Chapter 1: Introduction

* 1. Introduction of Project: -

In developing countries like India, majority of population is engaged in agriculture. Due to poor irrigation facilities, they depend on rainfall for their agricultural activities. Rainfall has a significant effect on their produce. Effective rainfall prediction can help farmers plan their agricultural activities in advance and avoid losses that are incurred due to erratic rainfall.

Long term monthly rainfall prediction is a challenging task in this era of highly uncertain climate. As we know, climate and amount of rainfall received at a given location are highly non-linear phenomena that depend on many different factors.

Rainfall is of the most complex elements of climate to understand and model due to the complexity of atmospheric process that generate it as well as the large range of variation over a wide scale in both space and time

1.2 Problem Statement: -

To predict whether or not it rains tomorrow in using today’s information given in the form of values for attributes of Weather Prediction Dataset. This is a supervised Learning problem, where we need to make predictions on whether or not it rains tomorrow.

* 1. Objectives:-

Rain Prediction is a binary classification problem where it needs to be analyzed whether or not it rains tomorrow, based on several features of the Dataset. The objective of study is to implement rainfall prediction with machine learning techniques such as support vector machine or linear regression. Accuracy of rainfall forecasting has great importance for countries like India whose economy is largely dependent on agriculture. Due to dynamic nature of atmosphere, Statistical techniques fail to provide good accuracy for rainfall forecasting.

Chapter 2: Literature Survey

2.1 Existing Systems: -

Rainfall prediction model based on several architectures have been proposed to predict rainfall in India. The learning algorithm tries to find out the optimal set of weights for the neural connections of the ANN. It has been revealed that the standard algorithms may be unable to approximate the exact pattern of the data if it is reasonably complex

2.2Proposed System: -



* Converting data in to the correct format to conduct experiments.
* Make a good analysis of data and observe variation in the patterns of rainfall.
* Finally, We apply various statistical and machine learning approaches in prediction and make analysis over various approaches.
* Logistic Regression model predict rainfall based on rainfall by given dataset.

Chapter 3: Requirement Specification

3.1 Functional Requirements

* Introduction:- Rain prediction is done based on . Our Project will help to predict the whether or not it rains tomorrow using existing dataset through Machine Learning.
* Inputs: -In our project we are using Benchmark Reed Cannaberra city data set as input.
* Processing:- When it comes to Linear Regression model, the rainfall dataset is used as the input where the pre-processing stage happens. The feature is extracted by making use of the Linear Regression Model. In the second step, we will be applying various machine learning algorithms. These algorithms analyze the large datasets and mechanism which show the intrusion in the given Reed cannaberra dataset with different accuracies.

3.2 Non-Functional Requirements: -



Chapter 4: Design

4.1 Architectural Design:-



**4.2 Use case Diagram:-**



4.3 Dataflow Diagram:-



Chapter 5: Implementation

* Algorithms used for Implementation :

1) Logistic Regression:- Logistic Regression is used to solve the classification problems. It is a classification problem where your target element is categorical. In Logistic regression the output required is represented in discrete values like binary 0 and 1. It estimates relationship between adependent target and one or more independent predictors where dependent variable is categorical/ nominal

2) Decision Tree:- This is one of the popular learning techniques in machine learning is the benchmark learning algorithm in decision tree which is often compared with the new algorithms that are being developed. Here learning algorithm is used which is an advanced version of traditional decision tree learning algorithms. The nodes along with the edges are the series of conditions and the leaves are the class labels.

H(X)=EX[I(x)= -∑xX p(x)log p(x)

3) Naive Bayes Classifier:- Naive Bayes is a popular classification technique which classifies examples based on the probability of chances that are likely to be occurred. It often performs very well for complex data set which are very hard to learn using the traditional learning algorithms.

P(H|E) = P(E|H)\*P(H)

P(E)

Where

* P(H) is the probability of hypothesis H being true. This is known as the prior probability.
* P(E) is the the probability of the evidence (Regardless of hypothesis).
* P(E|H) is the the probability of the evidence given that hypothesis is true.
* P(H|E) is the probability of the hypothesis given that evidence is there.

5.2 Result Analysis:-

|  |  |
| --- | --- |
| Algorithms | Accuracy |
| 1. Logistic Regression | 96% |
| 2. SVC | 83% |
| 3. KNeighbors Classifier | 93% |
| 4. Random Forest | 100% |

5.3 Conclusion and Future work:

Conclusion:

* This model is supervised rainfall learning model which used machine learning algorithms to classify rainfall data. We used different machine learning algorithm to check the accuracy of rainfall prediction. We have compared Logistic Regression, SVM, Random Forest.

Future work:

* A reasonable long-term annual precipitation prediction has important significance in the flood control.
* As future work, we plan to improve our architecture for light rain scenarios. It should be highlighted that the focus of our study was precisely the oppo-site, heavy rain scenarios, as they are the scenarios that may lead to negative consequences (e.g., landslides).

**Chapter 6: References**

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