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Improvement of Agriculture Yield Rate of Crops and Decision Making Using Machine Learning Techniques

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Abstract - India being an agricultural country, its economy mainly depends on agriculture yield growth and allied agro-industry products. In India agriculture is largely influenced by rain water which is highly unpredictable. Agriculture growth depends on diverse soil parameters like nitrogen, phosphorous, potassium, crop rotation, soil moisture, surface temperature. It also depends on whether aspects which include temperature, rainfall etc. Agriculture is one of the major fields in our country and also plays a major role in our country's economy. India is the second largest producer of agriculture crops and agriculture is one of the major and least paid occupations in India. Variability in seasonal climate conditions can have harmful effects, with incidents of drought reducing production. Developing better techniques to predict crop productivity in various climatic conditions can help farmer and other stakeholders in their decision making in terms of agronomy and crop choice.

Keywords: Indian Agriculture, Machine Learning Techniques, Crop selection method, KNN, SVM, RF.

1. INTRODUCTION

Agriculture is demographically the broadest economic sector and it plays a major role in the overall socio-economic fabric of India. It also contributes a large portion of employment. As the time passes the need for production has been increasing exponentially. With the advent of new technologies and overuse of non-renewable energy resources patterns of rainfall and temperature are disrupted. The inconsistent trends developed from the side effects of global warming make it difficult for the farmers to clearly predict the temperature and rainfall patterns thus affecting their crop yield productivity.

Crop yield prediction is nothing but forecasting the yield of the crop from past historical data which includes factors such as temperature, humidity, PH, rainfall, crop name. Machine learning can bring a revolution in agricultural field by changing the income scenario through growing an optimum crop. In order to perform accurate prediction and handle inconsistent trends in temperature and rainfall various machine learning algorithms can be applied. It will complement the agricultural growth and all together augment the ease of living for farmers. The main goal of agricultural planning is to achieve maximum yield rate of crops by using limited number of land resources. Whenever there is loss in unfavourable conditions we can apply crop selecting method and reduce the losses, thus it will help to increase the crop yield rate and this in turn helps in improving countries economy.

2. LITERATURE SURVEY

In [1] the authors NiketaGndhi& Amiya Kumar concluded that Support Vector Machines (SVM's) a supervised machine learning technique. There are number of examples of where it has been used in the agriculture domain. Tripathi reported on how SVMwas applied for reduction of precipitation for climate change scenarios to minimize the generalization error bound and to achieve generalized performance. SVM was used to forecast to demand and supply of pulpwood. SVM was also applied to provide insights into crop response patterns related to climate conditions by providing the features contribution analysis for agricultural yield prediction for classification of agricultural datasets the use of discretization base support vector machines was used. Hung reported the use of SVM to model urban land use conversion. The study reported a relationship between various factors and rural urban land use. SVM has also been applied for the estimation of crop biophysical parameters with the use of aerial hyper spectral observations.

In [2] the authorsRakesh Kumar, MP Singh, Prabhat Kumar, JP Singhhas concluded that Indian agriculture is highly dependent on summer rainfall. The correlation between summer rainfall and agriculture product production. This paper presents an analysis of crop climate relationship using past crops data. Correlation analysis tells that the monsoon rainfall, Pacific and Indian Ocean sea-surface temperatures and drawing sea-level pressure directly influences the crop prediction in India. Results show that the state-

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level crop production statistics and sub divisional monsoon rainfall are consistent with all-India result, except few cases. Crop sequencing technique is used to improve net yield rate of crop over season. It uses a method called Crop Selection Method(CSM).

