International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

Agricultural Crop Recommendations based on Productivity and Season

P.SUBHAN BASHA [1], MANDLA VIJAYA KUMAR[2]
[1] Associate Professor, Department of Computer science and Engineering ,**SRI SAI INSTITUTE OF TECHNOLOGY AND SCIENCE**, **ANNAMAYA**, AP, India.
[2] UG Scholars, Department of Computer science and Engineering, **SRI SAI INSTITUTE OF TECHNOLOGY AND SCIENCE**, **ANNAMAYA**, AP, India.

ABSTRACT:

As a coastal state, Andhra Pradesh faces uncertainty in agriculture which decreases its production. With more population and area, more productivity should be achieved but it cannot be reached. Farmers have used word-of-mouth in past decades but now it cannot be used due to climatic factors. Agricultural Factors and parameters make the data to get insights about the Agri-facts. Growth of the IT world drives some highlights in Agriculture Sciences to help farmers with good agricultural information. Intelligence of applying modern technological methods in the field of agriculture is desirable in this current scenario. Machine Learning Techniques develops a well-defined model with the data and helps us to attain predictions. Agricultural issues like crop prediction, rotation, water requirement, fertilizer requirement and protection can be solved. Due to the variable climatic factors o f the environment, there is a necessity to have an efficient technique to facilitate the crop cultivation and to lend a hand to the farmers in their production and management. This may help upcoming agriculturalists to have a better agriculture. A system of recommendations can be provided to a farmer to help them in crop cultivation with the help o f data mining. To implement such an approach, crops are recommended based on its climatic factors and quantity. Data Analytics paves a way to evolve useful extraction from agricultural databases. Crop Dataset has been analyzed and recommendation of crops is done based on productivity and season

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INTRODUCTION

Andhra Pradesh being the 7th largest area in India has the 6th largest population. It is the leading producer of agriculture products. Agriculture is the main occupation of Telangana people. Agriculture has a sound tone in this competitive world. Cauvery is the main source of water. Cauvery delta regions are called the rice bowl of Andhra Pradesh. Rice is the major crop grown in Andhra Pradesh. Other crops like Paddy, Sugarcane, Cotton, Coconut and groundnut are grown. Bio-fertilizers are produced efficiently. Farming acts as a major source of occupation. Agriculture makes a dramatic impact in the economy of a country. Due to the change of

natural factors, Agriculture farming is degrading now-a-days. Agriculture directly depends on the environmental factors such as sunlight, humidity, soil type, rainfall, Maximum and Minimum Temperature, climate, fertilizers, pesticides etc. Knowledge of proper harvesting of crops is needed to bloom in Agriculture. India has seasons of

1. Winter which occurs from December to March

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2. Summer season from April to June
3. Monsoon or rainy season lasting from July to September and
4. Post-monsoon or autumn season occurs from October to November.

Due to the diversity of season and rainfall, assessment of suitable crops to cultivate is necessary. Farmers face major problems such as crop management, expected crop yield and productive yield from the crops. Farmers or cultivators need proper assistance regarding crop cultivation as now-a-days many fresh youngsters are interested in agriculture.Impact of the IT sector in assessing real world problems is moving at a faster rate. Data is increasing day by day in the field of agriculture. With the advancement in Internet of Things, there are ways to grasp huge data in the field of Agriculture. There is a need for a system to have obvious analyzes of data of agriculture and extract or use useful information from the spreading data. To get insights from data, it has to be learnt

Literature Survey

The paper [1] states the requirements and planning needed for developing a software model for precision farming is discussed. It deeply studies the basics of precision farming. The author's start from the basics of precision farming and move towards developing a model that would support it. This paper describes a model that applies Precision Agriculture (PA) principles to small, open farms at the individual farmer and crop level, to affect a degree of control over variability. The comprehensive objective of the model is to deliver direct advisory services to even the smallest farmer at the level of his/her smallest plot of crop, using the most accessible technologies such as SMS and email. This model has been designed for the scenario in Kerala State where the average holding size is much lower than most of India. Hence this model can be positioned elsewhere in India only with some modifications.

