Advanced Certification Program in Data Science & AI

Program Duration: 12 Months

Job Oriented Programme

Artificial intelligence and Data Science applications are transforming the Healthcare, Insurance, Finance, and Marketing sectors by automating various administrative processes like employee or patient record management, conducting market research, and interacting with potential customers, among others.

Artificial intelligence is an emerging industry that is turning out to be a proxy for the human brain. It performs various business functions without human intervention like customer interaction, creating brand awareness on social media, etc. Many experts believe that AI can beat humans in almost every cognitive task.

Potential Job Opportunities	Earning Potential	Employment Sector
6,000+Jobs listed across various industries	**Average Salary of E4 LPA to E10 LPA**	**IT, Finance and Banking, Healthcare and many more**

Loan Facility Available

SEMESTER-1

- Python
- My SQL
- Advance Excel
- Statistics
- Data Analytics
- Machine Learning
- Tableau
- Power Bi

SEMESTER-2

- Open CV
- Data Mining
- Computer Vision
- Data Visulization
- Neural Network
- Natural Language Processing (NLP)
- GIT
- Generative AI
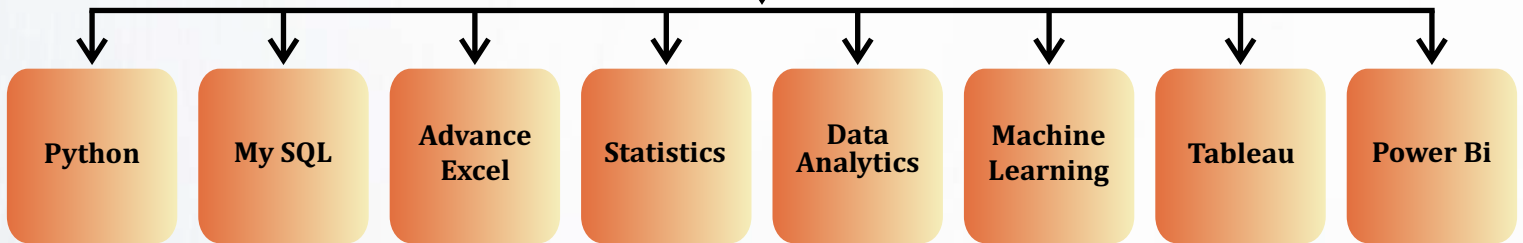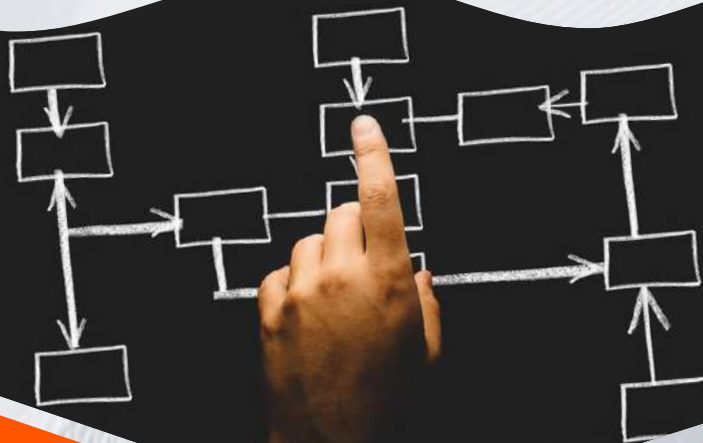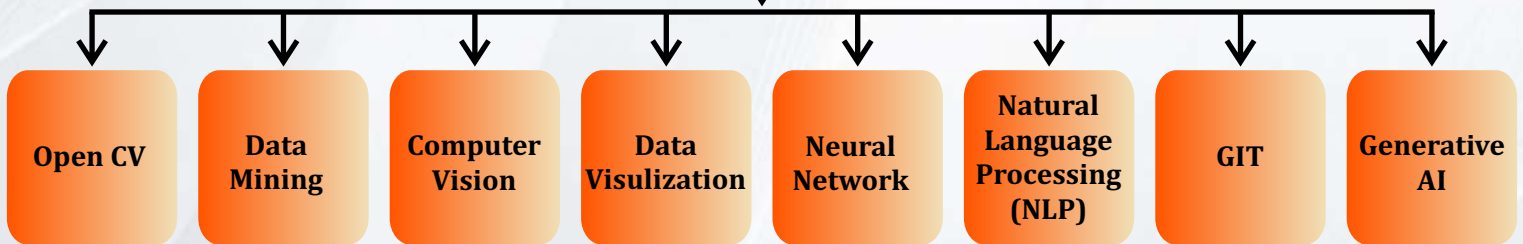
1. Introduction to Python
- What is python?
- Why Python?
- Use Of python
- Intro to programming interface
- How to download Python
- Basic syntax of Python
- First program in Python

