

Weather Data Analysis Report

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1. Introduction

This project aims to analyze a small weather dataset to visualize temperature trends, rainfall distribution, and seasonal weather variations. The goal is to gain insights into how weather parameters change over time and across seasons.

2. Methodology

The dataset includes temperature, rainfall, and seasonal information. We use Python libraries such as Pandas for data handling, Matplotlib and Seaborn for visualization, and Google Colab for execution. The approach includes data cleaning, visualization, and analysis of seasonal trends.

3. Code Implementation

```
# Install required libraries (if not already installed)
!pip install pandas matplotlib seaborn --quiet

# Import libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from google.colab import files

# Upload dataset manually in Colab
print("Please upload your 'weather_data.csv' file.")
uploaded = files.upload()

# Read the dataset
df = pd.read_csv("weather_data.csv", parse_dates=["Date"])

# Handle missing values (Forward Fill Method)
df.fillna(method='ffill', inplace=True)

# Set the plot style
sns.set_style("whitegrid")
```

```

# Temperature Trends Over Time (Line Plot)
plt.figure(figsize=(12, 5))
sns.lineplot(x=df["Date"], y=df["Temperature"], marker='o', color="b")
plt.title("Temperature Trends Over Time")
plt.xlabel("Date")
plt.ylabel("Temperature (°C)")
plt.xticks(rotation=45)
plt.show()

# Rainfall Distribution by Season (Bar Chart)
plt.figure(figsize=(10, 5))
sns.barplot(x=df["Season"], y=df["Rainfall"], estimator=sum, palette="Blues")
plt.title("Total Rainfall by Season")
plt.xlabel("Season")
plt.ylabel("Total Rainfall (mm)")
plt.show()

# Seasonal Temperature Variations (Box Plot)
plt.figure(figsize=(8, 5))
sns.boxplot(x=df["Season"], y=df["Temperature"], palette="coolwarm")
plt.title("Temperature Variations Across Seasons")
plt.xlabel("Season")
plt.ylabel("Temperature (°C)")
plt.show()

# Correlation Heatmap (Fixed)
plt.figure(figsize=(6, 4))

# Select only numeric columns (excluding "Season")
numeric_df = df.select_dtypes(include=['number'])

sns.heatmap(numeric_df.corr(), annot=True, cmap="coolwarm", linewidths=0.5)
plt.title("Weather Data Correlation Heatmap")
plt.show()

```

4. Results & Visualizations

The generated visualizations provide valuable insights into temperature trends, rainfall distribution by season, and correlations between weather factors. The graphs illustrate how weather patterns change over time.

5. Conclusion

This project successfully analyzed weather trends using a small dataset. The visualizations help understand how temperature and rainfall vary across seasons, providing valuable weather insights.

6. References & Credits

- Python Pandas Documentation
- Matplotlib & Seaborn Documentation
- Weather Data Sources (Simulated for this project)
- Google Colab for cloud execution