The paper [2] makes a qualified cogitation of assortment algorithms and their performance in yield prediction in precision husbandry. These algorithms are implemented in a data set collected for several years in yield prediction on soya bean crop. The algorithms used for yield prediction in this paper are Support Vector Machine, Random Forest, Neural Network, REPTree, Bagging, and Bayes. The conclusion drawn at the end is that bagging is the best algorithm for yield prediction among the above stated algorithms since the error deviation in bagging is minimum with a mean absolute error of 18985. The paper [3] shows the importance of crop selection and the factors deciding the crop selection like production rate, market price and government policies are discussed. This paper proposes a Crop Selection Method (CSM) which solves the crop selection problem and improves net yield rate of the crop. It suggests a series of crop to be selected over a season considering factors like weather, soil type, water density, crop type. The predicted value of influential parameters determines the accuracy of CSM. Hence there is a need to include a prediction method with improved accuracy and performance.

The paper [4] aims to solve the crucial problem of selecting the classifiers for the ensemble learning. A method to select a best classifier set from a pool of classifiers has been proposed. The proposal aims to achieve higher accuracy and performance. A method called SAD was proposed based on accuracy and classification performance. Using Q statistics, the dependency between most relevant and accurate classifiers is identified. The classifiers which were not chosen were combined to form the ensemble. This measure is supposed to ensure higher performance

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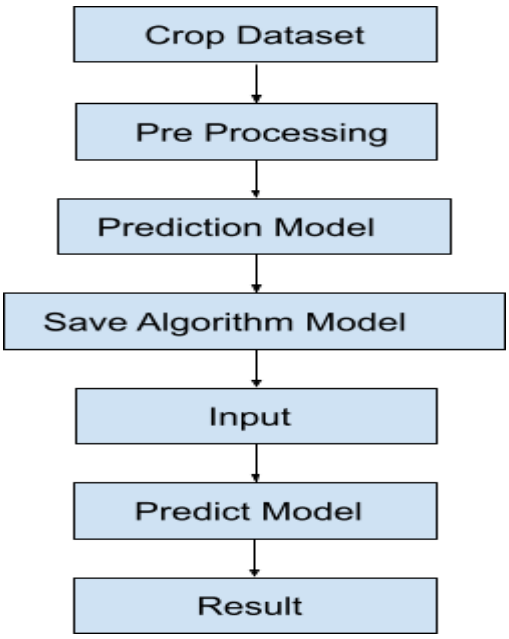
and diversity of the ensemble. Various methods such as SA (Selection by Accuracy), SAD (Selection by accuracy and Diversity) and NS (No selection) algorithm were identified. Finally it is inferred that SAD works better than others. The paper [5] proposes various classification methods to classify the liver disease data set. The paper emphasizes the need for accuracy because it depends on the dataset and the learning algorithm. Classification algorithms such as Naïve Bayes, ANN, ZeroR and VFI were used to classify these diseases and compare the effectiveness, correction rate among them. The performance of the models where compared with accuracy and computational time. It was concluded that all the classifiers except naive bayes showed improved predictive performance. Multilayer perceptron show the highest accuracy among the proposed algorithms. The paper [6] tries to solve the problem of food insecurity in Egypt. It proposes a framework which would predict the production, and import for that particular year. It uses Artificial Neural Networks along with Multi-layer perceptron in WEKA to build the prediction. At the end of the process we would be able to visualize the amount of production import, need and availability. Therefore it would help to make decisions on whether food has to be further imported or not.

The soil datasets in paper [7] are analyzed and a category is predicted. From the predicted soil category the crop yield is identified as a Classification rule. Naïve Bayes and KNN algorithms are used for crop yield prediction. The future work stated is to create efficient models using various classification techniques such as support vector machine, principal component analysis

Architecture



EXISTING SYSTEM

● Extensive work has been done, and many ML algorithms have been applied in the agriculture sector. The biggest challenge in agriculture is to increase farm production and offer it to the end-user with the best possible price and quality. It is also observed that at least 50% of the farm produce gets wasted, and it never reaches the end-user. The proposed model suggests the methods for minimizing farm produce wastage.

One of the recent works, S. Pavani et.al. presented a model where the crop yield is predicted using KNN algorithms by making the clusters. It has been shown that KNN clustering proved much better than SVM or regression.

● Nishant et. al. predicted the crop yield for the specific year with the help of advanced regression techniques like Enet, Lasso and Kernel Ridge algorithms. The Stacking regression helped to enhance the accuracy of the algorithms.