2. Conditions
- Why condition
- Syntax of conditions
- How to take User Inputs
- If else statements
- Nested if else statement
- Debugging in conditions
- How to handle the errors in python
- Assignment 1
- Assignment Discuss

3. Loops
- What is loop ?
- Types of loops
- Use of loop
- Syntax of loop
- Programming using loops
- Range function in loop
- Assignment 2
- Assignment Discuss
-

4. Data Structures (list , tuple, dictionary , set)
- What is list,tuple, dic, set.
- Uses
- Why we use it
- Examples

4. Data Structures (list , tuple, dictionary , set)
- What is list,tuple, dic, set.
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- Why we use it
- Examples
- Functions
- Assignment 3
- Assignment discuss

5. Function
- What is function?
- Why we use it
- Function Syntax
- Types of function
- Overall assignment 4

6. Extra
- How to debug the code
- Finding error and run the code properly.
- Understand the errors to make the code right.

Retrieve Data Using The Sql Select Statement

- List the capabilities of SQL SELECT statements
- Generate a report of data from the output of a basic SELECT statement
- Select All Columns
- Select Specific Columns
- Use Column Heading Defaults
- Use Arithmetic Operators
- Understand Operator Precedence
- Learn the DESCRIBE command to display the table structure

Learn To Restrict And Sort Data

- Write queries that contain a WHERE clause to limit the output retrieved
- List the comparison operators and logical operators that are used in a WHERE clause
- Describe the rules of precedence for comparison and logical operators
- Use character string literals in the WHERE clause
- Write queries that contain an ORDER BY clause to sort the output of a SELECT statement
- Sort output in descending and ascending order

Usage Of Single-row Functions To Customize Output

- Describe the differences between single row and multiple row functions
- Manipulate strings with character function in the SELECT and WHERE clauses
- Manipulate numbers with the ROUND, TRUNC, and MOD functions

- Perform arithmetic with date data
- Manipulate dates with the DATE functions

Invoke Conversion Functions And Conditional Expressions

- Describe implicit and explicit data type conversion
- Nest multiple functions
- Apply the NVL, NULLIF, and COALESCE functions to data
- Use conditional IF THEN ELSE logic in a SELECT statement

Aggregate Data Using The Group Functions

- Use the aggregation functions to produce meaningful reports
- Divide the retrieved data in groups by using the GROUP BY clause
- Exclude groups of data by using the HAVING clause

Display Data From Multiple Tables Using Joins

- Write SELECT statements to access data from more than one table
- View data that generally does not meet a join condition by using outer joins
- Join a table to itself by using a self-join

Use Sub-queries To Solve Queries

- Describe the types of problem that sub-queries can solve
- Define sub-queries
- List the types of sub-queries
- Write single-row and multiple-row sub-queries

The Set Operators
- Describe the SET operators
- Use a SET operator to combine multiple queries into a single query
- Control the order of rows returned

Data Manipulation Statements
- Describe each DML statement
- Insert rows into a table
- Change rows in a table by the UPDATE statement
- Delete rows from a table with the DELETE statement
- Save and discard changes with the COMMIT and ROLLBACK statements
- Explain read consistency

Use Of Ddl Statements To Create And Manage Tables
- Categorize the main database objects
- Review the table structure
- List the data types available for columns
- Create a simple table
- Decipher how constraints can be created at table creation
- Describe how schema objects work

Other Schema Objects
- Create a simple and complex view
- Retrieve data from views
- Create, maintain, and use sequences
- Create and maintain indexes
- Create private and public synonyms

Control User Access
- Differentiate system privileges from object privileges
- Create Users
- Grant System Privileges

- Create and Grant Privileges to a Role
- Change Your Password
- Grant Object Privileges
- How to pass on privileges?
- Revoke Object Privileges

