SQL SCHOOL
Premium Quality Training

Data Science Training

What is Data Science?

Data science is the study of data that helps us derive useful insight for business decision making. Data Science is all about using tools, techniques, and our analyse the hidden trends of data !

What are the elements available in Data Science?

- **Graphs and Charts**: Visuals of bar graphs, line charts, scatter plots, etc..
- **Code snippets:** Python or R code with libraries like pandas, numpy, matplotlib, etc
- **Data clouds or binary code**: Depicting the flow of data.
- **Machine Learning:** Visualizations of neural networks, decision trees, or AI models
- **Big Data:** Images of servers, clouds, and databases
- **Statistics:** Equations or symbols for things like mean, median, variance.

What we do as a Data Scientist?

Data Science processes the raw data and solve business problems and even make prediction about the future trend or requirement. Includes:

- What do customer want?
- How can we improve our services?
- What will the upcoming trend in sales?
- How much stock they need for upcoming festival.

🔥 Data Science Training Plans:

👉 ▩ **Level 1: Duration @ 3 Months**

- ✓ **Module 1: SQL Database Concepts**
- ✓ **Module 2: Power BI**
- ✓ **Module 3: Python Analytics**

👉 ▩ **Level 2: Duration @ 2 Months**

- ✓ **Module 4: Python Programming**
- ✓ **Module 5: Python with AI-ML**
- ✓ **Module 6: Advanced Statistics**

👉 ▩ **Level 3: Duration @ 2 Months**

- ✓ **Module 7: Machine Learning (Advanced Level)**
- ✓ **Module 8: Deep Learning, Computer Vision**
- ✓ **Module 9: Natural Language Processing**
- ✓ **Module 10: AI & Gen AI, Prompt Engineering**

Who can become a Data Scientist?

Anyone. We start the classes from scratch, right from Basics of Data, Database, Analysis, Machine Learning, Statistics, Maths, AI, Gen AI, Prompt Engineering and then finally Realtime Projects..!

🔥 Data Science: Detailed Course Content 🔥

Module 1: SQL Server TSQL (MS SQL) Queries

Ch 1: Data Engineer Job Roles

- ✓ **Introduction to Data Science**
- ✓ **Data Science Job Roles**
- ✓ **Data and Databases Concepts**

Ch 2: Database Intro & Installations

- ✓ Database Types (OLTP, DWH, ..)
- ✓ DBMS: Basics
- ✓ SQL Server 2025 Installations
- ✓ SSMS Tool Installation
- ✓ Server Connections, Authentications

Ch 3: SQL Basics V1 (Commands)

- ✓ Creating Databases (GUI)
- ✓ Creating Tables, Columns (GUI)
- ✓ SQL Basics (DDL, DML, etc..)
- ✓ Creating Databases, Tables
- ✓ Data Inserts (GUI, SQL)
- ✓ Basic SELECT Queries

Ch 4: SQL Basics V2 (Commands, Operators)

- ✓ DDL: Create, Alter, Drop, Add, modify, etc..
- ✓ DML: Insert, Update, Delete, select into, etc..
- ✓ DQL: Fetch, Insert... Select, etc..
- ✓ SQL Operations: LIKE, BETWEEN, IN, etc..
- ✓ Special Operators

Ch 5: Data Types

- ✓ Integer Data Types
- ✓ Character, MAX Data Types
- ✓ Decimal & Money Data Types
- ✓ Boolean & Binary Data Types
- ✓ Date and Time Data Types
- ✓ SQL_Variant Type, Variables

Ch 6: Excel Data Imports

- ✓ Data Imports with Excel
- ✓ SQL Native Client
- ✓ Order By: Asc, Desc
- ✓ Order By with WHERE
- ✓ TOP & OFFSET
- ✓ UNION, UNION ALL

Ch 7: Schemas & Batches

- ✓ Schemas: Creation, Usage
- ✓ Schemas & Table Grouping
- ✓ Real-world Banking Database
- ✓ 2 Part, 3 Part & 4 Part Naming
- ✓ Batch Concept & “Go” Command