colab.research.google.com

upwan8152/Weather-Data-Analysis_202401100400200

14. Weather Data Analysis.ipynb

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Commands + Code + Text

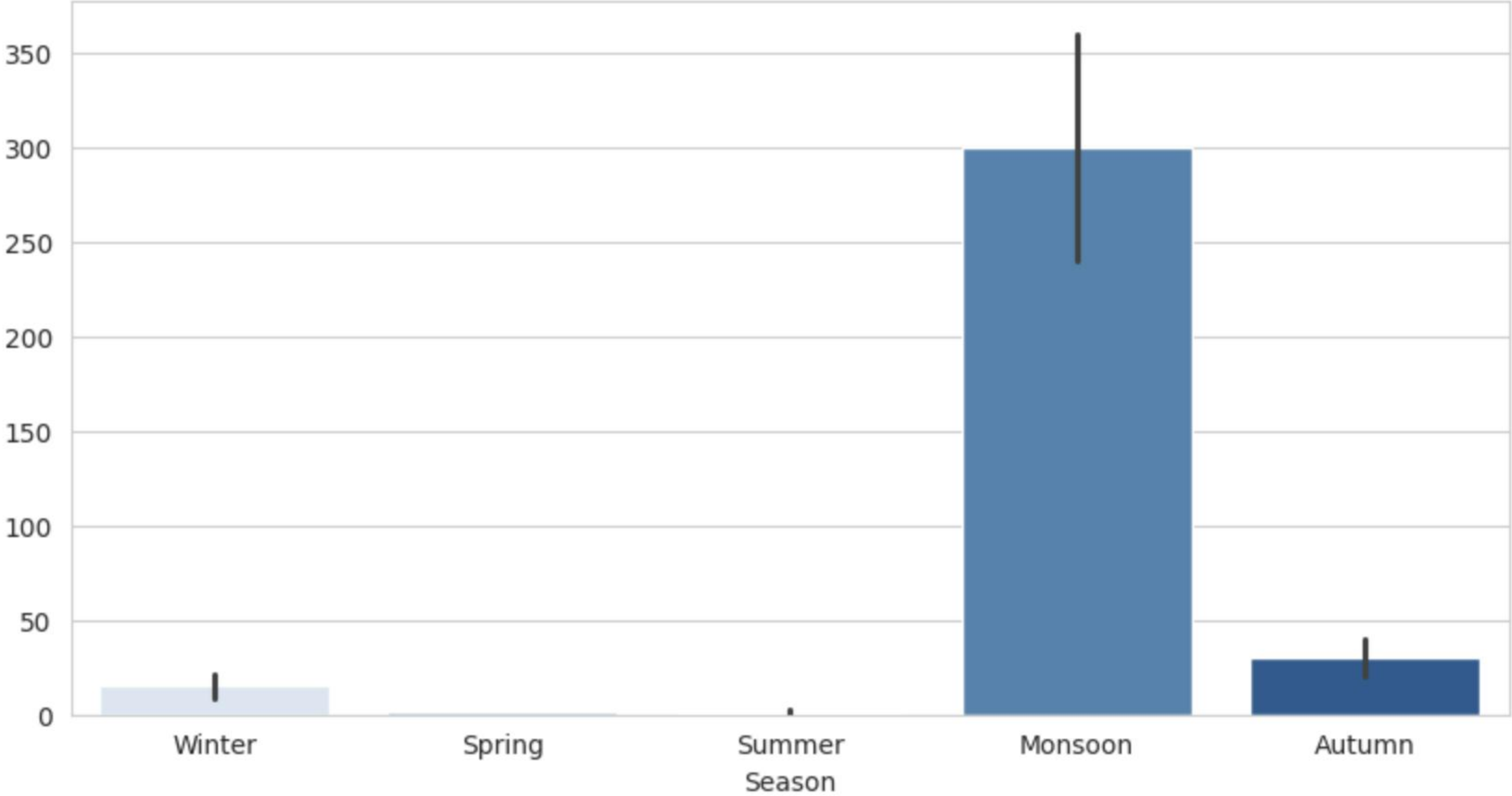
```
sns.heatmap(df[['Temp', 'Rainfall']], annot=True, cmap='coolwarm', linewidths=0.5,
plt.title("Weather Data Correlation Heatmap")
plt.show()
```

python-input-3-3add54934c9b>:34: FutureWarning:

Using 'palette' without assigning 'hue' is deprecated and will be removed in v0.14.0. Assign the 'x' variable to 'hue' and set 'legend=False' for the same effect.

```
ns.barplot(x=df["Season"], y=df["Rainfall"], estimator=sum, palette="Blues")
```

Total Rainfall by Season



Season	Total Rainfall (approx.)
Winter	15
Spring	5
Summer Season	2
Monsoon	300
Autumn	30

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Using 'palette' without assigning 'hue' is deprecated and will be removed in v0.14.0. Assign the 'x' variable to 'hue' and set 'legend=False' for the same effect.

```
ns.boxplot(x=df["Season"], y=df["Temperature"], palette="coolwarm")
```

