

RAINFALL PREDICTION

Abstract:

Predicting the amount of daily rainfall improves agricultural productivity and secures food and water supply to keep citizens healthy. To predict rainfall, several types of research have been conducted using data mining and machine learning techniques of India's environmental datasets. An erratic rainfall distribution in the country affects the agriculture on which the economy of the country depends on. Wise use of rainfall water should be planned and practiced in the country to minimize the problem of the drought and flood occurred in the country. The main objective of this study is to identify the relevant atmospheric features that cause rainfall and predict the rainfall using machine learning techniques. The dataset was collected from the internet to measure the performance of machine learning technique.

Introduction:

Rainfall prediction is crucial for increasing agricultural productivity which in turn secures food and quality water supply for citizens of one's country. The scarcity of rainfall has a negative influence on the aquatic ecosystem, quality water supply, and agricultural productivity. Agriculture and water quality depend on the rainfall and water amount on a daily and annual basis. Therefore, accurate prediction of daily rainfall is a challenging task to manage the rainfall water for agriculture and water supply. Various researchers conducted studies to improve the prediction of daily, monthly and annual rainfall amounts using different countries' meteorological data. The machine learning algorithms are proved to be better replacing the traditional deterministic method to predict the weather and rainfall. Consequently, this case study analysed machine learning for rainfall prediction.

Objectives:

The primary objective of this rainfall prediction case study is to leverage machine learning models to enhance the rainfall predictions. Traditional meteorological methods often face challenges in capturing the complex patterns and interactions influencing rainfall. Therefore, the specific goals of this study are as follows:

Improve Prediction Accuracy: Evaluate the performance of the machine learning models in comparison to traditional methods and aim to achieve higher accuracy in predicting rainfall events.

Contribute to Decision-Making: Provide insights that can contribute to informed decision-making in sectors heavily influenced by weather conditions.