Ch 8: Constraints, Keys & RDBMS – Level 1

- ✓ Null, Not Null Constraints
- ✓ Unique Key Constraint
- ✓ Primary Key Constraint
- ✓ Foreign Key & References
- ✓ Default Constraint & Usage

- ✓ DB Diagrams & ER Models

Ch 9: Normal Forms & RDBMS – Level 2

- ✓ Normal Forms: 1 NF, 2 NF
- ✓ 3 NF, BCNF and 4 NF
- ✓ Adding Keys to Tables
- ✓ Cascading Keys
- ✓ Self Referencing Keys
- ✓ Database Diagrams

Ch 10: Joins & Queries

- ✓ Joins: Table Comparisons
- ✓ Inner Joins & Matching Data
- ✓ Outer Joins: LEFT, RIGHT
- ✓ Full Outer Joins & Aliases
- ✓ Cross Join & Table Combination
- ✓ Joining more than 2 tables

Ch 11: Views & RLS

- ✓ Views: Realtime Usage
- ✓ Storing SELECT in Views
- ✓ DML, SELECT with Views
- ✓ RLS: Row Level Security
- ✓ WITH CHECK OPTION
- ✓ Important System Views

Ch 12: Stored Procedures

- ✓ Stored Procedures: Realtime Use
- ✓ Parameters Concept with SPs
- ✓ Procedures with SELECT
- ✓ System Stored Procedures
- ✓ Metadata Access with SPs
- ✓ SP Recompilations

Ch 13: User Defined Functions

- ✓ Using Functions in MSSQL
- ✓ Scalar Functions in Real-world
- ✓ Inline & Multiline Functions
- ✓ Parameterized Queries
- ✓ Date & Time Functions
- ✓ String Functions & Queries
- ✓ Aggregated Functions & Usage

Ch 14: Triggers & Automations

- ✓ Need for Triggers in Real-world
- ✓ DDL & DML Triggers
- ✓ For / After Triggers
- ✓ Instead Of Triggers
- ✓ Memory Tables with Triggers
- ✓ Disabling DMLs & Triggers

Ch 15: Transactions & ACID

- ✓ Transaction Concepts in OLTP
- ✓ Auto Commit Transaction
- ✓ Explicit Transactions
- ✓ COMMIT, ROLLBACK
- ✓ Checkpoint & Logging
- ✓ Lock Hints & Query Blocking
- ✓ READPAST, LOCKHINT

Ch 16: CTEs & Tuning

- ✓ Common Table Expression
- ✓ Creating and Using CTEs
- ✓ CTEs, In-Memory Processing
- ✓ Using CTEs for DML Operations
- ✓ Using CTEs for Tuning
- ✓ CTEs: Duplicate Row Deletion

Ch 17: Indexes Basics, Tuning

- ✓ Indexes & Tuning
- ✓ Clustered Index, Primary Key
- ✓ Non Clustered Index & Unique
- ✓ Creating Indexes Manually
- ✓ Composite Keys, Query Optimizer
- ✓ Composite Indexes & Usage

Ch 18: Group By Queries

- ✓ Group By, Distinct Keywords
- ✓ GROUP BY, HAVING
- ✓ Cube( ) and Rollup( )
- ✓ Sub Totals & Grand Totals
- ✓ Grouping( ) & Usage
- ✓ Group By with UNION
- ✓ Group By with UNION ALL

Ch 19: Joins with Group By

- ✓ Joins with Group By
- ✓ 3 Table, 4 Table Joins
- ✓ Join Queries with Aliases
- ✓ Join Queries & WHERE, Group By
- ✓ Joins with Sub Queries
- ✓ Query Execution Order

Ch 20: Sub Queries

- ✓ Sub Queries Concept
- ✓ Sub Queries & Aggregations
- ✓ Joins with Sub Queries
- ✓ Sub Queries with Aliases
- ✓ Sub Queries, Joins, Where
- ✓ Correlated Queries

