ELECTRICAL TEAM TRAINING

TASK 4

Task 4.1: Understanding The Weather

About

Red Tornado is on a mission to understand weather patterns better to aid in disaster prevention and management. Using his computational abilities, he needs to analyze a dataset containing historical weather data. Your mission is to help Red Tornado load, clean, and preprocess the dataset, then visualize key aspects of the data to extract meaningful insights.

Requirements

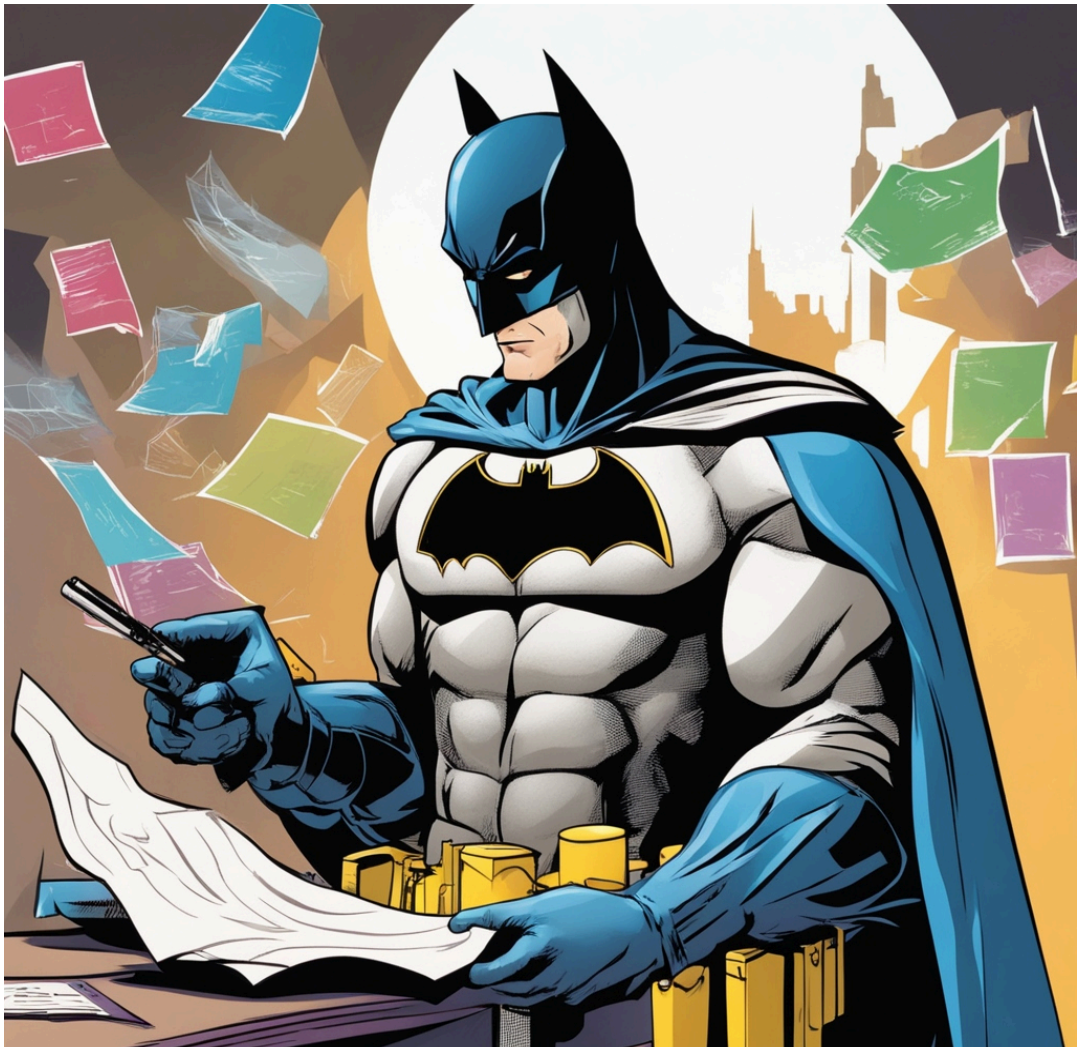
- Load the dataset as a dataframe.
- Clean and preprocess the data (handle missing values, remove duplicates and handle incorrect data).
- Plot temperature over time.
- Create a histogram of temperature distribution.
- Plot a scatter plot of temperature vs. humidity.
- Generate a correlation heatmap of the dataset and explain the output in a markdown cell.

