RAINFALL PREDICTION USING DEEP LEARNING TECHNIQUE

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Abstract - *Rainfall statement is extremely necessary as a result of serious and irregular downfall will have several impacts like the destruction of crops and farms, injury of the property thus higher a far better a much better a higher a stronger a more robust and improved statement model is crucial for Associate in Nursing early warning that may minimize risks to life and property and additionally managing the agricultural farms in better means This prediction mainly helps farmers and also water resources can be utilized efficiently. Rainfall statement is extremely necessary as a result of serious and irregular downfall will have several impacts like the destruction of crops and farms, injury of the property thus higher a far better a stronger a more robust and improved statement model is crucial for Associate in Nursing early warning that may minimize risks to life and property and additionally managing the agricultural farms in better means. The prediction of precipitation using machine learning techniques may use a Genetic algorithm, Random forest, Support Vector Machine, Naives Bayes algorithm, and deep learning algorithm named as a Neural network algorithm. The intention of this project is to supply non-experts with quick access to the techniques, approaches used within the sector of precipitation prediction and supply a comparative study among the assorted machine and deep learning techniques. The results provided by the MLP classifier are the most accurate and provide better results in this field.*

***Key Words*: Rainfall, Genetic algorithm, Support vector, MLP classifier, Forests**

1. INTRODUCTION

Associate knowledge base subfield of technology. The goal of the info mining method is to extract information from a knowledge set and remodel it into a visible structure for additional use. Data mining data method is that the analysis step of the "knowledge discovery in databases" process, or KDD. Data mining data methods the analysis step of the "Knowledge Discovery in Databases" process, or KDD, a field at the intersection of technology and statistics, is that the method that makes an attempt to find patterns in giant knowledge sets.

The actual data processing task is that the semi-automatic or automatic analysis of enormous quantities of information to extract antecedent unknown, fascinating patterns like teams of information records (cluster analysis), uncommon records (anomaly detection), and dependencies (association rule mining, successive pattern mining). This sometimes involves

mistreatment of information techniques like spatial indices. These patterns will then be seen as a form of an outline of the computer file and will be employed in additional analysis or, as an example, in machine learning and prophetical analytics.

1.1. FOUNDATION OF DATA MINING

Data Mining is that the method of movement queries to giant amounts of knowledge sources and extracting patterns and trends victimization applied mathematics and machine learning techniques. It integrates varied technologies as well as management, statistics and machine learning. Data processing has applications in various disciplines as well as medical, financial, defense and intelligence. Data processing tasks embrace classification, clustering, creating associations and anomaly detection. The method of creating by removal through information to get hidden connections and predict future trends includes a long history. Typically stated as "knowledge discovery in databases," the term "data mining" wasn't coined till the Nineteen Nineties. However its foundation contains 3 tangled scientific disciplines: statistics (the numeric study of knowledge relationships), AI (human-like intelligence displayed by code and/or machines) and machine learning (algorithms which will learn from information to form predictions). Varied data processing techniques are developed. These embrace techniques for extracting associations, neural networks, inductive logic programming, call trees, mathematical logic and rough sets.

1.2 ARCHITECTURE OF DATA MINING

The major components of any data mining system are data source, data warehouse server, data mining engine, pattern evaluation module, graphical user interface and knowledge base.
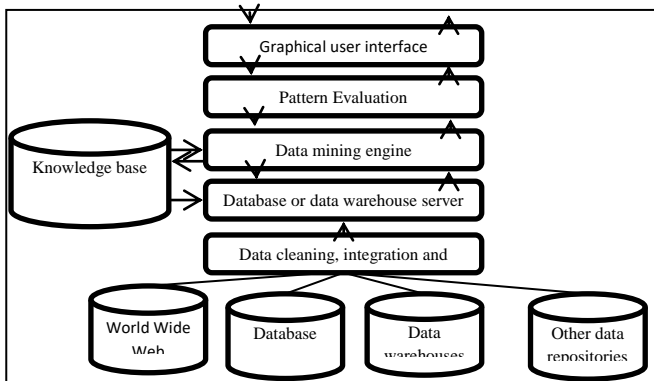
Figure 1.1: Architecture of Data Mining

a) Data Sources

Database, information warehouse, World Wide net (WWW), text files, and different documents area unit the particular sources of information. You would like giant volumes of historical information for data processing to achieve success. Organizations sometimes store information in information bases or data warehouses. Information warehouses could contain one or a lot of databases, text files, spreadsheets, or other forms of knowledge repositories. World Wide net or the web is another massive supply of information. The information must be cleansed, integrated, and designated before passing it to the info or information warehouse server.

b) Database or Data Warehouse Server

The information or information warehouse server contains the particular information that's able to be processed. Hence, the server is accountable for retrieving the relevant information supporting the info mining request of the user.