Ch 21: Cursors & Fetch

- ✓ Cursors: Realtime Usage
- ✓ Local & Global Cursors
- ✓ Scroll & Forward Only Cursors
- ✓ Static & Dynamic Cursors
- ✓ Fetch, Absolute Cursors

Ch 22: Window Functions, CASE

- ✓ IIF Function and Usage
- ✓ CASE Statement Usage
- ✓ Window Functions (Rank)
- ✓ Row_Number( )
- ✓ Rank( ), DenseRank( )
- ✓ Partition By & Order By

Ch 23: Merge (Upsert) & CASE, IIF

- ✓ Merge Statement
- ✓ Upsert Operations with Merge
- ✓ Matched and Not Matched
- ✓ IIF & CASE Statements
- ✓ Merge Statement inside SPs
- ✓ Merge with OLTP & DWH

Module 2: Power BI

Ch 1: Power BI Intro, Installation

- ✓ Power BI For Data Science Engineers
- ✓ 5 Design Tools, 3 Techniques
- ✓ 2 Hosting Solutions
- ✓ Power BI with Co-Pilot & AI
- ✓ Power BI Installation

Ch 2: Report Design Concepts

- ✓ Basic Report Design (PBIX)
- ✓ Get Data, Canvas (Design)
- ✓ Data View, Data Models
- ✓ Data Points, Spotlight
- ✓ Focus Mode, PDF Exports

Ch 3: Visual Interactions, PBIT

- ✓ Visual Interactions & Edits
- ✓ Limitations with Visual Edits
- ✓ Creating Power BI Templates
- ✓ CSV Exports & PBIT Imports

Ch 4: Grouping, Hierarchies

- ✓ Creating Groups : Lists
- ✓ Creating Groups: Bins
- ✓ List Items & Group Edits

- ✓ Bin Size & Bin Count

Ch 5: Slicer & Visual Sync

- ✓ Slicer Visual in Power BI
- ✓ Slicer: Format Options
- ✓ Single Select, Multi Select
- ✓ Slicer: Select All On / Off
- ✓ Visual Sync with Slicers

Ch 6: Hierarchies & Drill-Down

- ✓ Hierarchies: Creation, Use
- ✓ Hierarchies: Advantages
- ✓ Drill Up, Drill Down
- ✓ Conditional Drill Down
- ✓ Filtered Drill Down, Table View

Ch 7: Filters & Drill Thru

- ✓ Power BI Filters
- ✓ Basic, Top & Advanced
- ✓ Visual Filters, Page Filters
- ✓ Report Level Filters, Clear Filter
- ✓ Drill Thru Filters & Usage

Ch 8: Bookmarks, Buttons

- ✓ Power BI Bookmarks
- ✓ Images: Actions, Bookmarks
- ✓ Buttons: Actions, Bookmarks
- ✓ Page to Page Navigations
- ✓ Score Cards, Master Pages

Ch 9: SQL DB Access & Big Data

- ✓ SQL DB Access, Queries
- ✓ Storage Modes: Direct Query
- ✓ Formatting & Date Time
- ✓ Storage Modes in Power BI
- ✓ Azure (Big Data) Access & Formatting

Ch 10: Power BI Visualizations

- ✓ Charts, Bars, Lines, Area
- ✓ TreeMaps & HeatMaps
- ✓ Funnel, Card, Multrow Card
- ✓ PieCharts & Waterfall
- ✓ Scatter Chart, Play Axis
- ✓ Infographics, Classifications

Ch 11: Power Query Introduction

- ✓ Power Query (Mashup)

- ✓ ETL Transformations in PBI
- ✓ Power Query Expressions
- ✓ Table Combine Options
- ✓ Merge, Union All Options
- ✓ Close, Apply & Visualize

Ch 12: Power Query : Table Tfns

- ✓ Table Duplicate, Header Promotion
- ✓ Group By Transformation
- ✓ Aggregate, Pivot Operation
- ✓ Reverse Rows, Count Rows
- ✓ Advanced Power Query Mode

Ch 13: Power Query: Column Tfn

- ✓ Any Column Transformations
- ✓ Data Type Detection, Change
- ✓ Rename, Replace, Move
- ✓ Fill Up, Fil Down
- ✓ Step Edits & Rollbacks

