RAINFALL PREDICTION USING TIME SERIES ANALYSIS

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***Abstract* — we are creating a rainfall prediction application by using time series analysis this will predict the rainfall by using the data of previous years and predict the rainfall of the current year in time series analysis it uses the ARIMA algorithm for predicting and forecasting**

Keywords- Autoregressive integrated moving average(ARIMA)

I. INTRODUCTION & OBJECTIVE OF THE PROJECT

In India there is a large number of people who earns money by doing farming and brings the greatest crops available to us, for this they work very hard because farming is not the easy thing, this is done for very long period of time because there is many crops which takes so much time to grow and if they will not be properly cared the all the work of farmers will vanish on a single moment. As many crops requires care and time they need proper amount of water also for their nourishment in this the role of rainfall is major in all aspects of farming, without rainfall the farmers will not be able to do farming they will not be able to produce crops or any other thing without rainfall. This project will help to predict the proper amount of rainfall will take place in any region by analyzing the date over a period of time by using time series analysis, it allows one to see what factors that influence certain variables from one time period to another time period. This methods uses various algorithms in which ARIMA (Autoregressive integrated moving average) is best for forecasting and predicting, this will very helpful for farmers who does farming, this will provide the amount of rainfall takes place in the particular region where farming will takes place .

II. LITERATURE REVIEW

Over view

This topic is going to contribute in different fields that have huge impact in farmer's daily life. With this advancement we can predict the rainfall. This will acts as important thing because it will give the early notification about the rainfall that will minimize the risk of crops destruction in farming.

Being able to predict rainfall can, be very useful by this farmers can know about amount of rainfall, and by this they can know when to plant and harvest their crops. In India the amount of rainfall is 925 mm during monsoon season that is from June 1 to September 30. Thus 6.49 percent more rainfall was recorded this season. This process will take this data as a set and it will analyze it and after that this will predict the amount of rainfall occur in next monsoon which will going to help farmers in farmig.

III. FEATURE EXTRACTION

Here are some feature extraction for the research paper firstly you have to save the content in a separate file after writing it before starting the paper, complete all the organizational editing as well as all the content before formatting it, always keep graphic files and text separate till the text has been formatted and styled.

A. Acronyms and Abbreviations

ML	Machine learning
DFD	Data Flow Diagram
ARIMA	AUTOREGRESSIVE INTEGRATED MOVING AVERAGE

A. List of Symbols

Token	Name
()	Parentheses
[]	Square brackets

,	Comma
‘	Inverted comma
:	colon
-	Hyphen
/	slash

B. Algorith used

ARIMA

ARIMA stands for Autoregressive integrated moving average it is general class models which is used for forecasting time series data. These ARIMA models have their own denotation which is ARIMA(a,d,s) in this form the a,d and s stands for autoregressive, degree of differencing and moving average order respectively. In this models for conversion of non-stationary series into stationary uses differencing process and after the conversion process it predicts the future value from previous details or historic features or specifics. They uses “auto” tie-up relations and moving average over leftover errors in the specifics facts or data to foretell future results.

1. Autoregressive – AR(a)

$$\hat{y}_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \ldots + \phi_p y_{t-p} + \epsilon_t$$

2. Integrated – I(d)

$By_t = y_{t-1}$ where B is called a backshift operator

Thus, a first order difference is written as

$$y'_t = y_t - y_{t-1} = (1 - B)y_t$$

In general, a *d* th-order difference can be written as

$$y'_t = (1 - B)^d y_t$$

3. Moving average – MA(s)

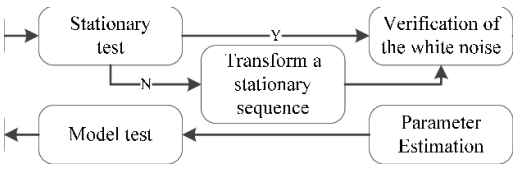
$$\hat{y}_t = c + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \ldots + \theta_q \epsilon_{t-q}$$

4. Final Formula

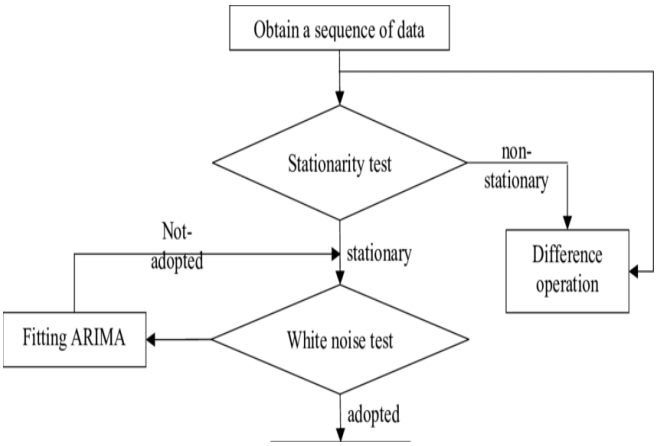
$$\hat{y}'_t = c + \phi_1 y'_{t-1} + \phi_2 y'_{t-2} + \ldots + \phi_p y'_{t-p} + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \ldots + \theta_q \epsilon_{t-q} +$$

