International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 06 | June 2021 www.irjet.net p-ISSN: 2395-0072

Prediction Based Sugar Cane Farming in Western Maharashtra Using Data Mining

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Abstract: In India, Most of Indians have agriculture as their occupation. The present paper deals with the prediction based farming by using data mining method. This research focuses on evolution of a prediction model which may be used to predict sugar production. The proposed method use data mining technique to predict the sugar production based on the association rules and k-means clustering.

The main objective of this paper is to study on Sugar prediction and farmers issues related to their sugarcane crop. Farmers can register their crop through paper or they will particular go to in sugar industry to registration. In our model, farmers can register to the system at any time and provide accurate information to industry. Through this information our model predict the sugar production in that industry and also help to harvesting team to make cluster data.

Key Words: Sugarcane crop information, Prediction analysis, Profit margins, Market price, Association rules, K-means clustering algorithm.

1. INTRODUCTION

Agriculture is very important because it produces food and feed which is necessity to animals and human beings. It fulfill the basic need of billions of people. It is one of the major contributor to the country's GDP and economic growth. Hence, it is widely practiced in India.

India is the second largest producer of sugarcane crop and produces about 20% of the world's sugarcane. With new regulatory policies and amendments in the older ones, there is a greater chance for farmers and millers to increase their efforts toward cane sugar production and processing. The sugar industry supports an estimated 12% of the rural population in the nine states of the country namely, Punjab, Uttar Pradesh, Maharashtra, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, and Tamil Nadu.

Normally, farmers can guess the final yield by their experience of growing particular crop again and again. Farmers yield prediction accuracy is low and not cost effective. To meet the sugar requirements of the entire population of the country and for the export to other countries, it is important to practice modern methods of farming by using technology instead of practicing traditional farming methods. Modern methods allows the farmers to cultivate the crops in small area with minimum amount of water ,fertilizers and pesticides ,which finally produces good yield and profit to the farmers.

Our system is developed based on the data mining concepts to predict sugarcane yield. With the data obtained from industries, it is divided into sample and verification data sets. System is tested on verification data and the predicted values are compared to actual values. System takes current location of farm land, number of hectares of land and crop decided by farmer to grow as an input from the farmer in the web application which is an interface between farmer and the system. By the provided data and earlier trained data, the system is well understood to produce solution. Thus, algorithm analyzes the final values and predicts the yield per hectare and total values of cultivated crop based on the current market price.

2. PROBLEM STATEMENT

To Design, Develop and Implement the training model by using different inputs data. So system will able to learn the features and extract the sugarcane crop yield from the data by using data mining techniques.

3. OBJECTIVE

The proposed system aims at predicting or forecasting the crop yield by learning the past data of the farming land. Here we make use of different data mining techniques such as Association Rules, K-means clustering. Performance is evaluated based on predicted accuracy.

4. CHALLENGES

Some of the challenges faced during crop yield prediction are:

- Choosing appropriate dataset, after choosing dataset tuning of the parameters which makes project more efficient to get the desired results.
- Model must be trained by taking consideration of less computational efficiency and power.
- Increase of error rate due to dynamically changing the environment.

