RAINFALL PREDICTION BASED ON ALMANAC USING ASSOCIATION RULES

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Abstract—Rainfall plays an important role almost in human activities in the nature. Rainfall prediction is the toughest issues around the world. Farmers in Tamil Nadu are still following the agronomic activities based on astrological facts of Panchangam (Almanac). Yet there is very few attempts to see the caution of the ancient knowledge system. Almanac has a mathematical base to predict the meteorological occurrences. During the study, predicting the rainfall by particular traditional Almanac or Panchangam is considered in attention for one cycle of 60 Tamil year’s corresponding to the Gregorian Year from 1957 to 2017. An effective way of extracting information from huge data repositories is an art. The extraction of similar patterns from a number of transactions is also an essential aspect of data mining. We have a lot of data mining techniques to extract information. In this work, we adopt “Apriori Algorithm”, which is the most fashionable algorithms mainly used for Association rule mining. In this work, we are trying to revise the existing Apriori algorithm is sufficient or not for finding the similar patterns in the almanac rainfall predictions.

Keywords—Rainfall Prediction, Almanac or Panchangam, Association rule, Apriori Algorithm

I. INTRODUCTION

Rainfall is important for setting up the activities of builders, agriculturists, water supply engineers and all activity plans in the nature. India is an agricultural country and its economy is mainly based upon crop productivity. Thus rainfall prediction becomes a significant factor in agricultural based countries like India. Rainfall Prediction is a very challenging task. Although there are many algorithms proposed for this, predicting the rainfall accurately is difficult. In an agricultural based country like India, the success or failure of the crops and water scarcity in any year is always viewed with greatest anxiety.

Astronomy is an area where Data Mining has an immense role. Numerous techniques of Data mining have been used to solve tasks in Astrology. There has been increasing research interest in use of data mining techniques to scrutinize in the Astrology area.

Data mining is the search and analysis of large data sets, in order to find out significant rules and patterns. The main idea is to find effective ways to combine the computer’s power to process data with the human eye’s ability to detect patterns [1]. Data mining techniques have been broadly applied almost in all fields to analysis the data for pattern the rules, classification, prediction, decision trees, fuzzy rules and so on. Right now the Meteorology Department is forecasting only short term information about weather but long term forecasting is needed for planning. Forecasting can be done by two ways, one is traditional forecasting and another is scientific weather forecasting. Traditional forecasting is based on observations and experience using animals, insects, combinations of plants, meteorological and astronomical indicators, and almanacs or panchangams over a period of time. Using mathematical models on past records of climate forecasting was succeeding for scientific weather forecasting.

II. EXISTING APPROACH

Sangari. R.S.[2] analyzed that Neural Network model for data mining process gave more accuracy in result than other algorithms in data mining empirical approaches. Mr. M. S. Chaudhari [3] observed that rainfall estimation and prediction varies from Multiple Linear Regression [MLR] to Supervised Learning In quest [SLIQ]. Neelam Chaplot [4] reviews various researches done for prediction, in medical, finance and weather forecasting field using artificial intelligence and machine learning. The methods used in these application spread from Logistic Regression, K-Nearest neighbor method, Case based reasoning, Hybrid models etc. most of the methods reviewed over are supervised learning concepts. They suggested these techniques to apply in astrology, Dhawal Hirani [5] reports a detailed survey on rainfall prediction using different rainfall prediction methods extensively survey lasted 20 years. From the survey it has been found that most of the researchers used artificial neural networks for rainfall prediction and got significant results. They conclude that MLP, BPN, RBFN, SOM & SUM are suitable for predict rainfall forecasting techniques. Shoba G [6] analysis of various algorithms of data mining is used rainfall prediction.
model. They found difficult to found suitable particular prediction algorithm. They found sometimes when certain algorithms are combined; they performed better and are more effective. M. Kannan [7] used Multiple Linear Regression Model for rainfall prediction [16]. They got approximate value not accurate value. Nikhil Sethi [8] observed that MLR method for prediction of rainfall achieve closer values between actual and predicted rainfall values due to that climate factors changes to different reasons influenced the rain. Pinky Saikia Dutta [9] uses data mining technique in Assam for monthly rainfall forecasting is Traditional Statistical technique – Multiple Linear Regression. They found 63% accuracy in variation of rainfall for their proposal model.