Retrieve Data Using Sub-queries
- Multiple-Column Subqueries
- Pairwise and Non-pairwise Comparison
- Scalar Subquery Expressions
- Solve problems with Correlated Subqueries
- Update and Delete Rows Using Correlated Subqueries
- The EXISTS and NOT EXISTS operators
- Invoke the WITH clause
- The Recursive WITH clause

Advance Functions Of Excel

- Logical Function: IF / ELSE, AND, OR, NOT, NESTED IF/ELSE
- Date and Time Functions: DATE, DAY, SECOND, MINUTES, HOURS, NOW, TODAY, MONTH, YEAR
- Information Functions: ISBLANK, ISERROR, ISEVEN, etc.
- Math Functions: RAND, ROUND, CEILING, FLOOR, INT, LCM, MOD, EVEN, SUMIF, SUMIFS
- Statistical Functions: AVERAGE, AVERAGEIF, COUNT, COUNTA, COUNTBLANK, COUNTIF, MAX, MIN
- Text Functions: LEFT, RIGHT, TEXT, LOWER, UPPER, PROPER, REPLACE, REPT, FIND, SEARCH, SUBSTITUTE, TRIM, CONCATENATE

Conditional Formatting

- Using Conditional Formatting
- Using Conditional Formatting with Multiple Cell Rules
- Using Colour Scales in Conditional
- Formatting
- Highlighting Duplicate
- Creating New Rules and Managing Existing Rules

Data Sorting And Filtering

- Sorting Data A-Z and Z-A
- Using Filters to Sort Data
- Advance Filtering Options

Pivot Tables

- Creating Pivot Tables
- Using Pivot Table Options
- Changing and Updating Data Range
- Formatting Pivot Table

Concept Of Cell Referencing

- Relative
- Absolute, Mixed

Vlookup & Hlookup

- Using VLOOKUP & HLOOKUP from same sheet
- Using VLOOKUP & HLOOKUP from other sheet
- Using VLOOKUP & HLOOKUP from other workbook
- Using VLOOKUP with MATCH

Charts

- Column Chart
- Pie Chart
- Line Chart
- Shortcut Of Chart

Index & Match

- Using Index and Match to find LEFT column Values
- Using MATCH to make the column dynamic

Offset

- Using OFFSET to make reports dynamic
- Using OFFSET to make Name Range Dynamic
- Using OFFSET to make PIVOT Table dynamic

Name Manager

- 3 methods of Creating Range name
- Making Range Name Dynamic

Data Validation

- Custom Validation
- Multilevel Data Validation

- Making Range Name Dynamic

Data Validation
- Custom Validation
- Multilevel Data Validatio
- Input Message
- Error Alert

Data Cosolidation
- Data Consolidation
- 3D Formulas

What-if Analysis
- Scenario Manager
- Goal Seek
- Data Table

New Features Of 2010
- Sparkline
- Slicer

Panes Properties
- Freeze Panes & Unfreeze Panes
- Split Panes

Sorting
- Sorting
- Custom Sort
- Sort on Custom List
- Sort on Colour

Paste Special Features

Share & Protect Workbook And Worksheet
- Protection of whole sheet
- Protection of a range
- Protection of a cell
- Sharing a workbook
- Watching the Changes by Users

- Accepting or Rejecting the Changes

Data Analysis
- Correlation
- Histogram
- Pareto Analysis

REVISITING PYTHON
- Revisiting Python
- List and dictionary comprehension
- Programming assignment

INTRODUCTION TO DATA ANALYTICS
- Why Analytics?
- Traditional Data Management
- Types of Analytics
- Dimensions and measures
- Why learn Python for data analysis?

