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RAINFALL PREDICTION APP USING MACHINE LEARING

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ABSTRACT

One of the most significant and difficult responsibilities in the modern world is rainfall forecasting. In general, weather and precipitation are very complex, nonlinear processes that require sophisticated computer modelling and simulation to accurately anticipate. For informationintensive applications, it will be important to swiftly find and analyze complex patterns and needs as well as to learn from fresh data. One answer to this is an artificial neural network. Such nonlinear systems' behavior can be predicted using ANN. Throughout the past 25 years, the majority of researchers in this area have employed ANN with success. The ANN methodology is more appropriate for predicting rainfall than conventional statistical and numerical techniques. Support vector machines (SVM) are a data-classification technique that assigns new data components to one of the labelled categories. It makes the assumption that the relevant data contains some potential target values.

KEYWORDS

Artificial Neural Network, Rainfall Prediction System, Support Vector Classification (SVC), Support Vector Regression (SVR), multi-layer perceptron (MLP), Neural Networks Model.

INTRODUCTION

Worldwide, rainfall forecasting is absolutely essential since it affects how people live their lives. The meteorological agency is burdened with the difficult task of analyzing rainfall frequency. With changing atmospheric conditions, it is challenging to predict rainfall with accuracy. It is hypothesized that rainfall may be predicted for both the rainy and summer seasons. This is the main reason why it is necessary to analyze the

algorithms that may be used to predict rainfall. Machine learning is one of these adept and powerful technologies; it is a method of manipulating and extracting implicit, previously unknown and known, and potentially helpful information about data. Machine learning is a vast and indepth topic, and its application and scope are expanding daily.

On a global scale, several attempts have been undertaken by various researchers using a variety of methodologies to reliably estimate rainfall. Yet, due to rainfall's nonlinear nature, these approaches' forecast accuracy is still below a reasonable level. Due to its high nonlinearity, flexibility, and data-driven learning in model development without any prior information about catchment behavior and flow processes, artificial neural network algorithms offer an appealing inductive technique in rainfall prediction.

The network for predicting rainfall in this study is a multi-layer perceptron (MLP). Because to its aptitude for resolving challenging non-linear issues, MLP is chosen. The learning process makes advantage of backpropagation. Feed forward, determining the error, and feed backward are the three processes that make up the backpropagation technique. Three layers make up the neural networks model: input, one hidden, and output. The first network model has n input nodes (x1, x2,..., xn), each of which represents the rainfall rate from n prior years for the same months as the one being forecasted. For instance, the input for predicting the rainfall rate for December 2019 would include the data for the rainfall rate for December in the years 2018 to 2013, etc. The number of input nodes and hidden nodes are configured to be equal. The forecast of whether or not it will rain during the month is the output. The model's network is depicted in figure.

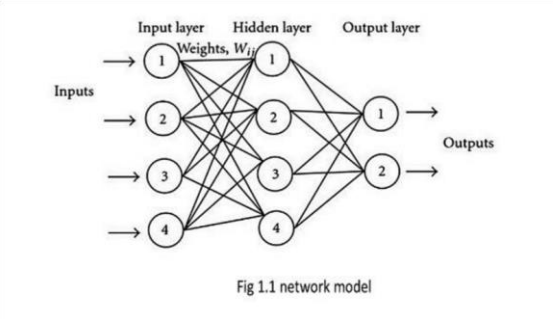

Fig 1.1 network model

we proposed the use of artificial neural networks to predict rainfall over a 25-year period has been thoroughly studied. The majority of the researchers tried diverse models to predict rainfall, according to the study, however the Keras model of artificial neural networks (ANN) produces meaningful findings. The model with accurate prediction and the lowest mean squared error is the ANN. Also, the survey reaches the conclusion that forecasting methods like SVC, SVR, and SVM are better suited to forecasting rainfall than statistical and numerical approaches. The copious references supplied in support of the various ANN research advancements should be of considerable use to ANN researchers in their efforts to reliably forecast future rainfall, despite certain limitations of those approaches having been discovered.

