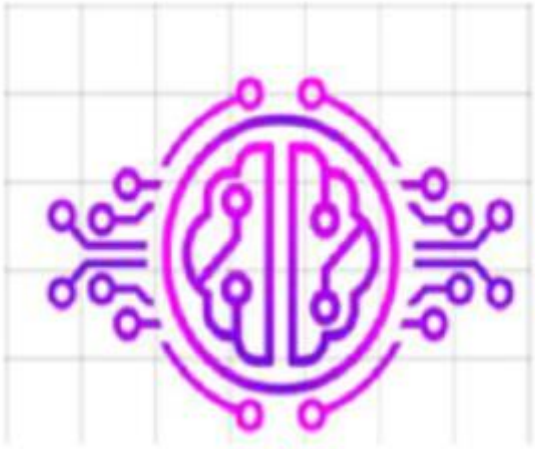
4X4 Training Session Portfolio

ABOUT CEREBRATECH



"We’re thrilled to have you onboard as part of our growing community. Together, let’s innovate, learn, and build solutions for tomorrow!" "Cerebra Tech is a dynamic startup specializing in developing end-to-end projects using modern technologies.“ "Our mission is to deliver impactful solutions while fostering a culture of innovation and continuous learning

Day 1:

Python is a high-level, interpreted programming language known for its readability and simplicity. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming. Here's a brief overview of the basics of Python:

1. Variables and Data Types

Python is dynamically typed, meaning you don't need to declare the data type of a variable explicitly.

Data Types:

- **int**: Integer (whole numbers)
- **float**: Floating point number (decimals)
- **str**: String (text)
- **bool**: Boolean (True or False)

2. Operators

Operators are symbols used to perform operations on variables and values.

3. Conditional Statements (if-else)

- Python uses `if` and `else` to make decisions.

4. Loops

Python supports both **for loops** and **while loops** for iterating over data.

- **For Loop** (used to iterate over a sequence like a list or a range)
- **While Loop** (repeats a block of code as long as a condition is True)

Data Structures in Python

1. Lists

- Lists are used to store an ordered collection of items.
- They are **mutable**, meaning you can change their content.
- Lists are indexed, so you can access elements using an index.

Common List Methods:

  - append(): Adds an item to the end.
  - extend(): Adds multiple items at the end.
  - insert(): Adds an item at a specific index.
  - remove(): Removes the first occurrence of an item.
  - pop(): Removes an item at a given index.

2. Tuples

- Tuples are like lists but **immutable** (can't be changed after creation).
- They are used when you want to store data that shouldn’t be modified.

Common Tuple Methods:

  - count(): Returns the number of times a value appears in the tuple.
  - index(): Returns the index of the first occurrence of a value.

3. Dictionaries

- A dictionary is a collection of **key-value pairs**. Keys must be unique, and the order of elements doesn't matter (until Python 3.7, where insertion order is maintained).

Day2:

50 SQL Challenges were given to code and submit using Github

- SQL queries to interact with relational databases.
- The SQL pdf documentation contains 25 questions along with their code and solutions.

SQL (Structured Query Language) is used to interact with relational databases. Below is a comprehensive guide to SQL queries covering database creation, table manipulation, and advanced operations.

Basic SQL Commands

- **SELECT:** Retrieving Data
- **WHERE:** Filtering Data
- **INSERT INTO:** Inserting Data
- **UPDATE:** Modifying Data
- **DELETE:** Deleting Data

Advanced SQL Queries

ORDER BY: Sorting Data

The ORDER BY clause is used to sort the results in ascending (ASC) or descending (DESC) order.

LIMIT: Limiting Results

The LIMIT clause is used to restrict the number of records returned by the query.

JOIN: Combining Data from Multiple Tables

JOIN is used to combine rows from two or more tables based on a related column.

There are different types of joins:

- **INNER JOIN**: Returns rows when there is a match in both tables.

- **LEFT JOIN (or LEFT OUTER JOIN)**: Returns all rows from the left table, and matching rows from the right table. If there's no match, NULL values are returned for the right table.
- **RIGHT JOIN (or RIGHT OUTER JOIN)**: Similar to the LEFT JOIN, but returns all rows from the right table.
- **FULL JOIN (or FULL OUTER JOIN)**: Returns rows when there is a match in either left or right table.