Ch 14: Power Query: Text, Date

- ✓ String / Text Transformations
- ✓ Split, Merge, Extract, Format
- ✓ Numeric and Date Time
- ✓ Add Column & Expressions
- ✓ Expressions and New Columns
- ✓ Column From Examples

Ch 15: Power Query: Parameters

- ✓ Parameters in Power Query
- ✓ Static Parameters, Defaults
- ✓ Dynamic Dropdowns, Lists
- ✓ Linking with Table Queries
- ✓ Step Edits, Type Conversions

Ch 16: Power BI Cloud: Publish

- ✓ Power BI Cloud Concepts
- ✓ Workspace Creation, Usage
- ✓ Report Publish Cloud
- ✓ Report Edits in Cloud
- ✓ Semantic Models & Usage

Ch 17: Power BI Cloud Dashboards

- ✓ Power BI Dashboards
- ✓ Dashboard Creation, Usage
- ✓ Pin Visuals, Pin LIVE Pages
- ✓ Add Image, Video Tiles

- ✓ Q&A & Pin Tiles

Ch 18: Power BI Cloud Operations

- ✓ Report Shares, Alerts
- ✓ Subscriptions, Exploration
- ✓ Downloads & Edits
- ✓ Report Cloning in Cloud
- ✓ QR Codes, Web Publish
- ✓ Lineage & Metrics

Ch 19: Power BI Cloud Gateways

- ✓ Data Gateways, Data Refresh
- ✓ Install, Configure Gateways
- ✓ Data Sources Configurations
- ✓ Data Refresh & Scheduling
- ✓ Gateway Optimizations

Ch 20: Power BI Cloud Apps

- ✓ Power BI Apps: Creation
- ✓ App Sections & Content
- ✓ Audience Options
- ✓ App Security & Sharing
- ✓ App Updates, Favourites
- ✓ App URL, End User Access

Ch 21: Power BI Report Server

- ✓ SQL Server 2025 (Mandatory Installations)
- ✓ Power BI Report Server
- ✓ Report Server Vs Cloud
- ✓ Installation, Configuration
- ✓ RS Config Tool Options
- ✓ Report Database, TempDB
- ✓ Web Service & Server URL

Ch 22: Paginated Reports

- ✓ Report Builder Tool
- ✓ Paginated Report (RDL)
- ✓ Report Expressions (RDL)
- ✓ Tablix, Chart Wizards
- ✓ Fields & Drill-Down
- ✓ RDL Report Publish

Ch 23: DAX Concepts (Basics)

- ✓ DAX Concepts: Intro & Realtime Need
- ✓ DAX Columns: Creation, Use
- ✓ DAX Measures: Creation, Use
- ✓ DAX Functions: IIF, ISBLANK

- ✓ SUM, CALCULATE Functions
- ✓ DAX Cheat Sheet

Ch 24: DAX Quick Measures

- ✓ Quick Measures in Power BI
- ✓ Average & Filters
- ✓ Running Totals
- ✓ Star Rating Calculations
- ✓ DAX Measures in Data View
- ✓ DAX in Visuals
- ✓ DAX in Cloud Reports

Ch 25: Data Modelling, DAX

- ✓ Dimensions Tables
- ✓ Fact Tables & DAX Measures
- ✓ Data Models & Relations
- ✓ DAX Expressions
- ✓ Star & Snowflake Schemas
- ✓ DAX Joins & Expressions

Ch 26: DAX Joins, Variables

- ✓ CALCULATEX & Variables
- ✓ COUNT, COUNTA, etc..
- ✓ SUM, SUMX, etc..
- ✓ SELECTED MEMEBER
- ✓ Filter Context, RETRUN
- ✓ Dynamic Report with DAX

Ch 27: DAX Time Intelligence

- ✓ Need for Time Intelligence
- ✓ Date Table Generation
- ✓ Time Intelligence with DAX
- ✓ PARALLELPERIOD, DATE
- ✓ CALENDAR, Total Functions
- ✓ YTD, QTD, MTD with DAX