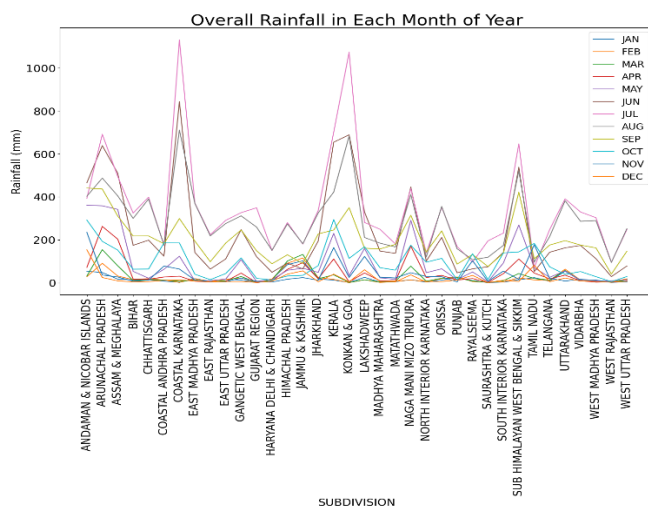
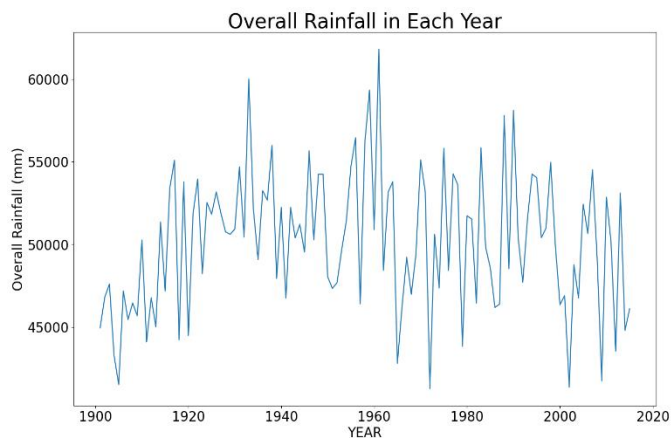
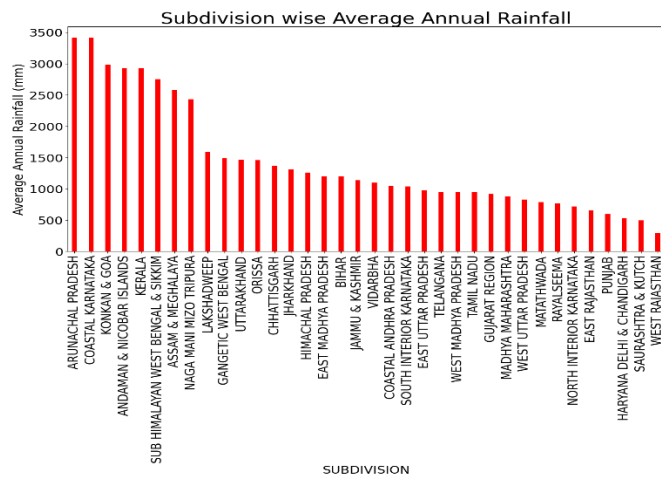
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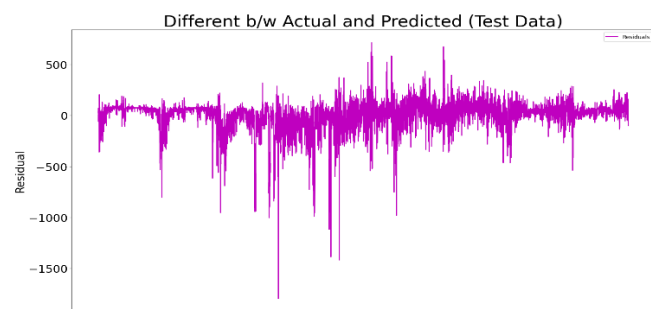
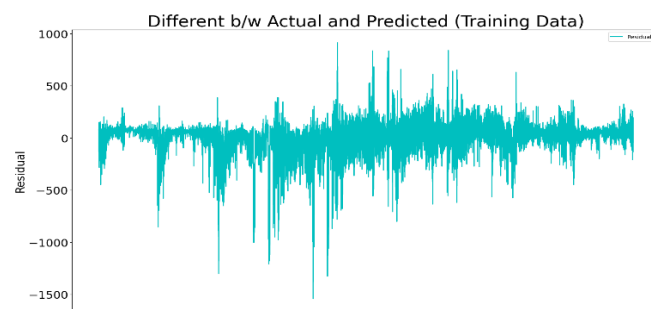
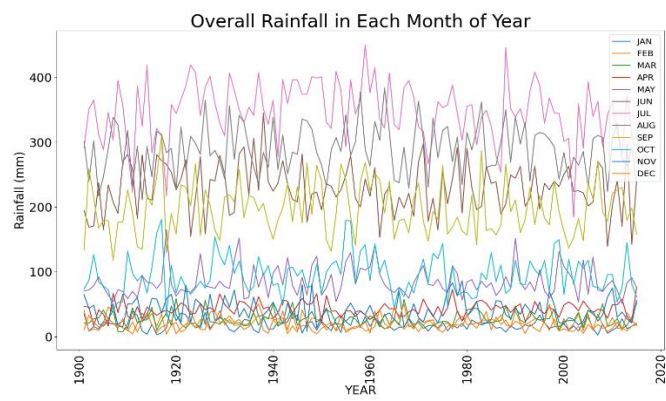
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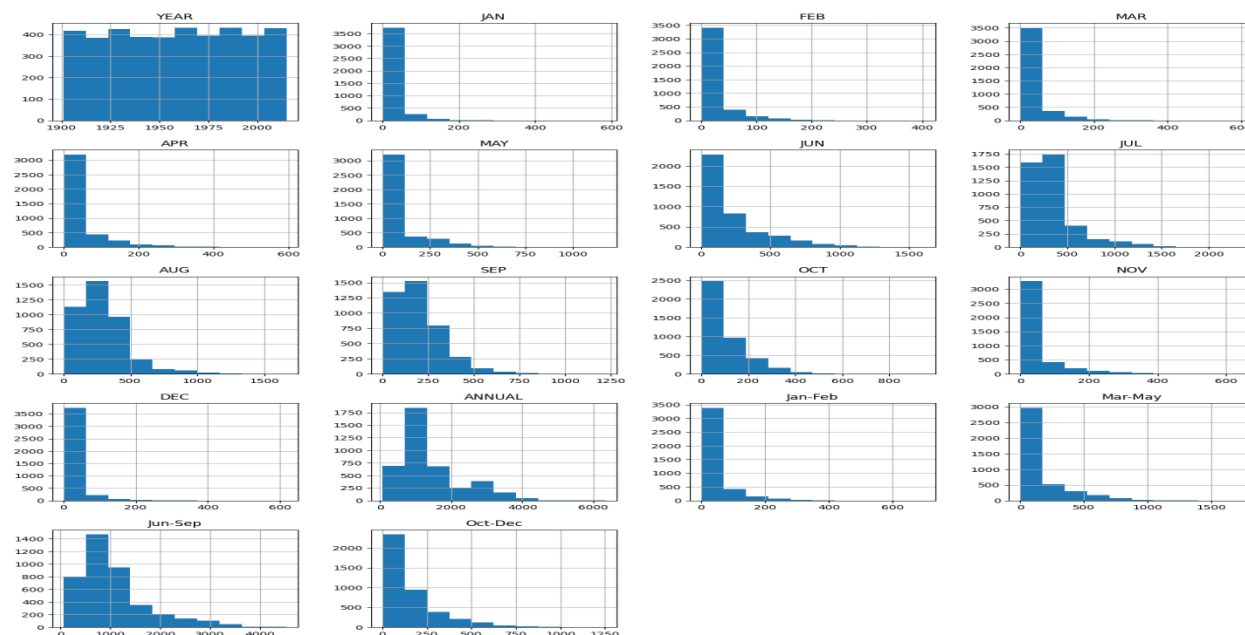
For this study, the raw data were collected from the India. The data features such as year, month, date, subdivision and rainfall were included. The raw data recorded for 15 years (1901–2015) were used for the study. For preparing the data some packages are imported such as **NumPy, Pandas, Matplotlib, Pyplot, Sklearn, Model Selection, Sklearn, Linear Model**.

Results:

The given diagrams represent the outcome of the case study:







Conclusion:

In conclusion, this rainfall prediction case study has provided valuable insights into the application of machine learning models for improving the accuracy of rainfall forecasts. The key findings and outcomes of the study can be summarized to :

Improved Prediction Accuracy: Linear regression model successfully captured intricate patterns in historical meteorological data, leading to more precise rainfall predictions.

Decision-Making Support: The insights gained from this study have direct implications for decision-making in sectors heavily reliant on weather predictions. This model forecasts and aiding in planning and risk mitigation.

References:

Parmar, Aakash, Kinjal Mistree, and Mithila Sompura. "Machine learning techniques for rainfall prediction: A review." 2017 International Conference on Innovations in information Embedded and Communication Systems. 2017.

Websites:

- Ministry of Electronics & Information Technology, Government of India.
- India Meteorological Department Ministry of Earth Sciences, New Delhi, India