c) Data Mining Engine

The data processing engine is that the core part of any data mining system. It consists of variety of modules for playing data processing tasks as well as association, classification, characterization, clustering, prediction, time-series analysis etc.

d) Pattern Evaluation Modules

The pattern analysis module is principally chargeable for the life of interest of the pattern by employing a threshold worth. It interacts with the information mining engine to focus the search towards attention-grabbing patterns.

e) Graphical User Interface

The graphical user interface module communicates between the user and the data mining system. This module helps the user use the system easily and efficiently without knowing the real complexity behind the process. When the user specifies a query or a task, this module interacts with the data mining system and displays the result in an easily understandable manner.

f) Knowledge Base

The cognitive content is useful within the whole data processing process. It would be helpful for guiding the search or evaluating the powerfulness of the result patterns. The cognitive content would possibly even contain user beliefs and knowledge from user experiences which will be helpful within the method of knowledge mining. The info mining engine would possibly get inputs from the cognitive content to form the result additional correct and reliable. The pattern analysis module interacts with the cognitive content on a daily basis to urge inputs and additionally to update it.

1.2 OBJECTIVES

Rainfall brings the foremost necessary role within the matter of human life all told types of weather happenings. The result of precipitation on human civilization is incredibly stupendous. Precipitation may be a natural climatic development whose prediction is difficult and stringent. Correct data on precipitation is important for the look and management of water resources and conjointly crucial for reservoir operation and flooding interference. In addition, precipitation contains a sturdy influence on traffic, sewer systems, and different human activities in urban areas. Thus, correct precipitation prediction is one of the best challenges in operational geophysics, despite several advances in meteorology in recent decades.

2. WORKING

2.1 SYSTEM REQUIREMENT SPECIFICATION

a. HARDWARE REQUIREMENTS

- Processor   : Dual core processor 2.6.0 GHZ
- RAM   : 1GB
- Hard disk   : 160 GB
- Compact Disk   : 650 Mb
- Keyboard   : Standard keyboard
- Monitor   : 15 inch color monitor

b. SOFTWARE REQUIREMENTS

- Front End   : MATLAB
- Operating System: Windows OS
- System type   : 32-bit or 64-bit Operating System
- DLL   :Depends upon the title

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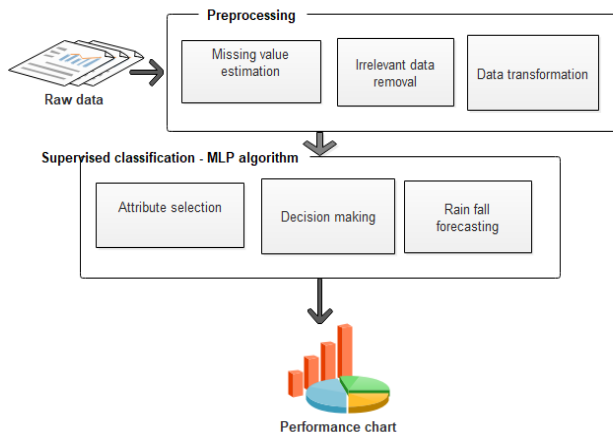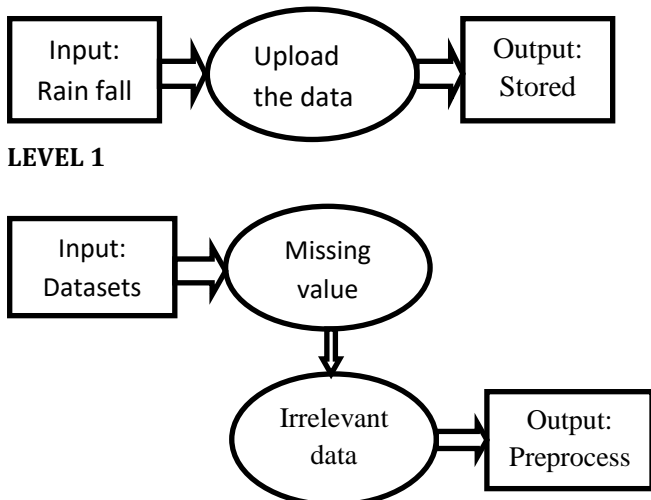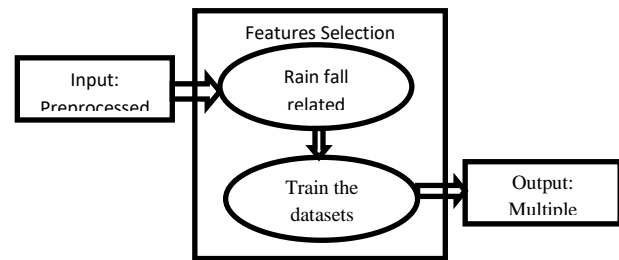