Ch 28: DAX - Row Level Security

- ✓ RLS: Row Level Security
- ✓ Data Modelling & Roles
- ✓ Verify Roles (Testing)
- ✓ Add Cloud Users to Roles
- ✓ Dynamic Row Level Security
- ✓ Testing RLS in Power BI

Ch 29: Analytical Reports

- ✓ Analytical Report Concepts
- ✓ Excel Data Analytics

- ✓ **Excel with Power BI Cloud**
- ✓ **SQL, AVRO, JSON Sources**
- ✓ **Analyse in Excel (Cloud)**
- ✓ **Excel Reports to Cloud**

Ch 30: Power BI AI, CoPilot, Projects

- 👉 **AI Components in Power BI**
- 👉 **CoPilot Practical Uses**
- 👉 **CoPilot with Desktop**
- 👉 **CoPilot with Cloud**
- 👉 **Need for AI Analytics (Fabric)**
- 👉 **PL 300 Exam (Microsoft Certified Data Analyst) Guidance**
- 👉 **Realtime Project**

Module 3: Python For Data Analysis

Ch 1: Python Introduction

- ✓ Python Introduction
- ✓ Python Versions
- ✓ Python Implementations
- ✓ Python Installations
- ✓ Python IDE & Usage
- ✓ Jupyter Notebooks

Ch 2: Python Operations

- ✓ Basic Operations in Python
- ✓ Python Scripts, Print()
- ✓ Single, Multiline Statements
- ✓ Python: Internal Architecture
- ✓ Compiler Versus Interpreter

Ch 3: Data Types & Variables

- ✓ Integer / Int Data Types
- ✓ Float, String Data Types
- ✓ Sequence Types: List, Tuple
- ✓ Range, Complex & memview
- ✓ Retrieving Data Type: type()

Ch 4: Python Operators

- ✓ Arithmetic, Assignment Ops
- ✓ Comparison Operators
- ✓ Operator Precedence
- ✓ If ... Else Statement, Pass
- ✓ Short Hand If, OR, AND
- ✓ ELIF and ELSE IF Statements

Ch 5: Python Loops, Iterations

- ✓ Python Loop & Realtime Use
- ✓ Python While Loop Statement
- ✓ Break and Continue Statement
- ✓ Iterations & Conditions
- ✓ Exit Conditions & For Loops
- ✓ iter() and Looping Options

Ch 6: Python Functions

- ✓ Python Functions & Usage
- ✓ Function Parameters
- ✓ Default & List Parameters
- ✓ Python Lambda Functions
- ✓ Recursive Functions, Usage
- ✓ Return & Print @ Lamdba

Ch 7: Python Modules

- ✓ Import Python Modules
- ✓ Built In Modules & dir
- ✓ datetime module in Python
- ✓ Date Objections Creation
- ✓ strftime Method & Usage
- ✓ imports & datetime.now()

Ch 8: Python User Inputs & TRY

- ✓ Try Except, Exception Handling
- ✓ Raise an exception method
- ✓ TypeError, Scripting in Python
- ✓ Python User Inputs
- ✓ Python Index Numbers
- ✓ input() & raw_input()

Ch 9: Python File Handling

- ✓ File Handling, Activities
- ✓ Loop, Write, Close Files
- ✓ Appending, Overwriting
- ✓ import os, path.exists
- ✓ f.open, f.write
- ✓ f.read, f.close

Ch 10: Pandas DataFrames 1

- ✓ Installation of Pandas
- ✓ Python Modules & Pandas
- ✓ Pandas Codebase & Usage
- ✓ import pandas.DataFrame
- ✓ Pandas Series, arrays

Ch 11: Pandas DataFrames 2

- ✓ Indexes & Named Options
- ✓ Locate Row and Load Rows
- ✓ Row Index & Index Lists

- ✓ Load Files Into a DataFrame
- ✓ df.to_string() Function
- ✓ tail() & null() Function