Day3 :

Focused on key data analysis libraries like NumPy, Pandas, Matplotlib, and along with performing Exploratory Data Analysis (EDA) on datasets. Covered topics like detecting outliers and addressing class imbalance.

NumPy:

NumPy is a powerful Python library used for numerical and scientific computing. It provides support for large, multi-dimensional arrays and matrices, along with a wide range of mathematical functions to perform operations on these arrays efficiently. NumPy is essential for tasks like data manipulation, statistical analysis, and machine learning due to its speed and flexibility.

Pandas:

Pandas is a powerful Python library used for data manipulation and analysis. It provides flexible data structures like Data Frame and Series, which allow for easy handling of structured data, including filtering, transforming, and aggregating data. Pandas is widely used in data science and machine learning for cleaning, analyzing, and visualizing data efficiently.

Exploratory Data Analysis:

Exploratory Data Analysis (EDA) is an essential step in data analysis that involves examining the dataset to summarize its main characteristics and uncover patterns, trends, or anomalies. It helps in understanding the data before applying any formal modeling or hypothesis testing. EDA is often performed visually using charts, graphs, and summary statistics, and it can help shape the direction for further analysis or modeling**.**

- **Data Cleaning:** Identifying and handling missing values, duplicates, or inconsistencies in the dataset.
- **Data Transformation:** Converting variables, encoding categorical variables, and normalizing or scaling data as necessary.

- **Data Visualization:** Using plots like histograms, boxplots, scatter plots, and heatmaps to visualize the distribution of data, detect outliers, and explore relationships between variables.

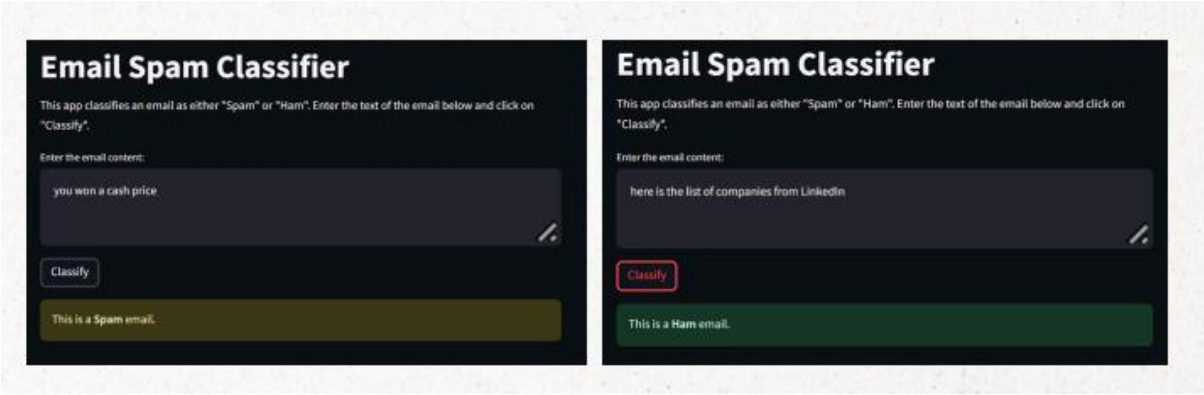
Machine Learning (ML):

Machine Learning (ML) is a subfield of artificial intelligence (AI) that focuses on creating algorithms that allow computers to learn from and make predictions or decisions based on data without explicit programming. Instead of being programmed with specific rules, machine learning models improve their performance through experience

There are three main types of machine learning:

1. **Supervised Learning**: In supervised learning, the algorithm is trained on labeled data, where both input data and corresponding output (labels) are provided.
2. **Unsupervised Learning**: Unsupervised learning deals with data that is not labeled. The algorithm tries to identify patterns, groupings, or structures in the data without predefined labels.
3. **Reinforcement Learning**: Reinforcement learning is a type of learning where an agent learns to make decisions by interacting with an environment. It receives feedback through rewards or penalties based on the actions it takes, aiming to maximize cumulative rewards over time.

Machine Learning Project: Email Spam Classifier



Day-4:

- **Introduction to Neural Networks:** Neural Networks are a class of machine learning models inspired by the structure and functioning of the human brain. They are designed to recognize patterns, classify data, and make predictions by learning from data in a way that mimics the way the human brain processes information. Neural networks are at the core of

deep learning, a subset of machine learning that involves training models with multiple layers of processing.

- Activation Functions

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