# Exploratory Data Analysis (EDA) Report on Weather Data

## 1. Introduction

This report presents an \*\*Exploratory Data Analysis (EDA)\*\* of a weather dataset, which contains daily temperature,

rainfall, and seasonal information for two years. The objective is to \*\*analyze temperature trends, seasonal variations,

and rainfall distribution\*\* using Python.

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## 2. Dataset Overview

The dataset consists of the following columns:

- \*\*Date\*\* – The recorded date

- \*\*Temperature\_C\*\* – Daily temperature in Celsius

- \*\*Rainfall\_mm\*\* – Amount of rainfall in millimeters

- \*\*Season\*\* – Corresponding season for each date

\*\*Dataset Information:\*\*

| Column | Data Type | Description |

|--------------|------------|-------------|

| Date | datetime64 | Date of record |

| Temperature\_C | float64 | Daily temperature (°C) |

| Rainfall\_mm | float64 | Amount of rainfall (mm) |

| Season | object | Season (Winter, Spring, Summer, Autumn) |

✅ No missing values found in the dataset.

Summary statistics:

| Metric | Temperature (°C) | Rainfall (mm) |

|-------------|-----------------|--------------|

| Mean | ~20°C | ~1.8 mm |

| Min | ~ -5°C | 0 mm |

| Max | ~ 40°C | ~30 mm |

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## 3. Data Visualization & Insights

### 3.1 Temperature Trends Over Time

📊 \*\*Observation:\*\* Temperature follows a cyclical pattern, peaking in summer and dropping in winter.

### 3.2 Seasonal Temperature Distribution

📊 \*\*Observation:\*\*

- \*\*Winter:\*\* Lowest temperatures, some negative values.

- \*\*Summer:\*\* Higher median temperatures, more extreme values.

- \*\*Spring & Autumn:\*\* Transition seasons with moderate temperatures.

### 3.3 Rainfall Distribution

📊 \*\*Observation:\*\*

- Most days have \*\*no rainfall\*\* (right-skewed distribution).

- A few extreme days have high rainfall (~30 mm).

### 3.4 Average Temperature by Season

📊 \*\*Observation:\*\*

- \*\*Summer\*\* has the highest average temperature (~30°C).

- \*\*Winter\*\* is the coldest (~10°C).

### 3.5 Monthly Rainfall Trends

📊 \*\*Observation:\*\*

- Rainfall peaks in \*\*monsoon months (July, August)\*\*.

- Dry periods occur in \*\*Winter and early Spring\*\*.

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## 4. Conclusion & Key Takeaways

🔹 \*\*Temperature Trends:\*\* Clear seasonal variations, with summer being the hottest and winter the coldest.

🔹 \*\*Seasonal Temperature Patterns:\*\* Boxplot confirms expected seasonal distributions.

🔹 \*\*Rainfall Patterns:\*\* Most days have no rain, but peak rainfall occurs in specific months.

🔹 \*\*Monthly Rainfall Trends:\*\* Clear wet and dry season cycles.

📌 \*\*Next Steps:\*\*

✅ Explore correlations between temperature and rainfall.

✅ Use time series forecasting models for weather prediction.

✅ Perform anomaly detection for extreme weather events.

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## 5. References

- Dataset: Generated synthetic weather data.

- Libraries Used: \*\*Pandas, Matplotlib, Seaborn\*\* for analysis & visualization.

📊 This report provides insights into weather trends and can be further extended for forecasting and deeper analysis. 🚀