Ch 12: Pandas Transformations

- ✓ Pandas - Cleaning Data
- ✓ Replace, Transform Columns
- ✓ Data Discovery & Column Fill
- ✓ Identify & Remove Duplicates
- ✓ dropna(), fillna() Functions
- ✓ Data Plotting & matlib Lib

Ch 13: Realtime Project (Banking / Finance) For Data Analysis [End to End]

Ch 14: Weekly Mock Interview Review meet ++ 1:1 Resume Meet

Module 4: Python Programming

Ch 1: Python Dictionary

- ✓ Dictionary Creation, Use
- ✓ Hashing, Copy, Update
- ✓ Deletion, Sorting
- ✓ Len(), Inbuilt Functions
- ✓ Variable Types - python List
- ✓ Cmp() List Method
- ✓ Python Dictionary Str(dict)
- ✓ Programming Concepts
- ✓ Loops and Sets
- ✓ Realtime Usage

Ch 2: Python Packages

- ✓ Package in Python
- ✓ Creating a package
- ✓ Package Imports, Modules
- ✓ Sub Packages Creation
- ✓ Sub Package Imports
- ✓ Popular Packages in Python
- ✓ NumPy & SciPy
- ✓ Libraries in Python
- ✓ Python Seaborn
- ✓ Python framework

Ch 3: Exception Handling

- ✓ Shell Script Commands
- ✓ OS operations in Python
- ✓ File System Shell Methods
- ✓ os - math - cmd -csv - random
- ✓ Numpy (numerical python)

- ✓ Pandas - sys - Matplotlib;
- ✓ Common RunTime Errors
- ✓ Python Custom Exception;
- ✓ Exception Handling
- ✓ ry…Except…else,Try…finally

Ch 4: Python Class & Objects

- ✓ Class variables, Instances
- ✓ Built in Class Attributes
- ✓ Objects - Constructors
- ✓ Modifiers - Self Variable
- ✓ Python Garbage Collections
- ✓ Hierarchical Inheritance
- ✓ Multilevel, Multiple, Hybrid
- ✓ Overloading & OverRiding
- ✓ Polymorphism – Abstraction

Ch 5: Regular Expressions

- ✓ Regular Expression
- ✓ Regular Expression Patterns
- ✓ Literals - Repetition Cases
- ✓ Groups andGrouping
- ✓ w+ and ^ , \s Expressions
- ✓ re.split function
- ✓ Regular expression methods
- ✓ re.match() in Regular Expr
- ✓ re.search(), re.findall for Text

Ch 6: Multi-Threading

- ✓ Python Multi-Threading
- ✓ Thread Synchronization
- ✓ Multiprocessing
- ✓ Python Gil & Programming
- ✓ Thread Control Block (TCB)
- ✓ Stack Pointers & App Usage
- ✓ Program Counters in Realtime
- ✓ Thread State Concept
- ✓ Python Exception Handling

Ch 7: Python TKinter

- ✓ Tkinter GUI Program
- ✓ Components & Events
- ✓ Adding Controls inTkinter
- ✓ Entry, Text Widgets
- ✓ Radio & Check Buttons
- ✓ Tkinter Forms in Realtime

- ✓ List Boxes, Menu, ComboBox
- ✓ Mainloop () & Functions

Ch 8: Python Web & IoT Intro

- ✓ Python Web Frameworks
- ✓ Django : Advantages
- ✓ Web Framework
- ✓ MVC and MVT - Django
- ✓ Web Pages using python
- ✓ HTML5, CSS3 usage
- ✓ PYTHON Bottle & Pyramid
- ✓ Falcon ; smart_open in python

Module 5: Python with AI – ML

Ch 1: Machine Learning Basics

- ✓ Machine Learning Funda
- ✓ Python ML in Realtime
- ✓ Pandas Extension in ML
- ✓ Machine Learning Ops
- ✓ Business to Data Conversions
- ✓ ML Algorithms in Realtime

Ch 2: Python ML Concepts

- ✓ Machine Learning (ML) Intro
- ✓ Supervised, Unsupervised
- ✓ Scikit-Learn Library
- ✓ Python Libraries for ML
- ✓ sklearn : Advantages & Uses
- ✓ sklearn : Functions, Use

