break and continue
- Pass and else statements
- Formatted input and output

Lists, Tuples, Sets, Dictionary

- Use of while and for
- Break and continue
- Pass and else statements
- Formatted input and output

Functions and Recursion, Functional Programming and Lambda Functions

- Defining a function
- Types of arguments
- Global and local variables
- Functions as arguments
- Implementing Lambda functions
- Map, Reduce, and Filter functions

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File Input-Output and Modules

- Read-write operations
- With the keyword
- File opening modes
- Moving within a file
- Serialization
- File and directory operations
- Importing a module
- Variations of import
- Third-party packages

Classes and Objects

- Class variables
- Methods
- Operator overloading
- Reuse
- Containership
- Inheritance

Exception Handling, Iterators and Generators

- Iterables and iterators
- Syntax errors and exceptions for:
- try-except
- else
- finally blocks

Python Packages

- NumPy
- Pandas
- Matplotlib
- Seaborn:
- Scikit-learn with Statsmodels
- SciPy
- TensorFlow
- Keras
- PyTorch
- NLTK (Natural Language Toolkit)

R Programming

R Programming Concepts

- The datatypes in R and its uses
- Built-in functions in R
- Subsetting methods
- Summarize data using functions
- Use of functions like head(), tail(), for inspecting data
- Use-cases for problem solving using R

Data Manipulation in R

- Various phases of Data Cleaning
- Functions used in Inspection
- Data Cleaning Techniques
- Uses of functions involved
- Use-cases for Data Cleaning using R

Data Visualization in R

- Storytelling with Data
- Principle tenets
- Elements of Data Visualization
- Infographics vs Data Visualization
- Data Visualization & Graphical functions in R
- Plotting Graphs
- Customizing Graphical Parameters to improvise the plots
- Various GUIs
- Spatial Analysis
- Other Visualization concepts

Power Bi

- Introduction to Power BI
- Connecting to Data Sources
- Data Transformation and Cleaning
- Data Modeling
- DAX (Data Analysis Expressions)
- Data Visualization
- Interactive Dashboards
- Advanced Data Analysis with DAX
- Power BI Service
- Power BI Apps
- Data Gateways
- Power BI and Excel Integration
- Power BI Security
- Power BI REST API
- Power BI Best Practices

Database (SQL)

- Introduction to SQL
- Basic SQL Commands
- Filtering and Sorting Data
- Aggregation Functions
- Joins
- Subqueries
- Data Modification Commands
- Indexes and Constraints
- Views
- Stored Procedures and Functions
- Data Types and Conversion
- Normalization
- Transactions

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- Window Functions
- Optimizing SQL Queries
- Indexes and Performance Tuning
- Working with Date and Time Functions
- Advanced JOIN Operations
- Working with JSON Data
- Handling NULL Values
- Common Table Expressions (CTEs)
- Analytic Functions
- Geospatial Data
- Data Import and Export
- Security and Permissions
- Database Design Principles
- Stored Procedures for ETL
- Temporal Tables

Statistics + Machine Learning Statistics

What is Statistics?

- Descriptive Statistics
- Central Tendency Measures
- The Story of Average
- Dispersion Measures
- Data Distributions
- Central Limit Theorem
- What is Sampling
- Why Sampling
- Sampling Methods
- Inferential Statistics
- What is Hypothesis testing
- Confidence Level
- Degrees of freedom
- what is pValue
- Chi-Square test
- What is ANOVA
- Correlation vs Regression
- Uses of Correlation and Regression

Machine Learning

Machine Learning Introduction

- ML Fundamentals
- ML Common Use Cases
- Understanding Supervised and Unsupervised Learning Techniques
- Clustering
- Similarity Metrics
- Distance Measure Types: Euclidean, Cosine Measures
- Creating predictive models
- Understanding K-Means Clustering
- Understanding TF-IDF, Cosine Similarity and their application to Vector Space Model
- Case study
- Implementing Association rule mining
- Understanding Process flow of Supervised Learning Techniques
- Decision Tree Classifier
- How to build Decision trees
- Case study
- Random Forest Classifier
- What is Random Forests
- Features of Random Forest
- Out of Box Error Estimate and Variable Importance
- Case study
- Naive Bayes Classifier
- Case study
- Project Discussion
- Problem Statement and Analysis
- Various approaches to solving a Data
- Pros and Cons of different approaches and algorithms
- Linear Regression
- Case study
- Logistic Regression
- Case study
- Text Mining
- Case study
- Sentimental Analysis

Machine Learning Introduction

- Introduction to Machine Learning
- Areas of Implementation of Machine Learning
- Why Python
- Major Classes of Learning Algorithms
- Supervised vs Unsupervised Learning
- Learning NumPy
- Learning Scipy
- Basic plotting using Matplotlib
- Machine Learning application

Supervised and Unsupervised learning

- Classification Problem
- Classifying with k-Nearest Neighbours (kNN)

Artificial Intelligence

- AI Introduction Perceptron
- Multi-Layer perceptron
- Markov Decision Process
- Logical Agent & First Order Logic
- AL Applications Deep Learning
- Deep Learning Algorithms
- CNN – Convolutional Neural Network
- RNN – Recurrent Neural Network
- ANN – Artificial Neural Network

Projects

- Applying learned concepts to a real-world project
- Data exploration, analysis, and presentation