PM ACCELERATOR:

Our Mission:

By making industry-leading tools and education available to individuals from all backgrounds, we level the playing field for future PM leaders. This is the PM Accelerator motto, as we grant aspiring and experienced PMs what they need most—access. We introduce you to industry leaders, surround you with the right PM ecosystem, and discover the new world of AI product management skills.

Weather Data Analysis and Forecasting Report:

Introduction:

This project involves analysing and forecasting weather data, focusing on **temperature and precipitation trends**. The workflow includes **data cleaning, exploratory data analysis (EDA), model building, and evaluation** to predict future weather conditions.

Data Cleaning & Preprocessing

Handling Missing Values :

- Checked for missing values using `df.isnull().sum()`.
- Missing values in numerical columns were **imputed with median values**.
- Categorical missing values (if any) were **filled with mode**.

Handling Outliers :

- **Boxplots** revealed outliers in **temperature and precipitation**.
- **Capping method (1st and 99th percentile)** was applied.
- **Log transformation** was suggested for precipitation due to high skewness.

Exploratory Data Analysis (EDA)

Trend Analysis :

- Plotted time series graphs of **temperature and precipitation**.
- Identified seasonal and long-term trends.

Correlation Analysis :

- Correlation matrix showed relationships between weather variables.
- Temperature had a **strong inverse relationship** with precipitation.

Visualizations :

- **Boxplots** for detecting outliers.
- **Line plots** for temperature and precipitation trends.
- **Histograms** for distribution analysis.

Model Building & Forecasting

Time Series Forecasting Model :

- Used **exponential smoothing (Holt-Winters)** for forecasting.
- The `lastupdated` feature was used for time-based predictions.

Model Evaluation :

- Metrics used:
  - **Mean Absolute Error (MAE)**
  - **Mean Squared Error (MSE)**
  - **Root Mean Squared Error (RMSE)**
- Forecasting accuracy was evaluated with these metrics.

Weather Trends Summary

Temperature Trends :

- Rising trend over time, indicating climate change.
- Seasonal variations with peaks in summer and dips in winter.
- Sudden spikes and drops suggest extreme weather events.

Precipitation Trends:

- Highly variable, with dry periods followed by rainfall bursts.
- Extreme rainfall events were detected, requiring better forecasting.
- Seasonal dependence, with higher rain in wet seasons.

Key Correlations:

- Negative correlation between temperature and precipitation.
- Erratic precipitation patterns may be linked to climate change.

Forecasting observations:

- The Holt-Winters model predicts a slight temperature increase.
- Precipitation forecasts are uncertain, requiring advanced models (e.g., ARIMA, LSTM).

Final Takeaways:

- Rising temperatures suggest climate change impacts.
- Advanced models are needed for precipitation forecasting.
- More features (humidity, wind speed) can improve accuracy.