3. METHODOLOGY

The proposed methodology has two phases, training phase and test phase. In the training phase data will be collected and preprocessed. The preprocessed data will be clustered using K-Means algorithm. The training phase stops with number of generated rules. In the testing phase yield value is predicted based on the generated rules. The work starts with preprocessing step. In this the collected data was preprocessed. In the preprocessing, some data was removed from the dataset. Some of the area will not be suitable for crop production so it will be removed. The proposed methodology will be conducted using Python matplotli band Sea born which is used for data visualization. Data preprocessing are performed by using the Pandas library of python. Basically broad five steps are used:

- Data collection
- Data wrangling
- Data preprocessing
- Data visualization
- Exploratory data analysis (EDA)

1. KNN (K- Nearest Neighbor)

K-nearest neighbor method can be used for both regression and classification predictive problems. This method helps in interpret output, calculate time and predictive power. The Machine learning techniques are used in various fields. KNN is also one of the machine learning method. This is also called as method of sample based learning. This will contain the data of past datasets and can be used while predicting the new datasets. This will apply function called as distance function likeManhattan or Euclidean distance. This can be used to compute distance from samples to all other training samples. It calculates the target value for new samples. The target vale will be the weighted sum of target values of the k nearest neighbors. The valve of K can be directly proportional to the prediction. Whenever the valve of K is small this indicates there is high variance and there is low bias. If the valve of the K is larger than this indicates that there is low variance and high bias. The main advantage of this KNN is it does not require any training or the optimization. This KNN uses data samples when predicting the new datasets. Hence it is having higher complexity and also more time consumption.

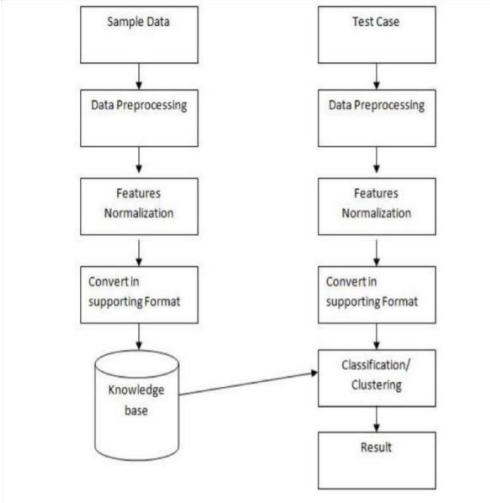

Fig-1: System design for Crop Yield Prediction

2. Support Vector Machine

Support vector machine used in crop yield prediction is called support vector regression. The aim of the support vector technique is to obtain non-linear function using kernel function (a linear function or polynomial function). The radial basis function and the polynomial function are the widely used kernel function. The merit of support vector regression is to avoid difficulties of using

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linear function in large input samples space and optimization of a complex problems transformed into simple linear function optimization.

4. RESULTS AND DISCUSSION

To predict the crop yield rate anywhere in the Karnataka state, a web page is created. The web page is given with three attributes namely location, soil type and area. Whenever a wrong soil type is given for a specific location, it will prompt to give the correct soil type for the location. The web page consists of 3 methods namely KNN, SVM and Random Forest and theses three methods gives the name of the crop that is suitable for the given area along with the estimated price of the crops and the yield rate of the crop. The web application also compares these three methods to show which method gives better accuracy. The accuracy may vary with each crops and location.

This is the signup page. Here we can create an account for the webpage.

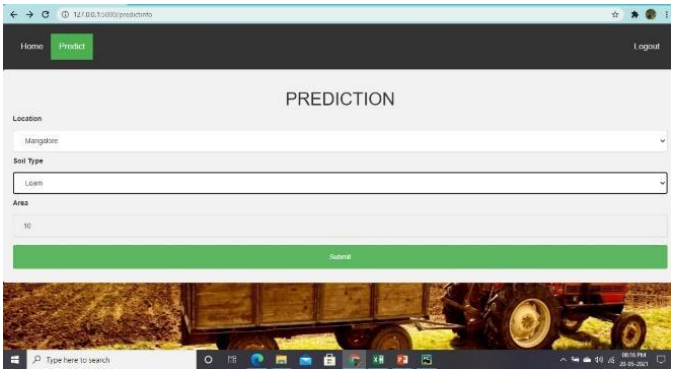

Fig.-2: Input page of the web application

The above picture shows the prediction page. Here we can give the input (location, soil type, area) to predict the crop.