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DISADVANTAGES OF EXISTING SYSTEM:

- The main challenge faced in agriculture sector is the lack of knowledge about the changing variations in climate. Each crop has its own suitable climatic features. This can be handled with the help of precise farming techniques. The precision farming not only maintains the productivity of crops but also increases the yield rate of production.
- The existing system which recommends crop yield is either hardware-based being costly to maintain, or not easily accessible.
- Despite many solutions that have been recently proposed, there are still open challenges in creating aan application with respect to crop recommendation.

PROPOSED SYSTEM

- In this project, we have proposed a model that addresses the existing issues. The novelty of the proposed system is to guide the farmers to maximize the crop yield as well as suggest the most profitable crop for the specific region.
- The proposed model provides crop selection based on economic and environmental conditions, and benefit to maximize the crop yield that will subsequently help to meet the increasing demand for the country's food supplies. The proposed model predicts the crop yield by studying factors such as rainfall, temperature, area, season, soil type etc. The system also helps to determine the best time to use fertilizers.
- The user provides an area under cultivation and soil type as inputs. According to the requirement, the model predicts the crop yield for a specific crop. The model also recommends the most profitable crop and suggests the right time to use the fertilizers.
- The main objective is to obtain a better variety of crops that can be grown over the season. The proposed system would help to minimize the difficulties faced by farmers in choosing a crop and maximize the yield.

ADVANTAGES OF PROPOSED SYSTEM:

- The proposed model predicts the crop yield for the data sets of the given region. Integrating agriculture and ML will contribute to more enhancements in the agriculture sector by increasing the yields and optimizing the resources involved. The data from previous years are the key elements in forecasting current performance.
- The proposed system uses recommender system to suggest the right time for using fertilizers.
- The methods in the proposed system includes increasing the yield of crops, real-time analysis of crops, selecting efficient parameters, making smarter decisions and getting better yield.

METHODOLOGY

Dataset Collection

The dataset comprising the soil specific attributes which are collected for Madurai district tested at soil testing lab, Madurai, Tamil Nadu, India. In addition, similar online sources of general crop data were also used. The crops considered in our model include millet, groundnut, pulses, cotton, vegetables, banana, paddy, sorghum, sugarcane, coriander. Figure 1 gives an analysis of the dataset. The number of instances of each crop available in the training dataset is depicted. The attributes considered where Depth, Texture, Ph, Soil Color, Permeability, Drainage, Water holding and Erosion

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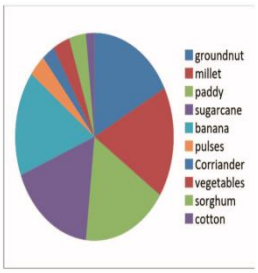
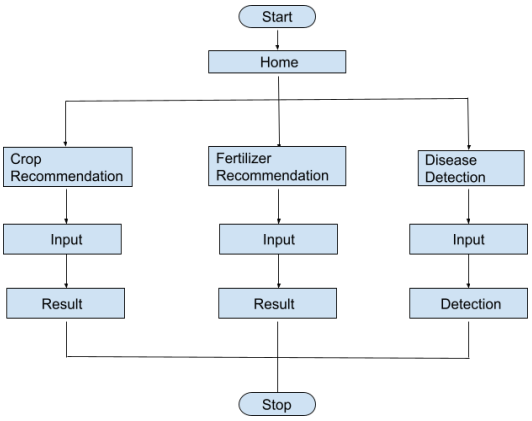


Fig 1 Analysis of dataset with respect to crops(Training data)

The above stated parameters of soil play a major role in the crop's ability to extract water and nutrients from the soil. For crop growth to their fullest potential, the soil must provide a satisfactory environment for it. Soil is the anchor of the roots. The water holding capacity determines the crop's ability to absorb nutrients and other nutrients that are changed into ions, which is the form that the plant can use. Texture determines how porous the soil is and the comfort of air and water movement which is essential to prevent the plants from becoming waterlogged. Soil texture which affects the soil's ability to hold onto nutrients. The level of acidity or alkalinity (Ph) is a master variable which affects the availability of soil nutrients. The activity of microorganisms present in the soil and also the level of exchangeable aluminum can be affected by PH. The water holding and drainage determine the penetration of roots. Hence for the following reasons the above stated parameters are considered for choosing a crop. Ensemble is a data mining model also known as the Committee Methods or Model Combiners, that combine the power of multiple models to acquire greater prediction, efficiency than any of its models could achieve alone. In our system, we use one of the most familiar ensembling technique called Majority Voting technique .In the voting technique any number of base learners can be used. There has to be at least two base learners. The learners are chosen in a way that they are competent to each other yet being complimentary also. Higher the competition higher is the chance of better prediction. But it is necessary for the learners to be complimentary because when one or few members make an error, the probability of the remaining members correcting this error would be high. Each learner builds itself into a model. The model gets trained using the training data set provided. When a new sample has to be classified, each model predicts the class on its own. Finally, the class which is predicted by majority of the learners is voted to be the class label of the new sample. This method is implemented in Rapid miner tool (figure 2, 3, 4, 5) depicts the process implemented in rapid miner.