Temperature Variations Across Seasons

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colab

14. Weather Data Analysis.ipynb - Colab

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CO 14. Weather Data Analysis.ipynb

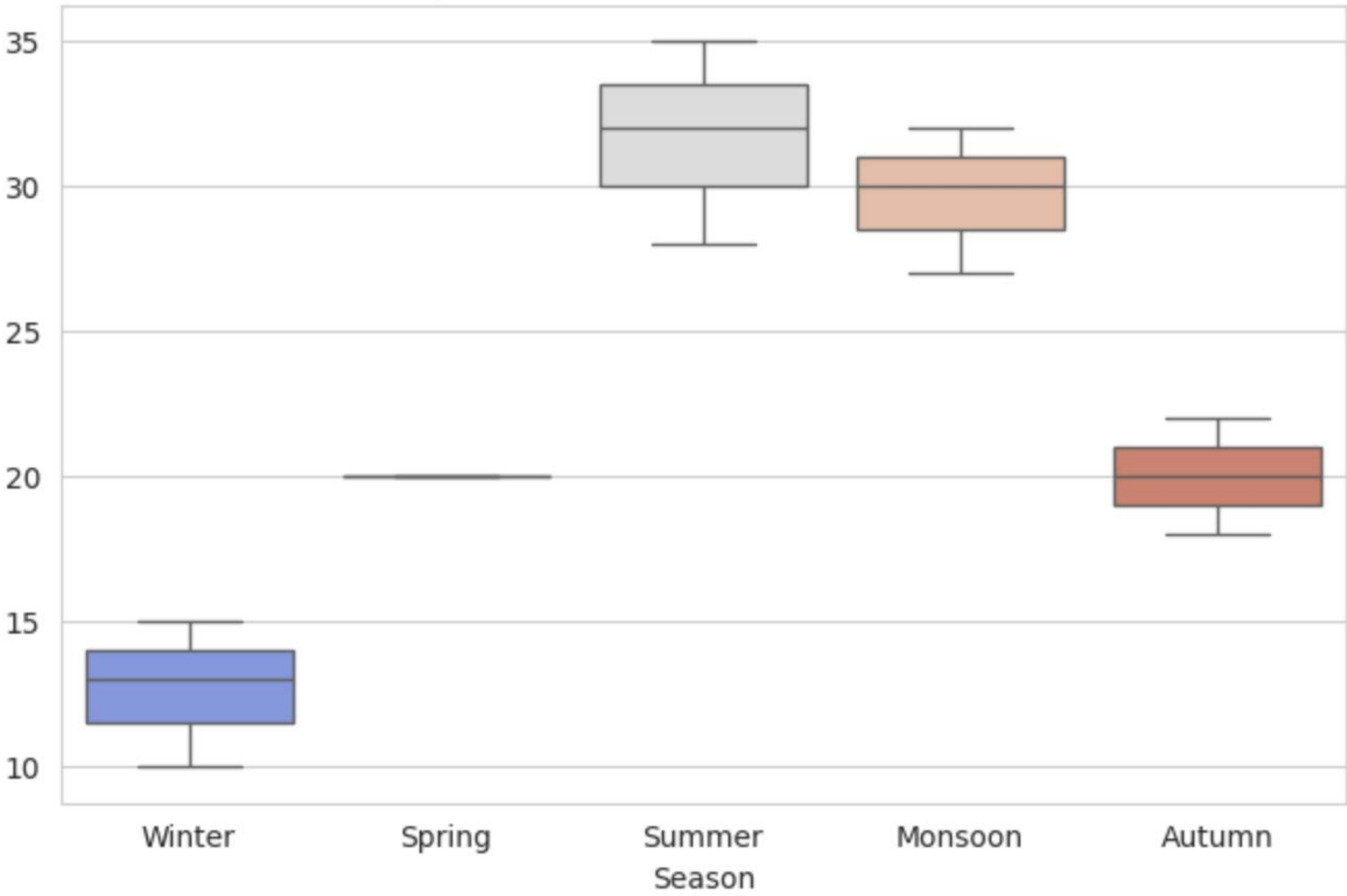
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ns.boxplot(x=df["Season"], y=df["Temperature"], palette="coolwarm")