LIBRARIES FOR DATA ANALYTICS
- Anaconda
- Numpy, Scipy, Pandas   Matplotlib, Seaborn

STATISTICS:
- Mean, Median, Mode
- Z-scores
- Bias -variance dichotomy
- Sampling and t-tests
- Sample vs Population statistics
- Random Variables
- Probability distribution function
- Expected value
- Binomial Distributions
- Normal Distributions
- Central limit Theorem
- Hypothesis testing
- Z-Stats vs T-stats
- Type 1 type 2 error
- Chi Square test
- ANOVA test and F-stats

JUPYTER NOTEBOOK
- Create Documentation
- Code mode
- Markdown mode
- Heading mode

NUMPY:
- Creating NumPy arrays
- Indexing and slicing in NumPy
- Downloading and parsing data
- Creating multidimensional arrays
- NumPy Data types
- Array tributes
- Indexing and Slicing
- Creating array views copies
- Manipulating array shapes I/O

SCIPY:
- Introduction to SciPy
- Create function
- modules of SciPy

PANDAS:
- Using multilevel series
- Series and Data Frames
- Grouping, aggregating
- Merge DataFrames
- Generate summary tables
- Group data into logical pieces
- Manipulate dates
- Creating metrics for analysis
- Data wrangling
- Merging and joining
- Analytics Vidhya dataset- Loan
- Prediction Problem
- Data Mugging using Pandas
- Building a Predictive Model

MATPLOTLIB:
- Scatter plot
- Bar charts, histogram
- Stack charts

- Legend title Style
- Figures and subplots
- Plotting function in pandas
- Labelling and arranging figures
- Save plots

SEABORN:
- Style functions, Color palettes
- Distribution and Categorical plots
- Regression plots
- Axis grid objects

WEB SCRAPING:
- Scraping Webpages
- Beautifulsoup package
- Real time project

INTRODUCTION TO ML
- What is ML? And Why ML?
- Introduction to Supervised ML
- Introduction to Unsupervised ML
- Mathematical Background for ML
- Matrix ops Probability Theory (Bayes'Theorem)
- ML Glossary- Variable types, k-fold
- CV, AUC, F1 score, Overfitting / Underfitting
- Data split & hyper parameter

PROJECTS:
- Real time projects

NOTE: PREREQUISITES:
- Python programming

MODULE 1: INTRODUCTION TO MACHINE LEARNING
- What is ML?
- Applications of ML
- Why ML?
- Uses of ML
- Machine learning methods
- Machine learning algorithms (Regression, Classification, Clustering, Association)
- A brief introduction python libraries

MODULE 2: CREATING A MACHINE LEARNING MODEL
- Types of ML algorithms
- Labelled Dataset
- Training and Testing Data
- Importing the Libraries
- Importing the Dataset
- Demo: Creating a machine model

MODULE 3: DATA PREPARATION AND EXPLORATION
- What is data?
- What is information?
- Analyzing data to fetch the information
- Entropy, Information gain
- Data exploration and preparation
- Univariate, bivariate, and multivariate analysis
- Correlation
- Chi-Square, Z-test, T-test, ANOVA
- Categorical Data
- Feature Scaling
- Dimensionality Reduction
- Outliers

MODULE 4: REGRESSION
- What is regression?
- Applications of regression

- Types of regression
- Fitting the regression line
- Simple linear regression
- Simple linear regression in python
- Polynomial regression
- Polynomial regression in python
- Gradient Descent
- Cost function
- Regularization
- Demo: Perform regression on a real world dataset
- Ridge and lasso Regression

MODULE 5: CLASSIFICATION
- How is classification used?
- Applications of classification
- Logistic Regression
- Sigmoid function
- Decision tree
- K-Nearest Neighbors (K-NN)
- SVM
- Naive Bayes
- Understand limitations of linear classifier and evaluate abilities of non-linear classifiers using a data set

MODULE 6: EVALUATION OF CLASSIFICATION MODELS
- Confusion Matrix
- Precision, Recall
- F1-score
- ROC, AUCn-fold cross validation
- Measuring classifier performance
- Overfitting
- Ensemble Learning
- Bagging and Boosting

MODULE 7: UNSUPERVISED LEARNING - CLUSTERING

- Application of Unsupervised learning, examples, and applications
- Clustering
- Hierarchical Clustering in Python, Agglomerative and Divisive techniques
- Measuring the distance between two clusters
- k-means algorithm
- Limitations of K-means clustering
- SSE and Distortion measurements
- Demo: Agglomerative Hierarchical clustering

MODULE 8: DIMENSIONALITY REDUCTION
- What is dimensionality reduction?
- Applications of dimensionality reduction
- Feature selection
- Feature extraction
- Dimensionality reduction via Principal component analysis
- Eigenvalue and Eigenvectors
- Hands on PCA on MNSIT data