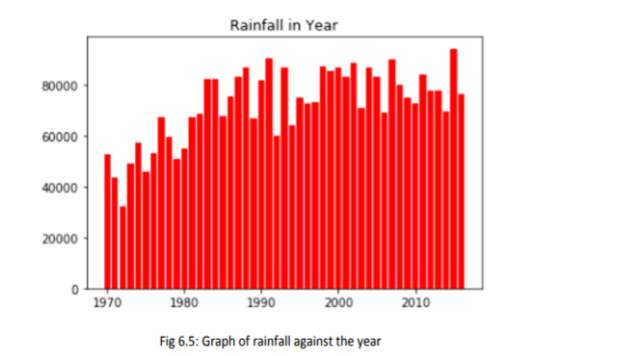

Fig 6.5: Graph of rainfall against the year

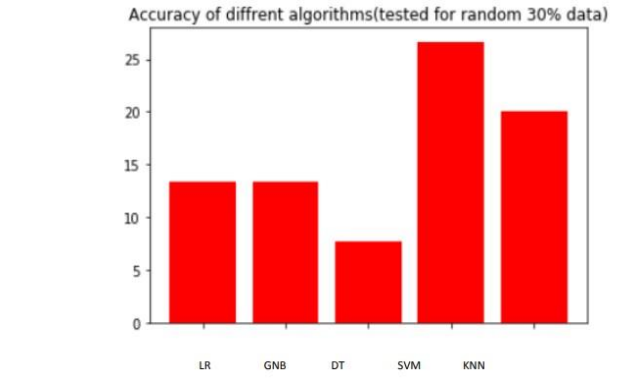

Fig 6.4: Graph of Accuracy of different algorithms.

SYSTEM ARCHITECTURE

The architecture diagram of the rainfall prediction model is depicted in figure 4.1. The similar architecture is utilised by ANN and SVM to forecast rainfall. The date for which the rainfall has to be anticipated is entered into the algorithm. Upon a successful input, the software is trained using rainfall data.

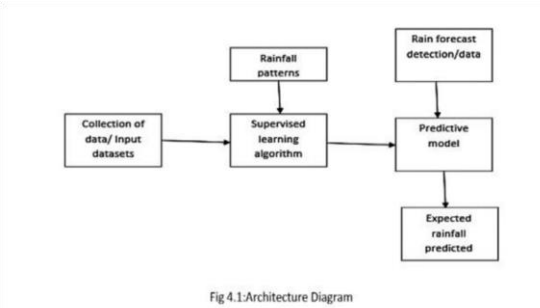

Fig 4.1:Architecture Diagram

FUTURE ENHANCEMENT

It would be difficult to forecast the amount of rainfall in a particular area. modifying the forecasting model to forecast weather conditions and even rainfall losses. adjusting to the shifting parameter values and adapting the oode to the shifting parameter values. To further lower the mean squared error, the ANN algorithm should be improved. The ability to anticipate rain is important both on a local and global level. The work is important because it makes a significant contribution to agriculture, water resource management, flood prediction, and management with the goal of easing people's lives by keeping them informed about weather and rainfall forecasts. The study will be important for flood management officials as well since it will provide them a more exact and accurate forecast for strong monsoon rains, which will keep them attentive and focused for an impending catastrophe whose devastation might be reduced by adopting preventative steps. Water is a limited resource that must be conserved for the benefit of humans as it is a rare resource. The rainfall prediction will significantly aid in addressing this growing problem. Also, it will assist people in managing and scheduling their social activities appropriately.

CONCLUSION

The general goal is to describe several machine learning (ML) algorithms that may be used to forecast rainfall. A thorough analysis of rainfall forecasts made over a 25-year period utilising artificial neural network architecture has also been conducted. According to the survey, the majority of researchers tried various models to predict rainfall, but the Keras model of artificial neural networks produces meaningful findings. The model with the lowest mean squared error and the most precise prediction is the ANN. The study also draws the conclusion that forecasting methods like SVC, SVR, and SVM are more suited to forecasting rainfall than other approaches like statistical and numerical methods. Yet, several of those techniques have been proven to have limitations. In order to effectively forecast future rainfall, ANN researchers should find the copious references offered to support the various advances of ANN research to be of great use.

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