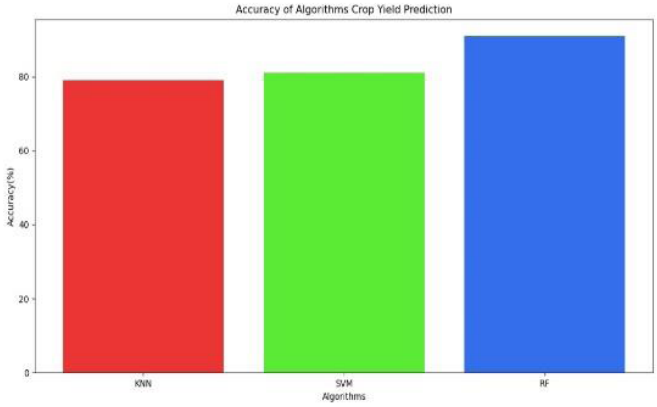

Fig.-3: Result of checking accuracy

This picture shows the accuracy comparison of the algorithms. The accuracies of the algorithms may change in each prediction.

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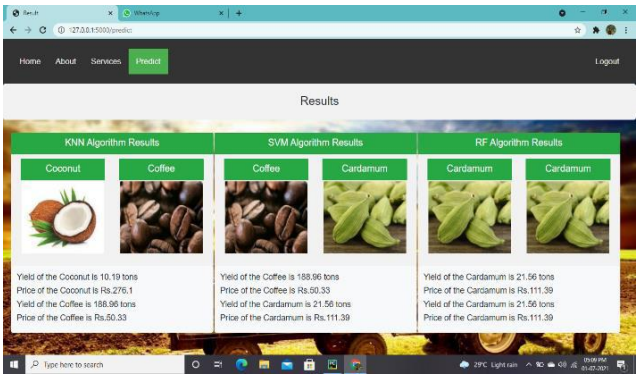

Fig.-4: Result of checking accuracy

5. CONCLUSION

Agriculture is the field which aids in economic growth of our country. But this is lacking behind in applying new technologies of machine learning. Thus our farmers should know all the new technologies of machine learning and other new techniques. These techniques help in getting maximum yield of crops. Many techniques of machine learning are applied on agriculture to improve yield rate of crops. These techniques also help in solving problems of agriculture. We can also get the accuracy of yield by checking for various methods. Hence we can improve the performance by checking the accuracy between various crops. Sensor technologies are implemented in countless farming sectors. This paper aids in getting maximum yield rate of the crops. Also assists in selecting proper crop for their selected land and selected season. These techniques will resolve the problems of farmers in agriculture field. This will aid in improving the economic growth of our country.

REFERENCES

[1] Gour Hari Santra, Debahuti Mishra and Subhadra Mishra, Applications of Machine Learning Techniques in Agricultural Crop Production, Indian Journal of Science and Technology, October 2016.

[2] Karan deep Kauri, Machine Learning: Applications in Indian Agriculture, International Journal of Advanced Research in Computer and Communication Engineering, April 2016.

[3] S. Djodiltachoumy, A Model for Prediction of Crop Yield, International Journal of Computational Intelligence and Informatics, March 2017.

[4] Nishit Jain, Amit Kumar, SahilGarud, Vishal Pradhan, Prajakta Kulkarni, Crop Selection Method Based on Various Environmental Factors Using Machine Learning, Feb -2017.

[5] Niketa Gandhi, OwaizPetkar, Leisa J Armstrong "Rice crop yield prediction using Support Vector Machines" 2016 IEEE Technological Innovations in ICT for Agriculture and Rural Development.

[6] J.P. Singh, M.P. Singh, Rakesh Kumar and Prabhat Kumar "Crop Selection Method to Maximize Crop Yield Rate using Machine Learning Technique", International Journal on Engineering Technology, May 2015.

[7] Prof. D. S. Zingade, OmkarBuchade, NileshMehra, ShubhamGhodekar, ChandanMehta "Crop Prediction system using machine Learning".

[8] Ramesh Medar, Vijay S.Rajpurohit, Shweta "Crop yield Prediction using Machine Learning Techniques" 2019 IEEE 5th International Conference for Convergence in Technology (I2CT)

[9] S. S. Kale and P. S. Patil, "A Machine Learning Approach to Predict Crop Yield and Success Rate," 2019 IEEE Pune Section International Conference (PuneCon), Pune, India, 2019.

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