MODULE 9: REINFORCEMENT LEARNING
- What is reinforcement learning
- Applications of reinforcement learning
- An Example use case
- Components of RL
- Approaches to RL
- RL algorithms
- Deep reinforcement learning

MODULE 10: INTRODUCTION TO NATURAL LANGUAGE PROCESSING (NLP)
- What is NLP?
- Why NLP
- Applications of NLP
- Components of NLP
- NLP techniques

MODULE 11: INTRODUCTION TO DEEP LEARNING
- Why deep learning?
- Neural networks
- Applications of neural networks
- Biological Neuron vs Artificial Neuron
- Artificial Neural networks, layers

HANDS ON CASE STUDY

TABLEAU: GETTING STARTED

- What is Tableau? What does the Tableau product suite comprise of?
- How Does Tableau Work?
- Tableau Architecture
- Connecting to Data & Introduction to data source concepts
- Understanding the Tableau workspace
- Dimensions and Measures
- Data Types & Default Properties
- Tour of Shelves & Marks Card
- Using Show Me
- Saving and Sharing your work-overview

TABLEAU: DATA HANDLING & SUMMARIES

- Date Aggregations and Date parts
- Cross tab & Tabular charts
- Totals & Subtotals
- Bar Charts & Stacked Bars
- Line Graphs with Date & Without Date
- Tree maps
- Scatter Plots
- Individual Axes, Blended Axes, Dual Axes & Combination chart
- Parts of Views
- Sorting
- Trend lines/ Forecasting
- Reference Lines
- Filters/Context filters
- Sets
- In/Out Sets
- Combined Sets
- Grouping
- Bins/Histograms
- Drilling up/down – drill through
- Hierarchies
- View data
- Actions (across sheets)

TABLEAU: BUILDING ADVANCED REPORTS/MAPS

- Explain latitude and longitude
- Default location/Edit locations
- Building geographical maps
- Using Map layers

TABLEAU: CALCULATED FIELDS

- Working with aggregate versus disaggregate data
- Explain - #Number of Rows
- Basic Functions (String, Date, Numbers etc)
- Usage of Logical conditions

TABLEAU: TABLE CALCULATIONS

- Explain scope and direction
- Percent of Total, Running / Cumulative calculations
- Introduction to LOD (Level of Detail) Expressions
- User applications of Table calculations

TABLEAU: PARAMETERS

- Using Parameters in
- Calculated fields Bins
- Reference Lines
- Filters/Sets
- Display Options (Dynamic
- Dimension/Measure Selection)
- Create What-If/ Scenario analysis

TABLEAU: BUILDING INTERACTIVE DASHBOARDS

- Combining multiple visualizations into a dashboard (overview)
- Making your worksheet interactive by using actions
- Filter

- URL
- Highlight
- Complete Interactive Dashboard for Sales & Services

TABLEAU: FORMATTING
- Options in Formatting your Visualization
- Working with Labels and Annotations
- Effective Use of Titles and Captions

TABLEAU: WORKING WITH DATA
- Multiple Table Joins
- Data Blending
- Difference between joining and blending data, and when we should do each
- Toggle between to Direct Connection and Extracts

INTRODUCTION
- Introduction to Power BI
- bout the Course

SIGN UP FOR POWER BI
- Load Data
- Practical Activity

THE POWER BI DESKTOP
- Introduction to Power BI Desktop

CREATING REPORTS IN POWER BI DESKTOP
- Creating Tables in Power BI
- Table Style and Formatting
- Matrix Visualization
- Tables and Metrics Practical Activity
- Changing Method of Aggregation
- Cards & Multi Row Cards
- Cards, Matrix and Multi Row Card
- Challenge
- Percentage Calculations
- Filtering Data- Using Slicers
- Filtering Data- Visual Filters
- Filtering Data- Page Filters
- Filtering Data- Drill Through Filter
- Practical Activity

VISUALIZATIONS AND GRAPHS
- Column
- Stacked
- Area, Ribbon
- Trend Analysis
- Scatter Plot
- Bubble Plot

DASHBOARDS
- Creating Interactive Dashboards
- Create an Interactive Report- Activity
- Publishing Reports to the Power BI

service
- Pinning Visualizations to Dashboards
- Mobile Reports
- App Workspaces
- Publishing an App
- Using Themes in Power BI
- Using Custom Visualizations