Flowchart



IMPLEMENTATION

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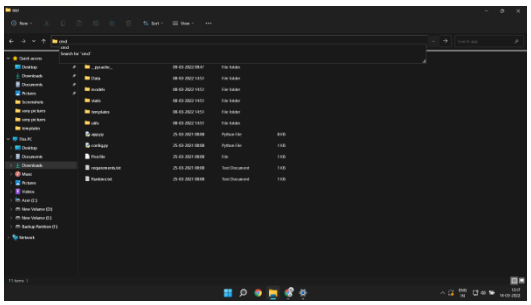

Fig.All the project files are stored in a folder and open the file ‘app’

Fig.copy the link and paste it in the browser to open the app

RESULTS:

Fig.The command prompt opens

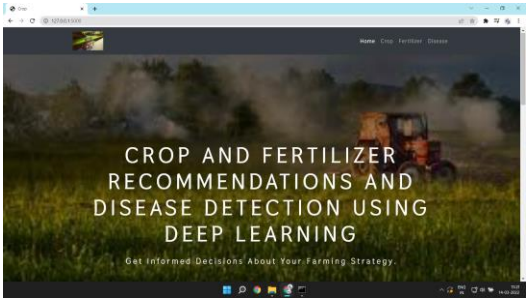

Fig.The web application front page looks like the picture above

Fig.To run the project give the command python app.py runserver

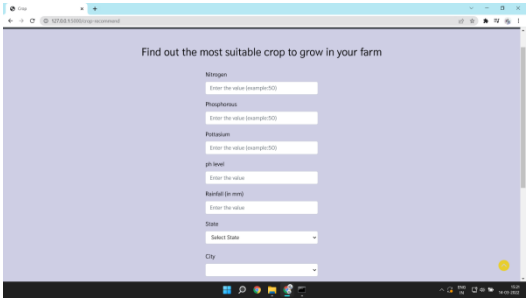

Fig.Suitable crop that can be grown can be found out

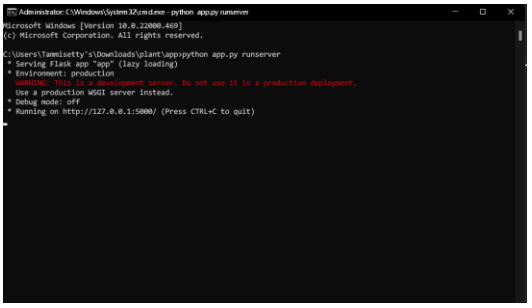

Fig.Once the code runs in the command prompt a link is given

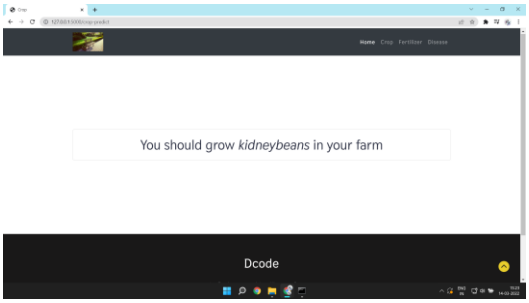

Fig.The result of which crop to be grown is shown

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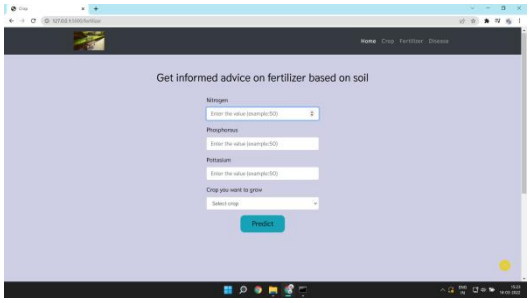