D Angchok [10] predicted rainfall by Tibetan astrological theories with meteorological predictions was accepted. They suggested as very few scientific studies have ever been conducted in ancient Astro-science and almost all databases have reported encouraging and positive outputs, there seems to have enormous scope lying in studying ancient sciences, especially Astro-disciplinary approaches. S Sivaprakasam [11] suggested the traditional methods of forecasting rainfall may be challenged with in accuracies but they can’t be disregarded altogether. Rahul Shajan [12] trying to study the existing association rule mining algorithm “ Apriori” is sufficient or not to find the similar patterns in the horoscope of different individuals. They found that apply some conditions in to the algorithm just before the generation of frequent item set and candidate item set, then it gives more association rules that help to analyse the horoscope of an individual. R. Raja [13] analysis 90 years (1909-1999) historical annual rainfall data of Coimbatore correlation with a particular Tamil year cycle with fourth coming Tamil cycle years. Pankaj S. Kulkarni [14] deals with converting ancient principles related to astrology into predictions using data mining techniques. Neelam Chaplot [15] taken total 102 records, an 50% records were of persons are doctor and other 50% records of are not doctor by Profession, They compared various Supervised classification techniques such as Logistic, Naive Bayes, Simple Cart, Decision Stump, Decision Table and DTNB algorithm. The better results were got by simple logistic with 12 fold cross validation with an accuracy of 54.902%. Decision Stump algorithm with 14 fold classification gave results with an accuracy of 50%.

Pratibha Mandave [17] explained an APRIORI algorithm of Association mining. Data mining association rule is used in almost in all real life applications. Lots of algorithms for mining association rules and their alteration (change/transformation) are plan on basis of APRIORI algorithm, but traditional algorithms are not efficient. Association rule is one of proficient technique of data mining for finding out frequent item set in transaction database. Improvement in the Classical APRIORI Algorithm helps to decreasing querying frequencies and storage spaces. It also significantly helps in increasing the efficiency and reduces I/O load.

Experimental research method has been adopted for this study. A record of 60 years (1957-2017) data from almanac has taken for analysis. Through the extensive search of literature and discussion with experts the item sets and the number of transactions has been finalized. From an almanac we have considered five influencing planets for rainfall as data item. King, Minister, Megathipathi, Megam (Cloud Type), Rainfall value (Marakkal) each of which has sub item sets, which as shown in Table I.

### Table I. Rainfall Influencing Attribute

<table>
<thead>
<tr>
<th>No.</th>
<th>Attribute</th>
<th>Description</th>
<th>Domain Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>King</td>
<td>Ruling Planet of the year</td>
<td>[Sun, Moon, Mars, Mercury, Jupiter, Venus, Saturn]</td>
</tr>
<tr>
<td>2</td>
<td>Minister</td>
<td>Minister Planet of the year</td>
<td>[Sun, Moon, Mars, Mercury, Jupiter, Venus, Saturn]</td>
</tr>
<tr>
<td>3</td>
<td>Megathipathi</td>
<td>Planet supporting rainfall for the year</td>
<td>[Sun, Moon, Mars, Mercury, Jupiter, Venus, Saturn]</td>
</tr>
<tr>
<td>4</td>
<td>Megam(Cloud Type)</td>
<td>Type/Formation of the Cloud</td>
<td>[Aavarta, Samvarta, Pushkara, Drona, Kaala, Neela, Varuna, Vayu, Dhamo]</td>
</tr>
<tr>
<td>5</td>
<td>Almanac Rainfall</td>
<td>Rainfall of the year as per Almanac</td>
<td>[Kuruni, Pathaku, Mukkuruni, Thosuni]</td>
</tr>
</tbody>
</table>

For this study the data mining technique Apriori algorithm has been used with R-Programming. The output has been analyzed to predict rainfall which as in the next section.

### IV. Result & Discussion

Fig. 1. Result in R-Programming
We got an output that shows (Fig. 1) the Absolute Minimum Support Count, Set transactions, Sorting and recording items, Minimum, 1st Quarter, Median, Mean, 3rd Quarter, Maximum Support, Confidence, Lift, Count and the best rules for the transactions are found. Here the minimum support = 0.1 and the minimum confidence = 0.9. We got 7 Association rules which have the minimum confidence.

There are different rules which show the connection among ruling planet, Megathipathi. Rainfall Value (Markkal). In these we got the plants which supports the rainfall are Venus, Jupiter, Moon and the planet which does not support the rainfall is Saturn. Only one rule is contradictory the ancient rule that which the planet Mars is not support the rainfall, but in rule is shows that it supports normal rainfall.

V. CONCLUSION

In this paper, Rainfall predicting attitudes and data sets are taken for cycle of 60 Tamil year’s related to the Gregorian Year from 1957 to 2017 from Almanac or Panchangam. For this data set Association rule mining technique Apriori Algorithm was applied using R-Programming. Association rules which have the minimum confidence is 0.9 are generated. We get more association rules that helps to analysis the rainfall prediction. 85.714% of association rules are supporting the ancient rainfall prediction rules. So, the existing Apriori algorithm is sufficient to find the similar patterns in the almanac rainfall predictions.

REFERENCES


[14] Mr. Pankaj S. Kulkami, Dr. S. S. Sane, Prof. N. L. Bhale “Use of Neural Networks in Horoscope prediction”, ResearchGate, Conference Paper March 2012

