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A Prognostic Rainfall using Machine Learning Technique

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Abstract: Substantial rainfall prediction is a significant issue for meteorological department as it is firmly connected with the economy and life of human. It is a reason for cataclysmic events like flood and drought which are experienced by people across the globe consistently. Exactness of rainfall forecasting has great importance for countries like India whose economy is largely dependent on agriculture. The proposed framework utilizes Machine Learning strategy which encourages us to predict the rainfall in an efficient way by using naïve bayes technique.

Keywords: Supervised Learning Technique, Naïve Bayes, Rainfall Prediction, Machine Learning

I. INTRODUCTION

India's prime occupation is agriculture and its economy depends upon the agriculture of the nation. Be that as it may dramatically effect on agriculture. Henceforth, early prediction of rainfall is important for the better growth of the economy. Early expectation of rainfall has been one of the most challenging tasks in the world from past years. India is a country that consists of more than a billion people and more than 60% of this population are reliant upon agriculture for a living.

Rainfall prediction is helpful to avoid flood which save lives and properties of humans. Besides, it helps in overseeing of water. Data of rainfall in earlier stages helps farmers to manage their crops better which result in growth of country's economy. Fluctuation in rainfall timing and its quantity makes rainfall prediction a challenging task for meteorological scientists. The special factor of rainfall prediction, which is necessary for all the people. Rainfall prediction plays an important role in preventing causalities caused due to natural disasters. It also helps us to maintain our water assests properly.

Rainfall prediction is an important practical problem in meteorology research. However, a reliable forecast is difficult to achieve due to the complexity of the climate system and the huge set of available climatic data at nearby sites. Thus, in most existing precipitation prediction systems or methods,

inevitable partial (selective) consideration of the types of climatic data has often led to less satisfactory prediction results. The occurrence of rainfall is an outcome of various natural factors such as temperature, humidity, cloudiness, wind speed, etc. Rainfall prediction is a major concern for meteorological department as it is closely associated with the economy and sustenance of human life. India is a country where agriculture and agriculture related industries are the major source of living for the people; agriculture is a major source of economy of the country. India is also one of the country which suffer from major natural calamities like drought or flood which damages the crop. This leads to huge financial loss for the farmers thus leading to the suicide. The Current technology "Machine Learning" used for rainfall rate prediction, system is useful for the society as it's a real time application for rainfall prediction, this helps farmers to make right decision in right time, and it helps farmers to get high profits.

II. RELATED WORK

The proposed framework uses Machine Learning technique which helps us to predict the rainfall in an efficient way by using naïve bayes technique. Proposed system is an agriculture application which analyses the previous data related to temperature, region, area and year. Proposed system makes use of machine learning in agriculture for decision making.

The research is conducted taking under consideration the various constraints such as temperature, humidity, region, area and other constraints. System uses "supervised learning" technique, Supervised learning is the machine learning task of learning a function that maps an input to an output based on example input-output pairs. It infers a function from labelled training data consisting of a set of training examples.

Naive Bayes Algorithm for rainfall prediction because It is easy and fast to predict the class of the test data set. It also performs well in multi-class prediction. When assumption of independence holds, a Naive Bayes classifier performs better compare to other models like logistic regression and you need less training data. Naïve Bayes performs well in cases of categorical input variables compared to numerical variables. It is useful for making predictions and forecasting data based on historical results. Data collected from government sector (agriculture department) can be used to predict rainfall.

III. METHODOLOGY

- 1) *Selection of Agriculture Field*: Consider any agriculture field for the rainfall prediction.
- 2) *Selection of region/year*: consider any year/region of choice which will be sown in that field.
- 3) *Input Data*: Data may include information regarding temperature, area, year, region etc which is collected over some period of time.
- 4) *Pre-processing*: Data which is collected should be pre-processed redundant data, inconsistent should be taken care.
- 5) *Attribute Selection*: Important Features have to be extracted.
- 6) *Classification Algorithm*: An appropriate and efficient algorithm should be employed.
- 7) *Result*: prediction or recommendation can be provided to the farmers based on the results obtained.

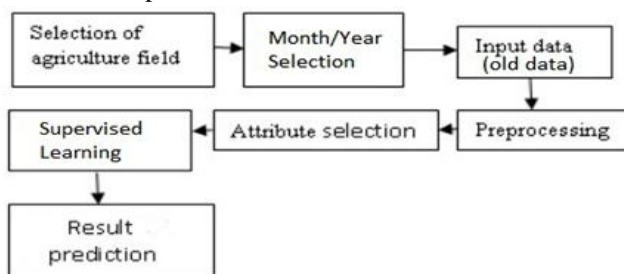


Fig 1: Methodology of rainfall prediction

A. Naive Bayes Algorithm

- 1) We have many algorithms to build model in supervised learning such as KNN, Naive bayes, Decision Tree, ID3, Random Forest, SVM, Regression techniques.
- 2) Depending of the requirement, labels, parameters and data-set we select the appropriate algorithm for predictions.
- 3) Algorithm is used to build a model that makes predictions based on evidence in the presence of uncertainty.
- 4) From the survey for prediction we make use to “naive bayes algorithm” which is an efficient and works fine for all different sets of parameters. It also generates accurate results.
- 5) It is a term in Bayesian statistics dealing with a simple probabilistic classifier based on applying Bayes theorem with strong (naive) independence assumptions.
- 6) A Naive Bayes classifier assumes that the presence of particular feature of a class is unrelated to the presence of any feature.
- 7) Depending on the exact nature of the probabilistic classifier, Naive bayes classifiers can be trained very efficiently in a supervised learning technique.
- 8) It is a theorem that works on conditional probability. Conditional probability is the probability that something will happen, given that something else has already occurred. The conditional probability can give us the probability of an event using its prior knowledge.

$$P(H/E) = \frac{P(E/H) * P(H)}{P(E)}$$

Where,

P(H): The probability of hypothesis H being true. This is known as prior probability.

P(E): The probability of the evidence.

P(E/H): The probability of the evidence given that hypothesis is true.

P(H/E): The probability of the hypothesis given that the evidence is true.

IV. CONCLUSIONS

Agriculture is one of the most important occupation practiced in our country.. It is the broadest economic sector and plays an important role in overall development of the country. Nowadays farmers facing lots of problems and they don't know the proper information regarding crops to grow and to cultivate. In agriculture field, farmer has to know about the suitable crops for cultivation. Growing crops are completely based on the rainfall and also type of the soil and its features, location, whether etc. Now a day analyzing soil and its features are entirely manual which requires more time. This leads to develop automation for rainfall prediction. Machine learning techniques applied to get good results.

The system is developed and tested successfully and satisfies all the requirement of the client.

The goals that have been achieved by the developed system are:

- A. Simplified and will reduce the manual work.
- B. Large volumes of the data can be stored.
- C. It provides smooth work flow.

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