**"Forecasting the Future: Weather Classification & Prediction! ☀️🌧️"**

**Introduction:**  
Understanding data is the first step toward making accurate predictions. This document contains a curated set of Python and Machine Learning questions that I explored while working on my weather prediction project. These questions range from fundamental data analysis to classification tasks, helping to build a strong foundation in data science.

**🟢 Easy Level (Basic Python, Pandas, Numpy, Data Visualization)**

**Python & Data Handling**

1. Load the dataset into a Pandas DataFrame and display the first five rows.
2. Check the data types of each column and convert Date into a proper datetime format.
3. Find the number of missing values in each column and fill them using appropriate methods.
4. Extract year, month, and day from the Date column and add them as new columns.
5. Calculate basic statistics (mean, median, mode) for Temperature, Humidity, and Wind Speed.
6. Find the day with the highest temperature recorded.
7. Identify the most frequent Weather Condition in the dataset.
8. Count the number of Sunny and Rainy days.
9. Find the average wind speed on Rainy days.
10. Filter out records where the temperature was below 0°C.

**Data Visualization**

1. Plot a histogram of Temperature.
2. Create a scatter plot of Temperature vs. Humidity.
3. Create a line plot of Temperature over time.
4. Create a bar plot showing the number of days per Weather Condition.
5. Plot a boxplot for Wind Speed to detect outliers.

**🟡 Intermediate Level (Feature Engineering, Model Selection, Hyperparameter Tuning)**

**Python & Data Handling**

1. Detect and handle outliers in Temperature, Humidity, and Pressure using the IQR method.
2. Create a new column called "Feels Like Temperature", using this formula:

FeelsLike = Temperature - (WindSpeed×0.2)

1. Encode Weather Condition into numerical values using Label Encoding or One-Hot Encoding.
2. Normalize Temperature, Humidity, and Wind Speed using Min-Max Scaling.
3. Use group by () to find average temperature per month.

**Machine Learning Tasks**

1. Regression Task:

* Predict Temperature using features like Humidity, Wind Speed, and Pressure.
* Train models: Linear Regression, Decision Tree, and Random Forest.
* Evaluate models using RMSE and R² score.
* Use feature importance to determine the most significant predictors.

1. Classification Task:

* Predict Weather Condition (Sunny, Cloudy, Rainy, etc.) based on numerical features.
* Train models: Logistic Regression, Random Forest, and SVM.
* Evaluate using Confusion Matrix and F1-score.