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Weather Data Analysis Report

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Introduction

Weather analysis is essential for understanding climate trends, predicting weather patterns, and making informed decisions in various sectors such as agriculture, aviation, and disaster management. This report presents an analysis of weather data, using programming tools to extract meaningful insights. The study includes data collection, processing, and visualization to interpret weather conditions over a period.

Methodology

1. **Data Collection**: Weather data is obtained from a reliable source (e.g., online weather APIs, CSV files, or meteorological databases).
2. **Data Preprocessing**: The data is cleaned, missing values are handled, and necessary transformations are performed.
3. **Exploratory Data Analysis (EDA)**: Statistical summaries, distributions, and visualizations are generated.
4. **Analysis & Visualization**: Line charts, bar graphs, and heatmaps are used to analyze temperature variations, precipitation, humidity, and wind speed trends.
5. **Conclusions & Insights**: Key observations are drawn based on the visualizations and statistics.

Code Typed

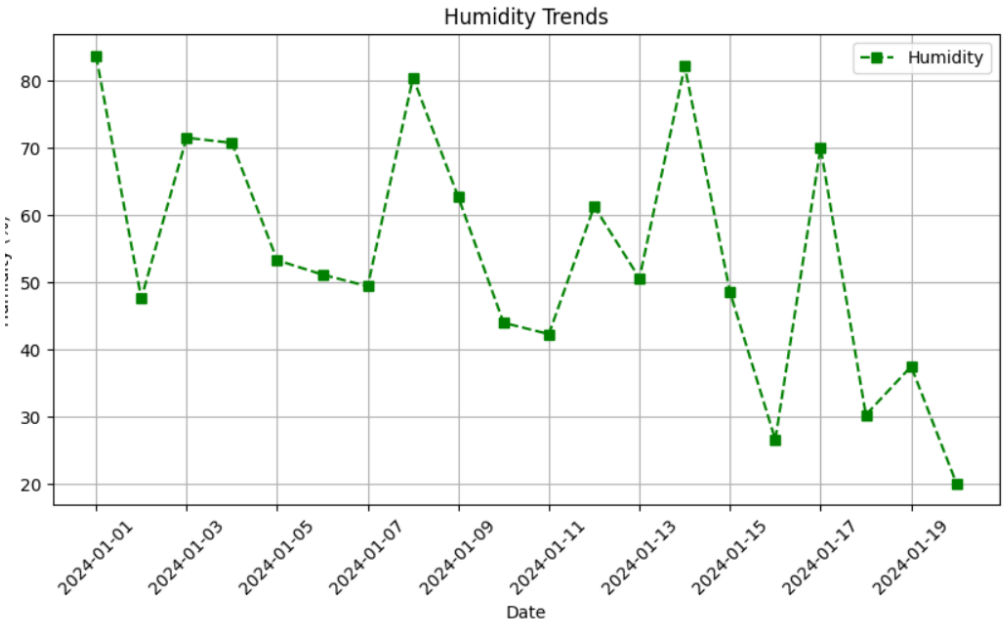
```
import pandas as pd
import matplotlib.pyplot as plt

# Load the dataset
file_path = "weather_data.csv"  # Update this if needed
df = pd.read_csv(file_path)

# Convert Date column to datetime
df['Date'] = pd.to_datetime(df['Date'])

# Basic statistics
print("Basic Statistics:")
print(df.describe())

# Identify hottest and coldest days
hottest_day = df.loc[df['Temperature'].idxmax()]
coldest_day = df.loc[df['Temperature'].idxmin()]
print(f"\nHottest day: {hottest_day['Date']} with {hottest_day['Temperature']}°C")
print(f"Coldest day: {coldest_day['Date']} with {coldest_day['Temperature']}°C")

# Plot temperature trends
plt.figure(figsize=(10,5))
plt.plot(df['Date'], df['Temperature'], marker='o', linestyle='-', color='r', label='Temperature')
plt.xlabel('Date')
```