DAX FORMULAS
- DAX Formulas
- D te Functions
- Formatting Dates
- Date Master Tables

DAX MEASURES
- Introduction to DAX Measures
- DAX Measures Practical Activity
- The = Calculate Formula

POWER BI EDITOR
- Introduction to Power BI Query Editor
- Basic Transformations
- Aggregating Data

RELATIONSHIPS
- Creating and Managing Relationships in
- Power BI
- Relationship Calculations
- Analyze Data with Excel
- Introduction to Power BI and Excel
- Power BI and Excel Connections
- Excel Data Types from Power BI
- Loading Excel Files into Power BI Service

CORONA CASE STUDY
- Introduction to the Corona Virus Case Study

- Corona Virus Case Study Part 1
- Corona Virus Case Study Part 2
- Corona Virus Dashboard Update
- Understanding the flow of using Power
-   BI, from connecting to various data
-   sources, importing these into Power BI,
-   transforming the data and then
-   presenting it effectively
- How to use Power BI Desktop, Power BI
-   Query Editor & the Power BI Service
- How to create relationships between
-   related data sources
- How to build reports with various types
-   of aggregations and filters
- About the various types of visualizations
-   possible in Power BI and how to use
  them
- How to create interactive dashboards
-   with drill through and relative date
  filters
- How to publish dashboards to the web
-   and mobile app
- How to use themes and custom
-   visualizations
- About DAX and how to use it to build
-   measures
- How to work with Excel & Power BI to
-   create a dynamic and effective business
-   solution
- How to put this all into practice with a
-   case study about the Corona Virus.

REQUIREMENTS
- You will need to have a PC/Windows laptop loaded with the latest version of Microsoft Power BI (available as a free download)

PROJECTS

Image Classification:
- Train a model to classify images

Stock Price Prediction:
- Explore historical stock price data and try to predict future trends

Music Recommendation System:
- Build a system that recommends music to users based on their listening history or preferences

Healthcare Diagnosis Prediction:
- Build a model to predict the likelihood of certain diseases or conditions based on patient data

Exploring Weather Trends:
- Utilize weather data from a weather service's website or app.

Spam Filter Assistant:
- Create a rule-based system in a spreadsheet to classify emails as spam or not spam.

Fake News Detection:
- Build a classifier that can distinguish between real and fake news articles

Chatbot Development:
- Build a simple conversational chatbot

Language Translation:
- Develop a simple language translation tool that can translate text from one language to another

Advanced Tools for AI

Module 1: Introduction to OpenCV
- **What is OpenCV?**
  - Introduction to the library, history, and applications
  - Benefits of using OpenCV for computer vision tasks
- **Getting Started with OpenCV and Python**
  - Setting up your development environment (Python installation, OpenCV library)
  - Basic commands for loading, displaying, and saving images/videos

Module 2: Exploring Image Fundamentals
- **Image Representation in OpenCV**
  - Understanding pixels, channels (RGB, grayscale) and image matrices
  - Accessing and manipulating individual pixels
- **Image Processing Operations**
  - Common image processing techniques: resizing, cropping, color conversion
  - Demonstrations using OpenCV functions

Module 3: Hands-on with Image Processing
- **Mini-Project 1: Image Enhancement and Filtering:**
  - Use OpenCV functions to perform basic image enhancements (brightness, contrast)
  - Apply noise reduction techniques (e.g., blurring) and edge detection filters
  - Experiment with different filters (Gaussian blur, Sobel edge detection) and understand their effects

- **Mini-Project 2: Basic Object Detection:**
  - Introduce simple template matching for object detection in images
  - Use OpenCV functions (cv2.matchTemplate) to find specific objects in an image
  - Explore variations of template matching and limitations

Module 4: Unveiling the World of Video Processing
- **Working with Videos in Open CV**
  - Introduction to video processing concepts: frames, video capture, playback
  - Using OpenCV functions (cv2.VideoCapture, cv2.VideoWriter) to work with videos
- **Basic Video Operations**
  - Techniques for video manipulation (reading frames, displaying videos)
  - Simple motion detection using frame differencing