Temperature Variations Across Seasons



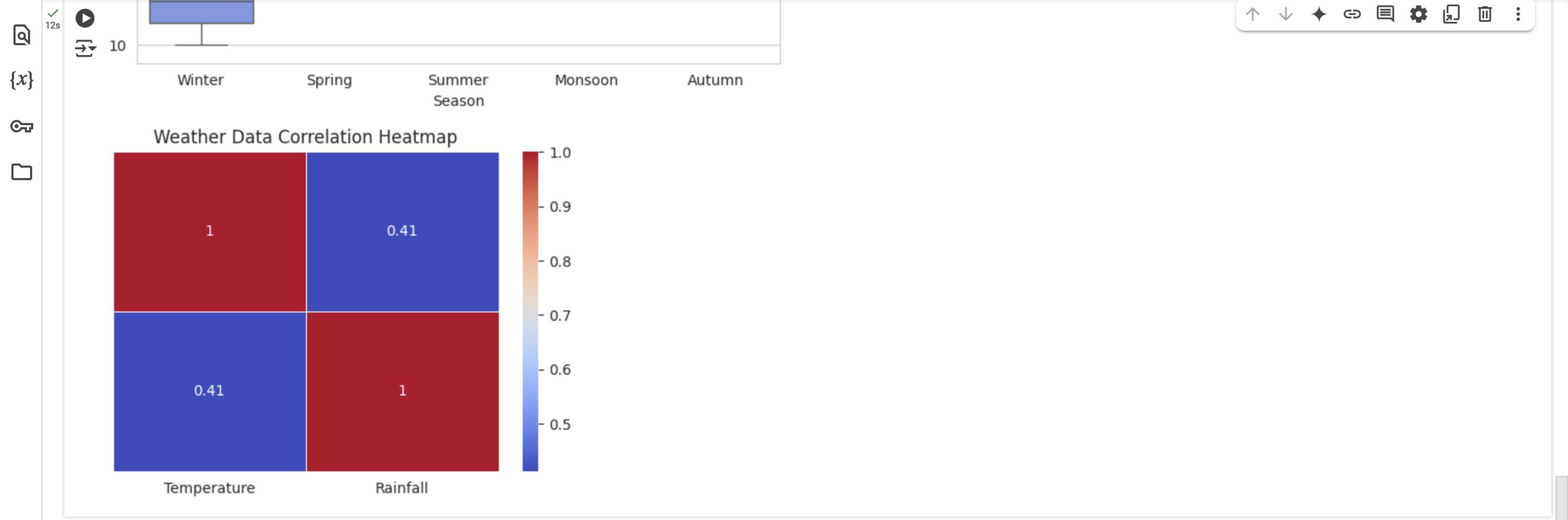
Season	Min	Q1	Median	Q3	Max
Winter	10	11.5	13	14	15
Spring	20	20	20	20	20
Summer Season	28	30	32	33.5	35
Monsoon	27	28.5	30	31	32
Autumn	18	19	20	21	22