Ch 3: Python Data Handling

- ✓ Data structures
- ✓ Lists, Tuples, Sets
- ✓ Dictionaries,
- ✓ Pandas Data Operations
- ✓ Data Visualizations
- ✓ Matplotlib & Seaborn

Ch 4: AI With Python Intro

- ✓ Artificial Intelligence
- ✓ Applications of AI
- ✓ AI Applicative Uses
- ✓ AI Usage with Python
- ✓ AI - Python Environment
- ✓ Python Libraries

- ✓ AI with Python in Realtime

Ch 5: Supervised Learning

- ✓ Linear & Logistic Regression
- ✓ Decision Trees
- ✓ Random Forests
- ✓ Support Vector Machines
- ✓ Neural Networks Basics
- ✓ Linear Regression Steps
- ✓ Linear Regression in AI-ML

Ch 6: Unsupervised Learning - 1

- ✓ Clustering & K-means
- ✓ DBSCAN & Realtime Usage
- ✓ Dimensionality Reduction
- ✓ K clustering hierarchical
- ✓ DBScan : Realtime Uses
- ✓ KMeans clustering Vs DBSCAN?
- ✓ PCA Vs t-SNE

Ch 7: Unsupervised Learning 2

- ✓ Unsupervised Learning
- ✓ Concepts and Scope
- ✓ Realtime Usage
- ✓ Dimensionality Reduction
- ✓ Component Analysis (PCA)
- ✓ PCA: Concept & Usage

Ch 8: Generalized Models

- ✓ GLM Concept in Python
- ✓ GLM in Regression
- ✓ Considerations for GLM
- ✓ Problem Solving Skills
- ✓ Python Libraries
- ✓ Python Extensions: GLM

Ch 9: Python Tree Models

- ✓ Decision Tree Models
- ✓ Decision Tree Working
- ✓ Model Works, Algorithms
- ✓ Random Forest Concept
- ✓ Random Forest Tree
- ✓ Random Forest Vs Knn

Ch 10: Big Data and ML

- ✓ Spark and Big Data
- ✓ Big Data with Python

- ✓ Spark with Python
- ✓ Spark with Big Data
- ✓ Spark Algorithms
- ✓ AI ML Libraries

Ch 12: Natural Lang" Processing

- ✓ NLP : Purpose, Usage
- ✓ NLP Applicative Uses
- ✓ NLP Vs Machine Learning
- ✓ NLP in Machine Learning
- ✓ Using NLP in AI – ML
- ✓ NLP code in Python?

Ch 13: AI in Real-World

- ✓ AI in Chatbots
- ✓ AI in Virtual Assistants
- ✓ AI Ethical Considerations
- ✓ AI Deployments (Flask)
- ✓ AI with FastAPI
- ✓ AI with Streamlit

Module 6: Advanced Statistics

Ch 1: Introduction to Statistics

- ✓ **Importance of Statistics in DS & AI**
- ✓ **What is Statistics?**
- ✓ **Population and Sample**
- ✓ **Parameter and Statistic**
- ✓ **Data Types**

Ch 2: Basic Operations

- ✓ **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**

Ch 3: Probability

- ✓ **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

Ch: 4 Data Sampling

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

Ch 5: 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

Ch 6: EDA

- ✓ What is EDA?
- ✓ Uni - Variate Analysis
- ✓ Bi - Variate Analysis
- ✓ Usage of Seaborn for Pair plots, Heat Maps, Count Plot
- ✓ Introduction to Web Scrapping

Ch 7: Advanced Regex for Unstructured Data

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

Module 7: Machine Learning (Advanced Level)

Ch 1: Introduction

- ✓ What is Machine Learning?
- ✓ Types of learning
- ✓ Approaches of machine learning algorithms
- ✓ Decision boundaries
- ✓ data pre-processing
- ✓ Under fit, optimal fit, over fit
- ✓ sklearn pipeline + model building