Module 5: Beyond the Basics: Exploring OpenCV Further
- **A Glimpse into Advanced Topics (0.5 hour)**
  - Briefly discuss feature detection, object tracking, and machine learning for computer vision
  - Introduce resources for further exploration in OpenCV
  - Applications of OpenCV
  - Exploring real-world applications in various fields (facial recognition, augmented reality)
  - Discussing the potential and future of computer vision

Module 1: Unveiling the Power of Data
- **What is Data Mining?**
  - Definition, core concepts (data as a valuable resource)
  - Benefits of data mining (improved decision making, uncovering trends)
  - Real-world applications across various industries (marketing, finance, healthcare)
- **The Data Mining Process: A Bird's-eye View**
  - Understanding the different stages: data collection, preparation, exploration, model building, evaluation, and deployment

Module 2: Preparing Data for Insights
- **Data Cleaning and Preprocessing**
  - Importance of handling missing values, outliers, and inconsistencies
  - Techniques for data cleaning (normalization, imputation)
- **Data Exploration: Getting to Know Your Data**
  - Exploratory Data Analysis (EDA) techniques (visualization, descriptive statistics)
  - Identifying patterns and potential areas for further investigation

Module 3: Mining for Knowledge: Popular Techniques
- Classification: Categorizing Your Data
  - Understanding the concept of classification model
  - Examples: classifying customers, predicting loan defaults
- **Association Rule Learning: Finding Relationships**

- Discovering frequent itemsets and associations between data points (e.g., market basket analysis)
- **Clustering: Grouping Similar Data**
  - Identifying groups (clusters) with similar characteristics

Module 4: Putting Data Mining into Action
- **Mini-Project: Analyzing Customer Data for Marketing Insights (3 hours):**
  - Use a data analysis tool (e.g., Excel, Google Sheets) to explore a sample customer dataset
  - Apply data cleaning and visualization techniques to understand customer behavior
  - Identify potential customer segments for targeted marketing campaigns

Module 5: Responsible Data Mining and Beyond
- **Ethical Considerations: Using Data with Care**
  - Biases in data and potential for discrimination
  - Importance of responsible data collection and usage
- **The Future of Data Mining (0.5 hour)**
  - Emerging trends like Big Data and Machine Learning
  - Exploring advanced data mining applications

Module 1: Demystifying Neural Networks
- **What are Neural Networks?**
  - Introduction to the biological inspiration and core concept (artificial neurons)
  - Benefits and applications of NNs in various domains (image recognition, speech recognition, natural language processing)
- **Building Blocks of Neural Networks**
  - Understanding artificial neurons (inputs, weights, activation functions)
  - Layers and architectures (simple feedforward networks)

Module 2: Learning with Neural Networks
- **Introduction to Supervised Learning**
  - The concept of training NNs with labeled data
  - Understanding the role of loss functions (measuring error)
- **The Learning Process: Gradient Descent**
  - Optimizing the network by adjusting weights (backpropagation algorithm)
  - Visualizing the training process and understanding convergence

Module 3: Hands-on with a Simple Neural Network
- **Mini-Project: Building a Digit Classifier**
  - Use a Python library (e.g., TensorFlow, PyTorch) to build a simple NN
  - Train the network to recognize handwritten digits (MNIST dataset)
  - Visualize the training process and evaluate the model's performance
  - Explore hyperparameter tuning (learning rate, number of epochs)

Module 4: Exploring the World of Neural Networks
- **Different Types of Neural Networks**
  - A glimpse into Convolutional Neural Networks (CNNs) for image recognition
  - Briefly discuss Recurrent Neural Networks (RNNs) for sequential data (text)
- **The Future of Neural Networks**
  - Ethical considerations and potential societal impact
  - Exploring advanced applications and research areas

Module 1: Introduction to NLP

- **What is NLP?**
  - Definition, goals, and applications of NLP (sentiment analysis, chatbots, machine translation)
- **Text vs. Code: Challenges in NLP**
  - Understanding the ambiguity and complexity of human language
  - Challenges for computers: grammar, slang, sarcasm

Module 2: Working with Text Data

- **Text Preprocessing**
  - Techniques for cleaning and preparing text data (tokenization, removing stop words, stemming/lemmatization)
- **Text Representation: From Words to Numbers**
  - Introduction to vectorization techniques (Bag-of-Words, TF-IDF)
  - Representing text data numerically for machine learning algorithms