Weather Data Correlation Heatmap



	Variable 1	Variable 2
Variable 1	1	0.41
Variable 2	0.41	1

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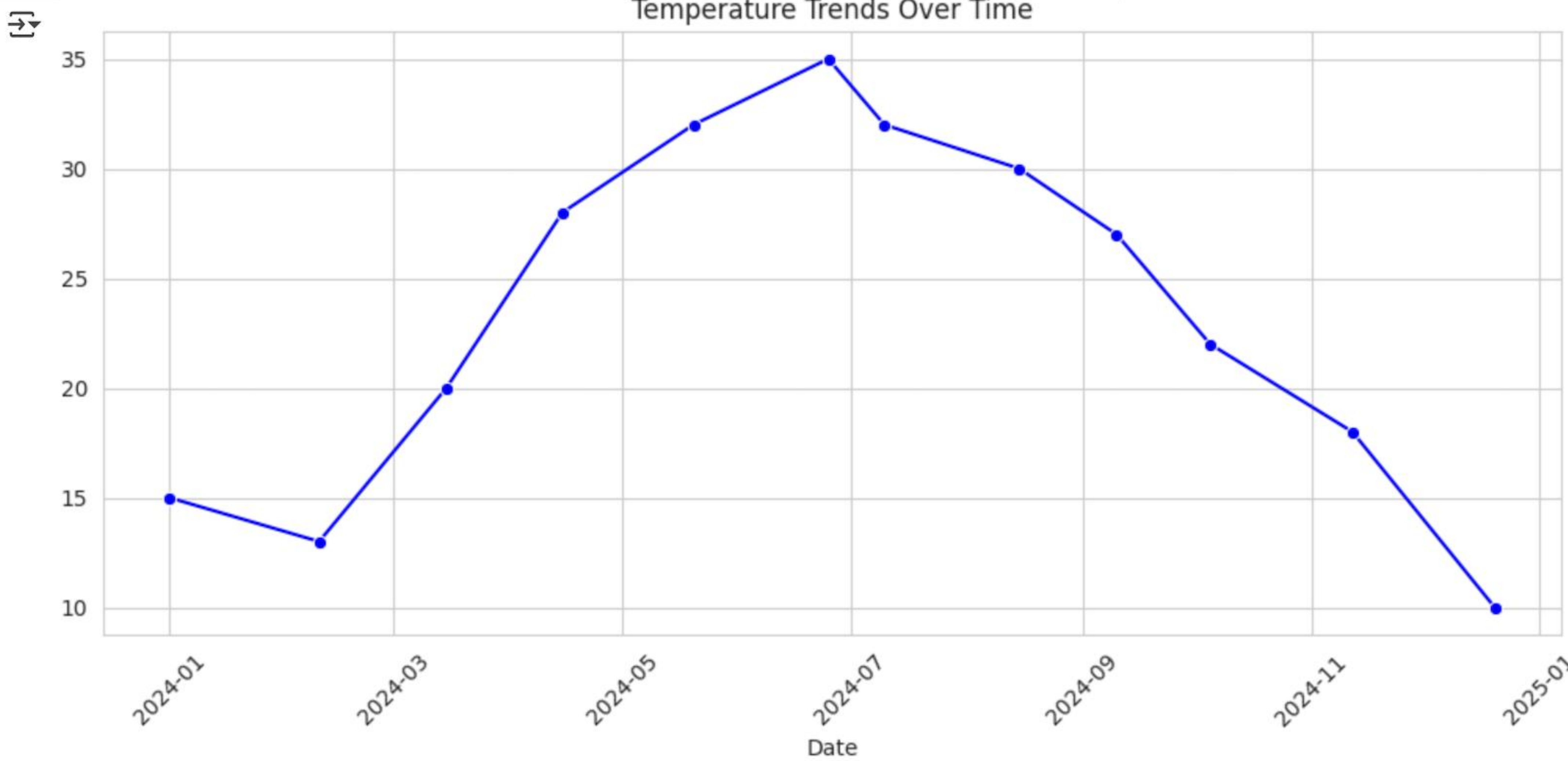
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ns.heatmap(numeric_df_corr(), annot=True, cmap='coolwarm', linewidths=0.5)
plt.title("Weather Data Correlation Heatmap")
plt.show()

Temperature Trends Over Time



Date	Temperature (°C)
2024-01-01	15
2024-02-01	13
2024-03-01	20
2024-04-01	28
2024-05-01	32
2024-06-01	35
2024-07-01	32
2024-08-01	30
2024-09-01	27
2024-10-01	22
2024-11-01	18
2024-12-01	10

python-input-3-3add54934c9b>:34: FutureWarning:
sing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
ns.barplot(x=df["Season"], y=df["Rainfall"], estimator=sum, palette="Blues")
Total Rainfall by Season

350