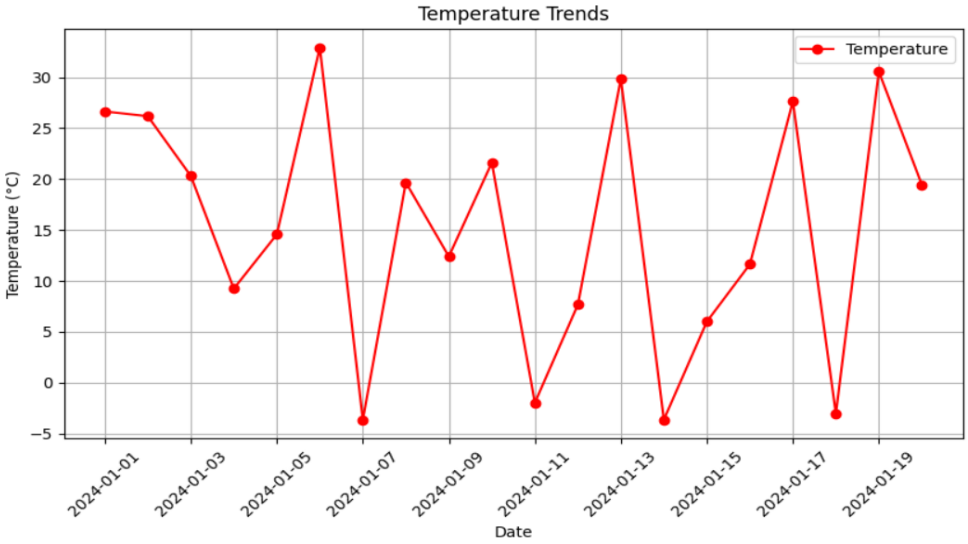
```
plt.ylabel('Temperature (°C)')
plt.title('Temperature Trends')
plt.legend()
plt.xticks(rotation=45)
plt.grid()
plt.show()

# Plot Rainfall trends
plt.figure(figsize=(10,5))
plt.bar(df['Date'], df['Rainfall'], color='b', label='Rainfall')
plt.xlabel('Date')
plt.ylabel('Rainfall (mm)')
plt.title('Rainfall Trends')
plt.xticks(rotation=45)
plt.legend()
plt.grid()
plt.show()

# Plot Humidity trends
plt.figure(figsize=(10,5))
plt.plot(df['Date'], df['Humidity'], marker='s', linestyle='--', color='g', label='Humidity')
plt.xlabel('Date')
plt.ylabel('Humidity (%)')
plt.title('Humidity Trends')
plt.legend()
plt.xticks(rotation=45)
```

```
plt.grid()

plt.show()
```

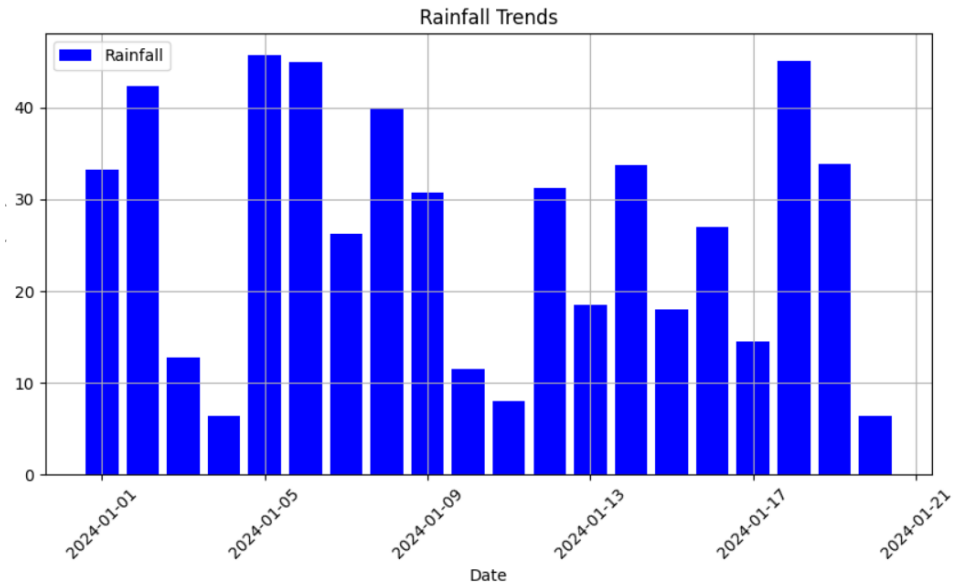
Screenshots Output Photo Pasted

```
Basic Statistics:
                      Date  Temperature   Rainfall   Humidity
count                   20    20.000000  20.000000  20.000000
mean   2024-01-10 12:00:00    15.197606  26.512254  54.217730
min    2024-01-01 00:00:00    -3.657570   6.346388  20.060225
25%    2024-01-05 18:00:00     7.236562  14.085247  43.567149
50%    2024-01-10 12:00:00    17.001724  28.873570  50.898195
75%    2024-01-15 06:00:00    26.295843  35.445143  70.247543
max    2024-01-20 00:00:00    32.922133  45.768719  83.786199
std                    NaN    12.168381  13.638843  18.427857

Hottest day: 2024-01-06 00:00:00 with 32.92213343608608°C
Coldest day: 2024-01-07 00:00:00 with -3.657570076011525°C
```




Temperature Trends
Temperature
Temperature (°C)
30
25
20
15
10
5
0
−5
2024-01-01
2024-01-03
2024-01-05
2024-01-07
2024-01-09
2024-01-11
2024-01-13
2024-01-15
2024-01-17
2024-01-19
Date

Date


Rainfall Trends
Rainfall
40
30
20
10
0
2024-01-01
2024-01-05
2024-01-09
2024-01-13
2024-01-17
2024-01-21
Date

Creadits

image 1 (Kiet Logo) taken from-

https://kietalumni.com/joinkaa.php

Image 2 Screenshot of code taken from-
https://colab.research.google.com/drive/1JyTZMcQ0gV119w_d39mO4VXvToxODxfF#scrollTo=v2S8MGkCgtQG