Module 3: Hands-on with Basic NLP Tasks

- **Mini-Project: Sentiment Analysis of Movie Reviews**
  - Use Python libraries (e.g., NLTK, spaCy) for text preprocessing and vectorization
  - Train a simple machine learning model (e.g., Logistic Regression) to classify movie reviews as positive or negative
  - Evaluate the model's performance and explore techniques for improvement

Module 4: Exploring the NLP Landscape

- **A Glimpse into Advanced NLP Techniques**
  - Introduction to Named Entity Recognition (NER) and Part-of-Speech (POS) tagging
  - Briefly discuss Natural Language Generation (NLG) for creating human-like text
- **The Future of NLP**
  - Ethical considerations and potential societal impact
  - Exploring advanced applications (chatbots, question answering systems)

Module 1: Introduction to Version Control
- **What is Version Control?**
  - Importance of tracking changes in code projects
  - Benefits of using Git compared to manual methods
- **Git Fundamentals**
  - Core concepts: repositories, working directory, staging area, commits
  - Understanding the Git workflow (track, modify, commit, push, pull)

Module 2: Setting Up Git
- Installing Git on your system (Windows, Mac, Linux)
- Creating a local Git repository for your project
- Configuring basic Git settings (username, email)

Module 3: Working with Git Commands
- **Hands-on Exercises in Terminal/Command Prompt (focus on practical application)**
  - git init: Initializing a new Git repository
  - git status: Checking the status of your working directory
  - git add: Adding files to the staging area for commit
  - git commit: Committing changes with a descriptive message
  - git log: Viewing the commit history
  - git diff: Comparing different versions of your files
- **Working with Unstaged and Staged Changes (demonstrate using commands)**

Module 4: Collaboration with Git
- **Introduction to Remote Repositories**

(using GitHub as an example)
- Creating a remote repository on GitHub
- Connecting your local Git repository to the remote repository
- git push: Pushing your commits to the remote repository (sharing your changes)
- git pull: Pulling changes from the remote repository (downloading updates)
- Understanding branches for parallel development (basic introduction)

Module 5: Wrap Up and Project
- **Q&A session: Addressing any remaining questions about Git concepts and commands**
- **Final Project:**
  - Apply your Git skills to a practical scenario (e.g., collaborative development on a small code project)
  - Independently create a local Git repository, track changes, commit regularly, and push/pull from a remote repository (simulated or real)
  - Present your project and demonstrate basic Git commands used (optional)

Module 1: Demystifying Generative AI
- **What is GAI?**
  - Definition, core concepts (adversarial learning, generative models)
  - Real-world examples (text generation, image creation)
- **Benefits and Concerns of GAI**
  - Potential for creative content, data augmentation, scientific discovery
  - Ethical considerations (bias, misuse), safety concerns

Module 2: Unveiling the Building Blocks
- **Deep Learning Essentials**
  - Artificial Neural Networks (ANNs) at a glance
  - Understanding basic concepts (activation functions, loss functions)
- **Generative Model Types: A Quick Overview**
  - Variational Autoencoders (VAEs) in a nutshell
  - Generative Adversarial Networks (GANs) – a competitive approach
  - Introduction to Autoregressive models (AR)

Module 3: Hands-on with Generative AI
- **Mini-Project 1: Text Generation with a Simple Model**
  - Explore a basic pre-trained text generation model
  - Experiment with generating different text formats (sentences, poems)
- **Mini-Project 2: Demystifying GANs with Visualization**
  - Use a pre-trained GAN to explore image generation
  - Visualize the training process and understand model behavior

Module 4: GAI Beyond the Basics
- **Exploring Advanced Techniques**
  - Introduction to Generative Pre-training Models (GPTs)
  - A glimpse into Conditional Generative Models (text-to-image)
- **Responsible Development of GAI**
  - Recognizing potential misuse (deepfakes)
  - Importance of ethical considerations

JOB ROLES AFTER A DATA SCIENCE PROGRAM

DATA ANALYST	DATA SCIENTIST
DATA ENGINEERS	DATA ARCHITECT
DATABASE ADMINISTRATOR	STATISTICIAN
MACHINE LEARNING ENGINEER	BUSINESS ANALYST

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