Ch 2: 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

Ch 3: Naïve 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

Ch 4: Linear Algebra

- ✓ Introduction to Matrices
- ✓ Vector spaces
- ✓ Eigenvalues and Eigenvectors

Ch 5: K Nearest Neighbours

- ✓ K-Nearest Neighbour Algorithm
- ✓ Eager Vs Lazy learners
- ✓ How does the KNN algorithm work?
- ✓ How do you decide the number of neighbours 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

Ch 6: Decision Trees

- ✓ 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, kfold cv

Ch 7: Linear Regression

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

Ch 8: Multiple Linear Regression

- ✓ Estimating the Regression Coefficients
- ✓ OLS Assumptions
- ✓ Multicollinearity
- ✓ Feature Selection
- ✓ Gradient Discent

Ch 9: Evaluation metrics for Regression

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

Ch 10: Polynomial Regression

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

Ch 11: Regularization Techniques

- ✓ Lasso Regularization
- ✓ Ridge Regularization
- ✓ ElasticNet Regularization

Ch 12: 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

Ch 13: Support Vector machine

- ✓ 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

Ch 14: Ensemble Methods in Tree Based Models

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

Ch 15: Random Forest Algorithm

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

Ch 16: Boosting

- ✓ Introduction to adaboost, Gradient Boosting, XG Boosting
- ✓ Working with the alogorithms
- ✓ Pros and Cons

Ch 17: ML for Data Analysis

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

Ch 18: Un-Supervised Learning

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

Ch 19: Dimensionality Reduction

- ✓ 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)

Ch 20: K-Mean Clustering

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

Ch 21: Hierarchical Clustering

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

Ch 22: Other Learning ways in ML

- ✓ Reinforcement Learning
- ✓ Hybrid Learning models
- ✓ Other models

Module 8: Deep Learning, Computer Vison

Ch 1: Introduction

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

Ch 2: Neural Networks

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

Ch 3: Forward and Backward Propogation

- ✓ 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)
- ✓ Weight Initialization Techniques (pros and cons)
- ✓ Batch Normalization
- ✓ Early Stopping
- ✓ Tensor Board

Ch 4: Optimizers

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

Ch 5: Keras

- ✓ Intro To Tensorflow and Keras
- ✓ Working

Ch 6: Images and image processing 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
- ✓ 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

Ch 7: CNN

- ✓ Intro To CNN
- ✓ Why CNN over MLP
- ✓ How does Convolution works on images
- ✓ Padding, Stride, Pooling
- ✓ LeNet5
- ✓ Alex Net
- ✓ Vgg 16 and Vgg 19
- ✓ Inception Net
- ✓ ResNet
- ✓ Xception
- ✓ Mobile Net
- ✓ Efficient Net
- ✓ Pre trained Model Introduction

Ch 8: Transfer Learning

- ✓ Intro To Transfer Learning

- ✓ Transfer learning Concepts (When and Why)
- ✓ Transfer Learning Coding
- ✓ Hyper Parameter Tuning [Random Search, Hyperband, Bayesian optimization]
- ✓ Ch 4: 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)

Ch 9: YOLO

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

Module 9: Natural Language Processing

Ch 1 Introduction to text processing

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

Ch2: Vectorization Techniques

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

Ch 3: RNN

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

Ch 4: LSTM

- ✓ Intro to LSTM
- ✓ Why LSTM
- ✓ LSTM algorthim
- ✓ Grus
- ✓ Bi-Directional RNN

- ✓ Understanding of working of Image captioning

Ch 5: Auto Encoders

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

Ch 6: Transformer and attention

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

Ch 7: BERT

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

Module 10: AI & Gen AI, Prompt Engineering

Ch 1: Introduction

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

Ch 2: Introduction to LLM

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

Ch 3: Prompt Engineering

- ✓ Introduction
- ✓ Working with models

Ch 4: Popular Gen-AI application

- ✓ Intro To Open AI and Gemini
- ✓ Utilizing OpenAI APIs
- ✓ Setting up and authenticating API usage
- ✓ 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

Ch 5: 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**

Ch 6: 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**