5. ARCHITECTURE

5.1 System Architecture

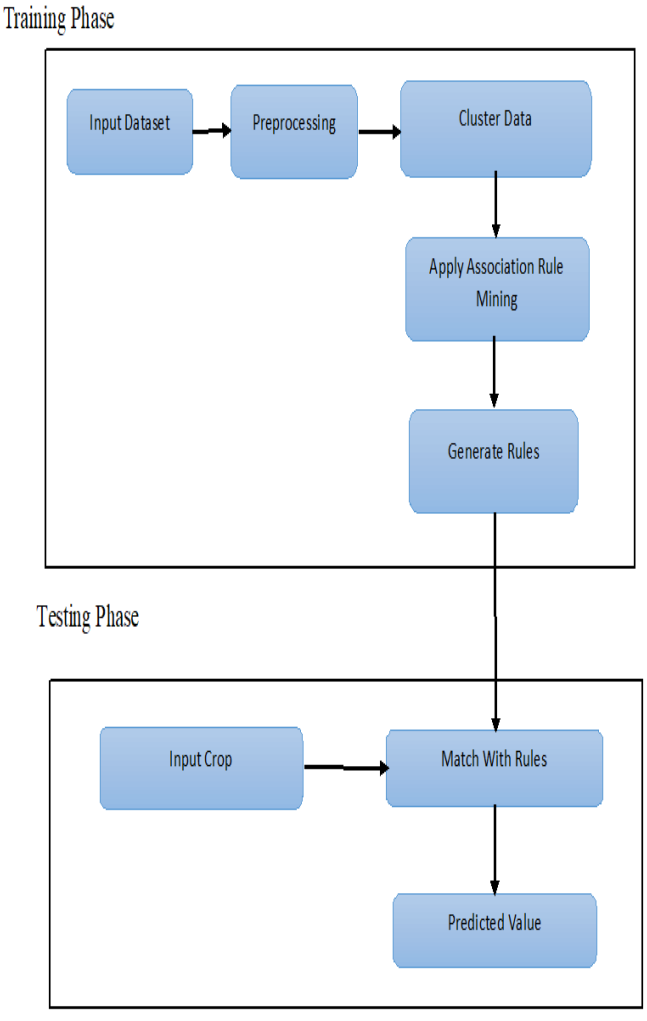

Diagram-1: Block Diagram of Proposed Work

5.2 Methodology

In our project includes following modules-

1. Farmer Module

In farmer module, farmer can register to the system. Through registration they can provide information to industry and also farmers enter to the system through username and password. After login they can see various options on the basis of information.

2. Admin Module

In this module, admin has the access to approval and disapproval which is controlled by the sugar industry. Staff admin can perform various operations like add, update, delete, etc.

3. Sugarcane Harvesting Module

In this module, the information of various harvesting tools are present like harvesting machine, tractors, teams etc. System add the various information related to harvesting tools and also view that information. Farmers crop information also viewed by this module and system make the cluster of same land location.

- **Data Clustering:** In clustering step, the preprocessed data was clustered using K-Means clustering algorithm.
- **Association Rule Mining:** Once the data has been collected and converted, association rule mining may begin. In this step, rules are created using frequent pattern mining. Association rules identify the relationships among a set of items or object in a database. The proposed method use data mining technique to predict the crop yield prediction based on the association rules.
- **Crop Yield Prediction:** Data Mining is widely applied to agricultural issues. Data mining is used to analyze large data sets and establish useful classifications and patterns in the data sets. The overall goal of the data mining is to extract the information from a data set and transform it into understandable structure for further use. This paper analyzes the crop yield production based on available data. The data mining technique was used to predict the crop yield for maximizing the crop productivity. Figure shows the flow of proposed crop yield prediction.

5.3 System working

1. The System takes input from user i.e. user location, sugarcane crop type, number of Hectares of land and also other information.
2. Based on the location and chosen crop, system takes previous years data from the repositories and analyzes the data and predicts the results.
3. The algorithm predicts the yield of crop and calculates the total weight of sugarcane crop in tons and generate sugar production in kilo.
4. Finally System produces the predicted output in the application.

6. IMPLEMENTATION

6.1 Experimental Setup

- Import the libraries.
- Import the data set.
- Get the basic information about the data set.
- And also need to purify the data set.
- Check for nulls in the data set.
- If any drop those rows.
- Check for any special characters in the columns.
- Just convert them in to nulls and drop those rows.
- Now need to select the features for the project.
- Taking all the column as input and sugarcane weight and sugar production as output
- Now need to split the data set into sample and verification data set.
- And finally using this trained model we can create an application to work.
- To take the inputs from the user and display the result.