Dataset Link Weather Dataset

Task 4.2: Battle Planning with Batman 2

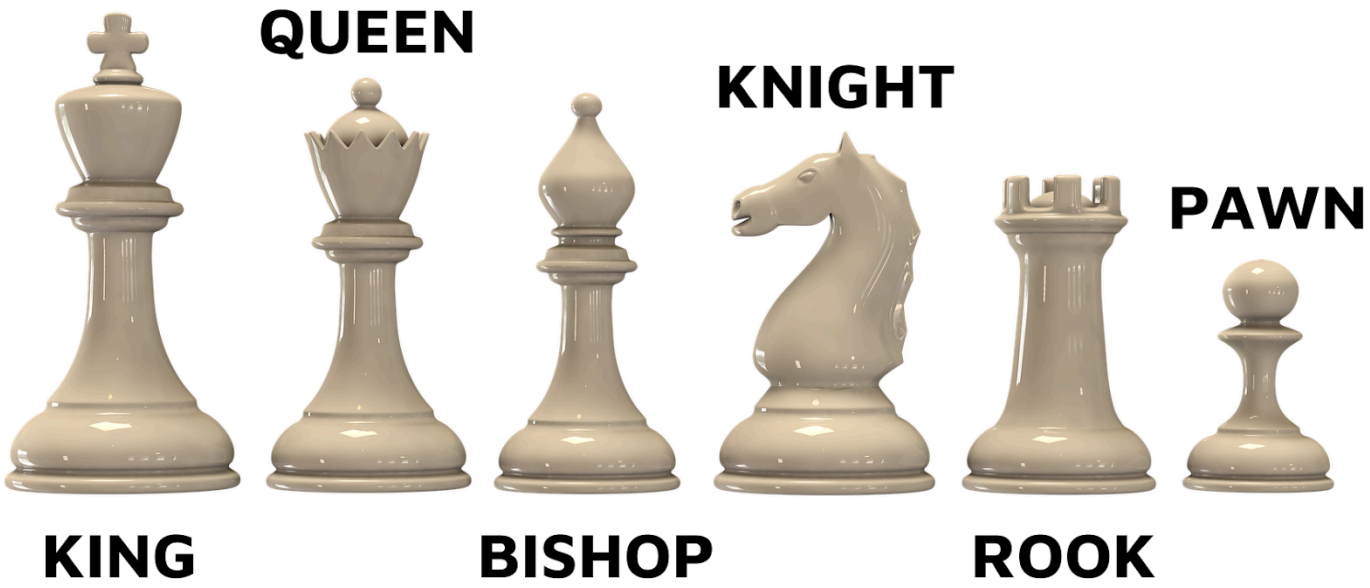
About

Batman has gathered his allies to plan a strategic battle against the villains, including Joker, Harley Quinn, and others. Using a chessboard as the battlefield, Batman must maneuver his pieces to outwit and defeat the villains. Each chess piece represents a member of the Justice League or an ally of Batman, while the opposing pieces represent various villains. Your mission is to implement a chess game to help the justice league simulate their strategies.



Requirements

- **Implement the Chess Logic (Basic Moves Only)**: Use python to create the core of the chess game.
  1. Handle piece movements (Pawn, Rook, Knight, Bishop, Queen and King movements).
  2. Switch between the two players.
  3. Implement game rules like checkmate.
- **Create a GUI**
- **Document Every Step**: Detailed documentation for your code, making it easy to understand and highlight any additional features implemented such as special moves (castling,en passant or pawn promotion) where using special moves is totally optional.



Hint: Use Pygame library for the GUI.

Bonus

- Document your code using readme file (.md).
- Flip the board for each player's turn.
- Convert the game to a single-player mode.

Task 4.3: Predicting The Weather

About

Red Storm, a superhero with the power to control weather patterns, needs to predict future weather conditions to prevent natural disasters and assist in planning rescue missions. By leveraging historical weather data, Red Storm aims to develop a machine learning model that can accurately forecast upcoming weather conditions. Let's help Red Storm achieve this goal by creating the model.

Objectives

To predict the weather conditions based on historical weather data using machine learning algorithms. The dataset includes features such as temperature, humidity, wind speed, and more. The goal is to train a model that can accurately forecast future weather conditions.
Use google colab or jupyter notebook in vs

Requirements

- Create a Machine Learning Model to predict the weather conditions.
- Use the given dataset , hint (use the numerical features only) and answer the following questions according to the model you created .
- Copy each question in a markdown cell and answer it below the code.
    1. What type of machine learning problem is this?
    2. How do the features relate to each other and to the weather conditions?
    3. What are the steps involved in preprocessing the dataset for machine learning?
    4. How do we select the best model for our dataset? Hint : use different regression models and compare their metrics
    5. What metrics should we use to evaluate the performance of our weather prediction model?
    6. Plot the predicted vs true values

Dataset:WeatherHistory Dataset

Bonus :

Objectives

Segmentation of the mall customers from the attached Mall Customers Dataset.
Use google colab or jupyter notebook in vs.

Requirements

- Create a Segmentation algorithm to segment the mall customers.
- Copy each question in a markdown cell and answer it below the code.
  1. What type of machine learning problem is this?
  2. What machine learning algorithms are suitable for customer segmentation tasks?
  3. Plot the Answer (hint : use scatter plot)

Dataset: Mall Customers Dataset

Resources for Task 4.3

1- Running Jupyter notebook in VS Code, set up, getting started with pyt…
2- Linear Regression
3- Unsupervised Machine Learning example

Submission

- You will submit your codes as **google colab links for Task 4.1 and Task 4.3**.
- You will submit your code as **a python file** and your documentation as **a pdf or a Markdown file in Task 4.2**.
- The Task's deadline is 30/7 11:59 PM.
- Q&A Sheet (if you have any question regarding the sessions or the task) : Q&A Sheet
- Submission form: https://forms.gle/iBcxvVL9oYAjYW2z7
- **Cheating is severely penalized**