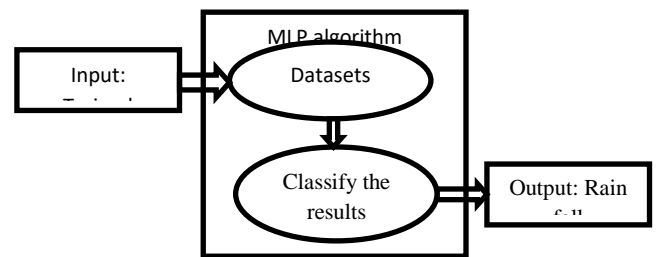**Figure 2.1 Rainfall Prediction Systems**

2.2 DATA FLOW DIAGRAM

A two-dimensional diagram explains, however, information is processed and transferred during a system. The graphical depiction identifies every supply of information of knowledge of information and the way it interacts with alternative data sources to achieve a typical output. people seeking to draft an information flow chart should establish external inputs and outputs, confirm however the inputs and outputs relate to every alternative, and justify with graphics however these connections relate and what they lead to. this sort of diagram helps business development and style groups visualize however information is processed and establish or improve sure aspects..

LEVEL 1

LEVEL 2

LEVEL 3

3. SYSTEM IMPLEMENTATION

3.1 DATASETS UPLOAD

Rainfall prediction is extremely necessary as a result of serious and irregular downfall will have several impacts like the destruction of crops and farms, harm of property thus higher a far better robust an improved prediction model is crucial for associate early warning which will minimize risks to life and property and additionally managing the agricultural farms in a better approach. This prediction chiefly helps farmers and additionally, water resources will be utilized expeditiously. Downfall prediction may be a difficult task and also the results ought to be correct. There square measure several hardware devices for predicting downfall by victimization the weather like temperature, humidity, pressure. These ancient strategies cannot add an associated economical approach thus by victimization deep learning techniques we will manufacture correct results. a knowledge set (or dataset, though this writing system isn't a gift in several up-to-date dictionaries like Merriam-Webster) may be an assortment of knowledge. during this module, we will transfer the science datasets relevant to rain fall parameters

3.2 PERFORMANCE EVALUATION

Accuracy (ACC) is found because the fraction of a complete range of good predictions to the whole range of check knowledge. It may also be depicted as one – ERR. The best attainable accuracy is one.0, whereas the terribly worst is zero.0

$$ACC = \frac{TP+TN}{TP+TN+FN+FP} \times 100$$

TABLE NO: 3.1

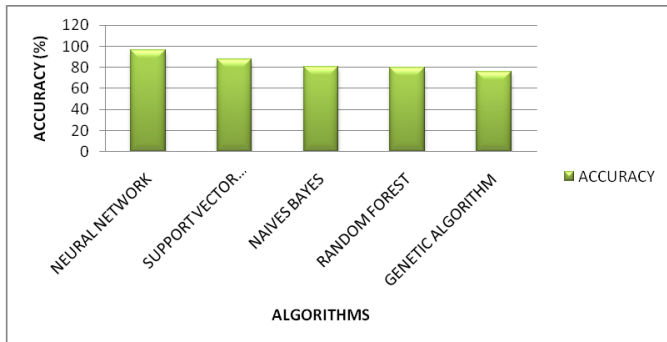| ALGORITHM	ACCURACY
NEURAL NETWORK	96.44
SUPPORT VECTOR MACHINE	87.35
NAIVES BAYES	80.45
RANDOM FOREST	79.38
GENETIC ALGORITHM	75.9

Figure 3.1 Algorithms Performance Evaluation

From the above graph, proposed neural network algorithm provide improved accuracy rate (96.44) than the existing machine learning algorithms.

4. CONCLUSION

Rainfall prediction is helpful to avoid floods which save lives and the properties of humans. Information of rainfall in prior helps farmers to manage their crops better which results in the growth of the country's economy. Fluctuation in rainfall timing and its quantity makes rainfall prediction a challenging task for meteorological scientists. In all the services provided by the meteorological department, Weather forecasting stands out on top for all the countries across the globe. The task is very complex as it requires a number of specialized and also all calls are made without any certainty. The estimation of rainfall is of great importance in terms of water resources management, human life, and the environment. It can be met with incorrect or incomplete estimation problems because rainfall estimation is affected by geographical and regional changes and properties. This project presented a review of different machine learning and deep learning methods used for rainfall prediction and problems one might encounter while applying different approaches for rainfall forecasting. Due to nonlinear relationships in rainfall data and the ability to learn from the past makes Artificial Neural networks are preferable approaches from all machine learning algorithms such as Support Vector Machine, Naives Bayes algorithm, Genetic and Random forest algorithms. Experimental results showed that the neural network algorithm provided improved accuracy than the state-of-art methods

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