C. Data flwo Digram

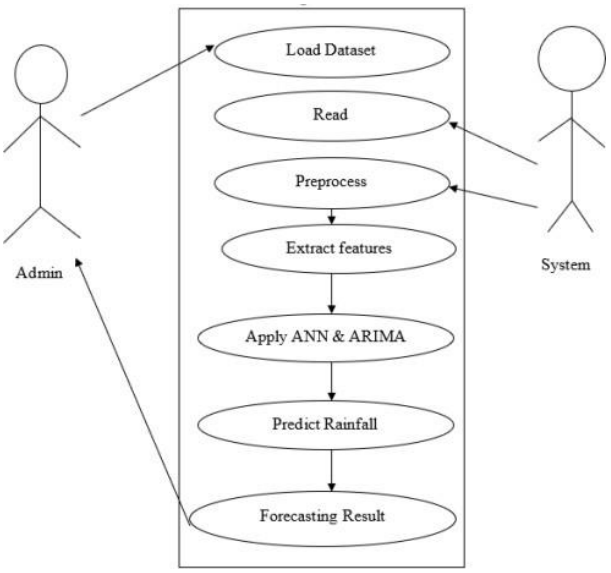
- the data flow diagram is the access of a data flow model. It contains one and only one process and does not show any data stored. This diagram is also called a context diagram. As in the figure below, the context diagram is supposed to be an abstract view, with the mechanism represented as a single process.



- The DFD level 2 is the highest abstraction level and it can be used to plan or record the specific/ necessary detail about the system’s functioning. The presented level gives user precise destination of the data that flows in the system along with showing user the detailed processes of system.



IV. USE CASE DIAGRAM



A. Authors and Affiliations

this paper is been authored by Ayush Kumar Sahu , Lokesh Niamalkar and Shikhar Bargah under the guidance of Mr. Manoj Kumar Singh in Affiliation with SSIPMT Raipur.

B. The Trigate Audience

Target audience are farmers who do farming and cannot bale to get proper information about rainfall on their area this will provide the proper information of the rainfall by predicting it.

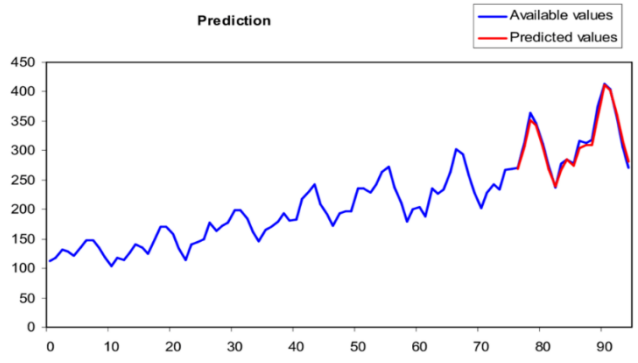
C. Conclusion

Rainfall prediction is very useful for farmer who do farming and some farmers do not have much facility of forecasting which will give the information about the rainfall this will provide the proper information to farmers about rainfall by predicting it with the help of ARIMA models which is generally used for forecasting and help to predict rainfall by using time series analysis this takes previous data as a set and by using that data it predicts the upcoming rainfall.

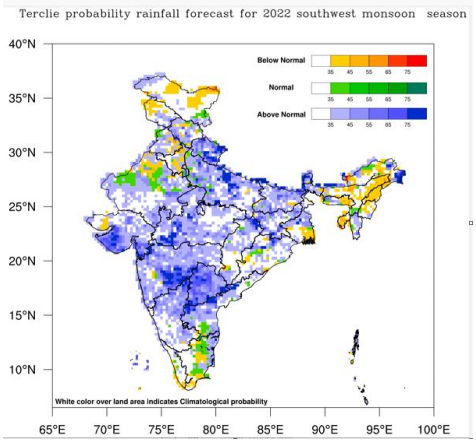
D. Images and tables

Below are the some images of prediction model and some related tables are provided after the below.

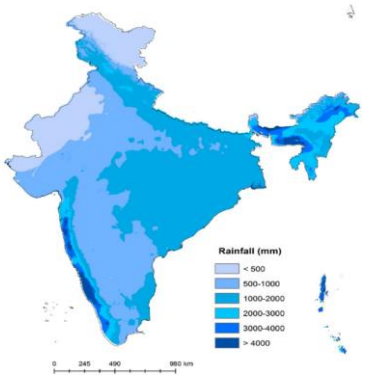
S.NO	Description
Fig(a)	time series prediction
Fig(b)	rainfall forecast 1
Fig(c)	rainfall forecast 2
Fig(d)	annual forecast



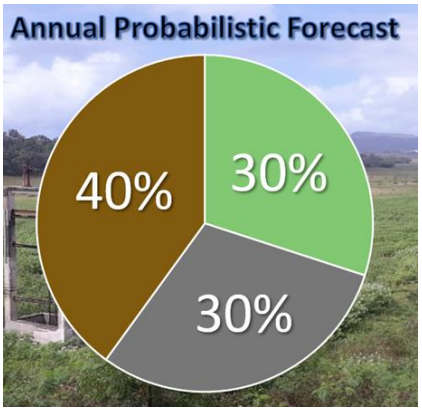
Fig(a)



Fig(b)



Fig(c)



Fig(d)

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