Project Report

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Climate Change Patterns in Bangladesh: A Correlation Analysis of Temperature and Rainfall Trends

Introduction:

Climate change is a global issue, and its impact are become increasing worldwide , including Bangladesh. The country is experiencing significant changes in weather patterns, categorized by rising temperatures and altered rainfall patterns. Understanding these changes is crucial for developing strategies to mitigate and adapt to climate change effects. This report aims to explore the relationship between temperature and rainfall patterns in Bangladesh over time. By analyzing long-term weather data , seeking correlations between these weather and temperature, which could provide insights into the broader implications of climate change in Bangladesh. This understanding is very helpful for making policy decisions and planning for sustainable development in Bangladesh.

Used Data

Data Sources

Bangladesh Weather Dataset (Dataset 1)

- **Source**: Kaggle
- **URL**: https://www.kaggle.com/datasets/yakinrubaiat/bangladesh-weather-dataset
- **Reason for Selection**: This dataset provides weather data for Bangladesh, covering various variables over a significant time-period.
- **License**: Open source. No restrictions to use.

Historical Rainfall Data in Bangladesh (Dataset 2)

- **Source**: Kaggle
- **URL**:https://www.kaggle.com/datasets/redikod/historical-rainfall-data-in-bangladesh
- **Reason for Selection**: This dataset focuses mainly on the historical rainfall data in Bangladesh, which is helpful for understanding precipitation patterns.
- **License**: Open source. No restrictions on use.

Data Description

The Bangladesh Weather Datasets contain data on various weather parameter , such as temperature, recorded lots of years. The Historical Rainfall Data in Bangladesh provides detailed records of rainfall amounts. Both datasets include monthly data, making them perfect for a proper analysis of weather patterns. The datasets are merged based on the 'Year' and 'Month' columns to create a dataset for analysis.

Analysis

Methodology

Data Fetching and Preparation

- Download datasets from Kaggle.
- Stored the data into a local SQLite database for efficient processing.

Data Merging

- Merged the weather and rainfall datasets of 'Year' and 'Month'.
- Controled the missing values by removing incomplete records.

Correlation Analysis

- Created a scatter plot to visualize the relationship between temperature and rainfall.
- Calculated the correlation coefficient to measure the linear relationship.

Output:

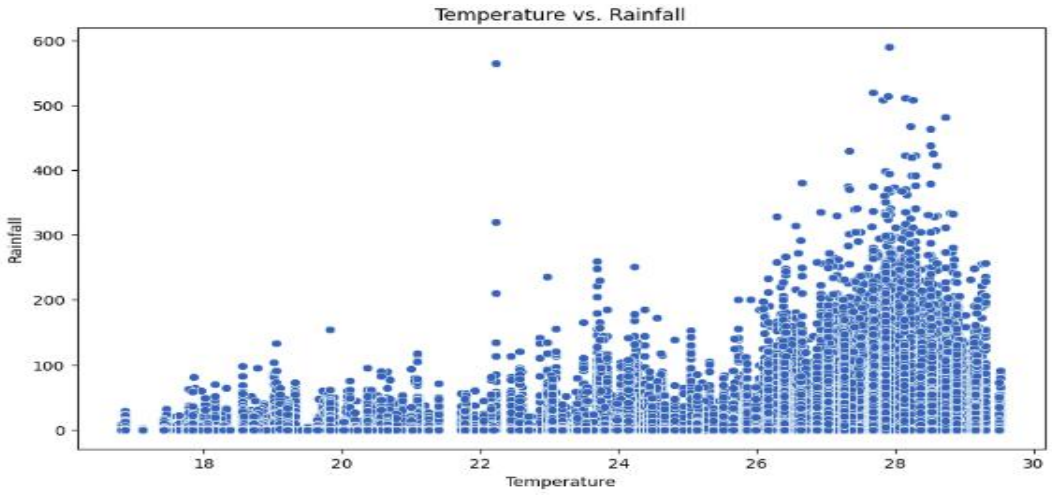

Figure: Correlation Analysis of Temperature and Rainfall Trends

Results

Scatter Plot

The scatter plot shows a positive relationship between the temperature and rainfall, which suggests that higher temperatures might be associated with higher rainfall amounts.

Correlation Coefficient

The Pearson correlation coefficient between temperature and rainfall is approximately 0.232. This value indicates a weak positive correlation, suggesting that as temperature increases, rainfall tends to increase slightly also.

Linear Regression Analysis

Coefficient: 1.213
Intercept: -24.19

These values indicate that for each degree Celsius increase in temperature, the rainfall increases by approximately 1.213 mm, holding other factors constant.

Interpretation

This analysis indicates a moderate positive correlation between temperature and rainfall in Bangladesh. This suggests that rising temperatures could lead to increased rainfall, which is significant for understanding climate change impacts in the region.

Conclusions

Summary of Findings

This study found a moderate positive correlation between temperature and rainfall in Bangladesh. Higher temperatures are associated with increased rainfall amounts, which indicating temperature changes significantly influence in patterns.

Implications for Climate Change Adaptation

These findings highlight the importance of considering temperature's impact on rainfall in climate change adaptation strategies. Policymakers should integrate these insights into broader plans to address climate change's effects on Bangladesh.

Limitations and Future Work

Limitations:

- The accuracy of findings depends on data quality
- Focuses only on temperature and rainfall, excluding other variables.

Future Work:

- Incorporate more variables and improve data quality.
- Explore advanced models to capture complex climate interactions.