6.2 Tools Used

Project Overview:

Front End: HTML, CSS, JavaScript

Back End: Java 1.8

Hardware Specification:

Processor: Intel CORE i3

RAM: 4GB

Hard Disk: 500 GB

Software Specification:

Software: Apache Tomcat 8.0.27.0

Operating System: Windows10

RESULTS

Fig -1: Home Page

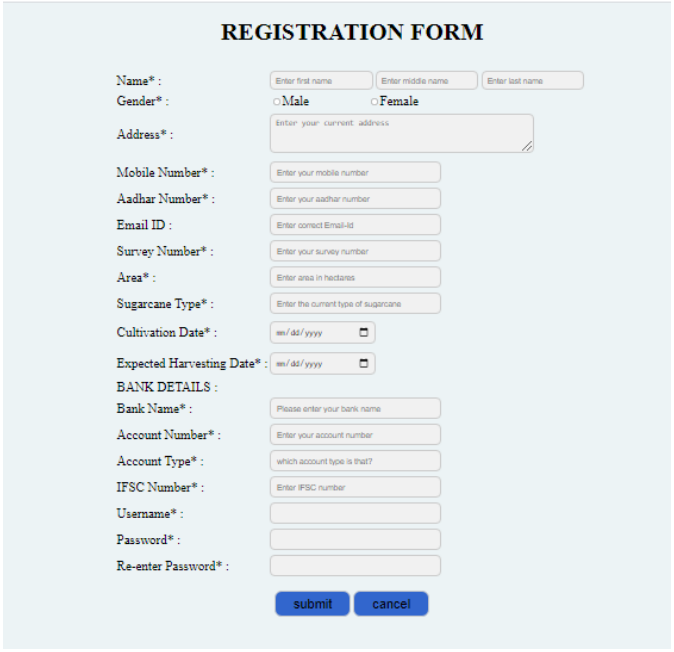

Fig -2: Registration

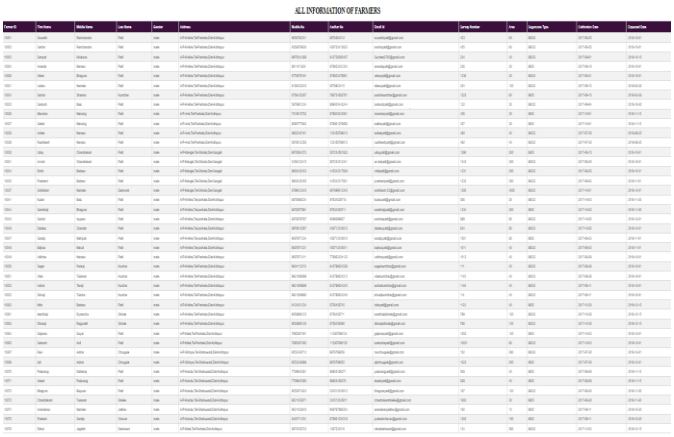

Fig -3: Input Dataset Information

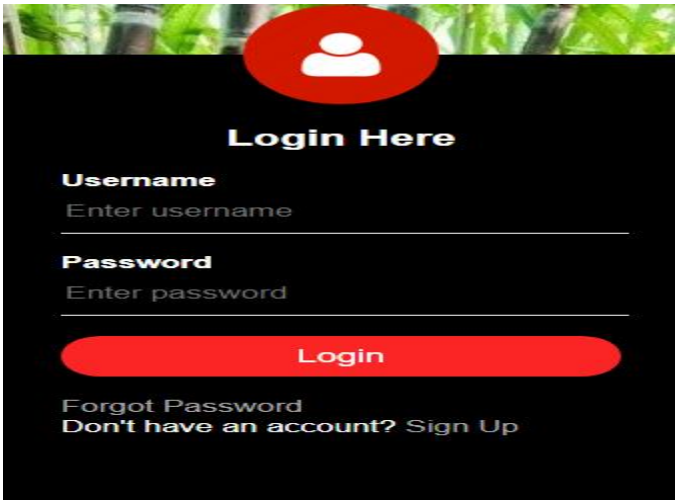

Fig -4: Login Page

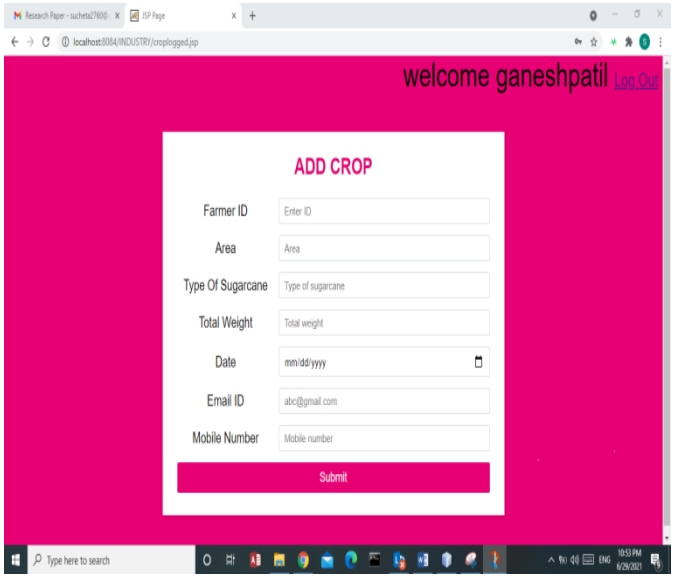

Fig -5: Add Harvested Crop

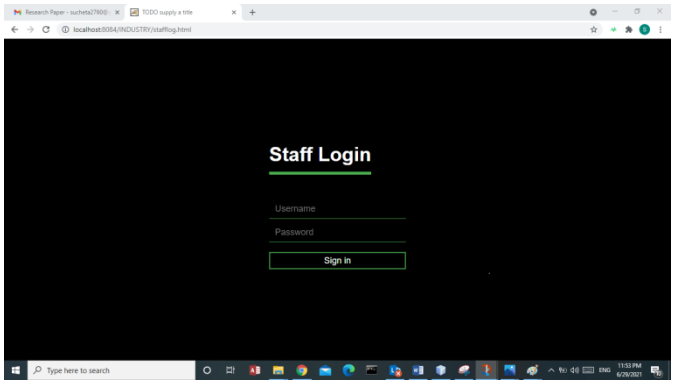

Fig -6: Admin/Staff Login

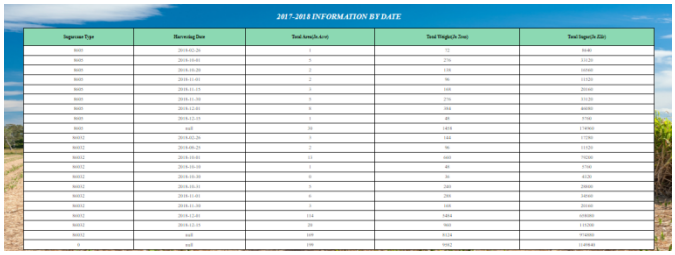

Fig -7: Date wise Clustered Information

Fig -8: Location Wise Clustered Information

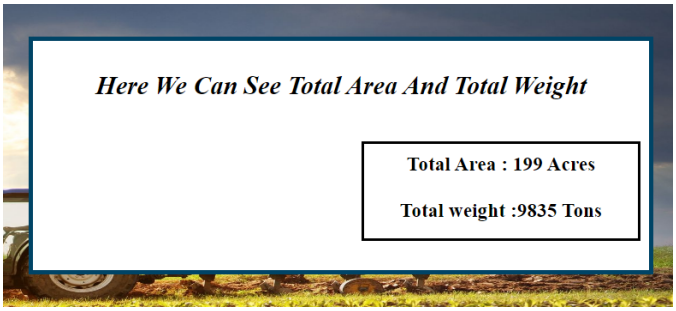

Fig -9: Actual Information

Fig -10: Predicted Information

7. CONCLUSIONS

Our system predicts the sugar production and total weight of sugarcane crop. Through this method we can predict all country sugar production and also it helpful for farmer and industry. Sugar industry can managed easily and farmers does not go in loss.

In future we add some extra features to our system like we list all the new and modern equipment used for cultivating the predicted best sugarcane crop.

ACKNOWLEDGEMENT

I mainly thanks to my guide **"Prof. M.M.Hajare"** who has provided the extensive guidance and expertise throughout the study. Thanks to all who helped we in complete this work.

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BIOGRAPHIES

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