Fig.The type of fertilizer to be used is recommended

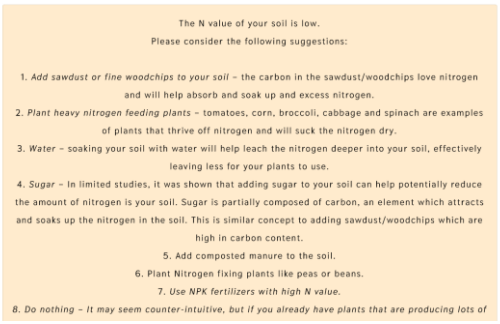


Fig.upon giving values the result is shown

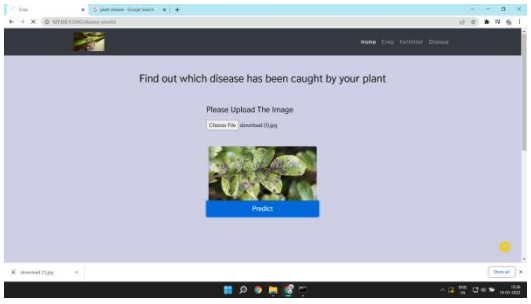
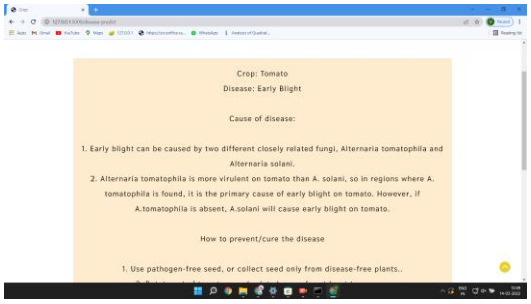


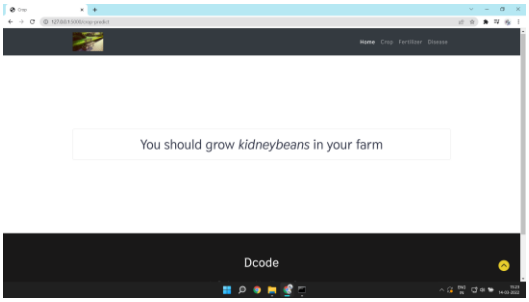
Fig.Plant disease can be detected by uploading the picture of the plant



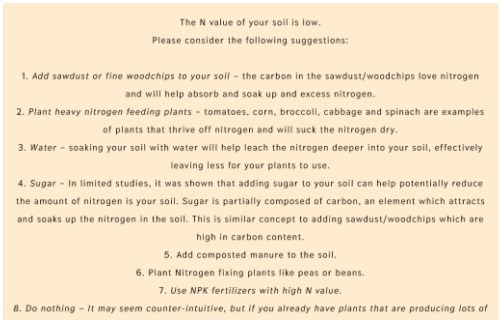
The disease type and cause is shown

The main aim or the objective of the project is to suggest the type of crop and the fertilizer that is suitable to be used in the soil based on some values provided by the user. This project also detects the type of disease a crop or a plant is having by uploading the image of the same. The objectives are fulfilled as the results are successfully displayed

CROP RECOMMENDATION



FERTILIZER RECOMMENDATION



DISEASE DETECTION

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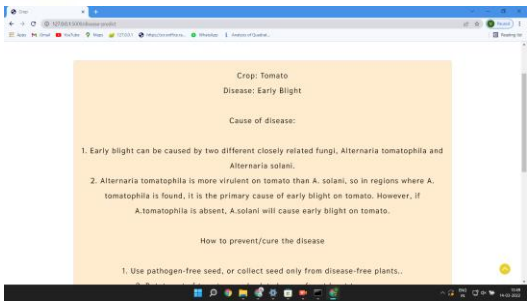

CONCLUSION AND FUTURE SCOPE

This paper extensively investigated the importance of crop management. Farmers need help in using new technologies to grow their crops. Farmers can be informed in time about the correct forecast of crops. Many machine learning techniques have been used to analyze agricultural parameters. Some of the techniques in various aspects of agriculture are explored through literature research. Soft computing technology, where neural networks are thriving, plays an important role in providingrecommendations. Taking into account parameters such as yield and season, farmers are given more personalized and appropriate recommendations and can achieve good yields. In this paper, we have effectively proposed and implemented an intelligent crop recommendation system, which can be easily used by farmers all over India. This system would help the farmers in making an informed decision about which crop to grow depending on some parameters like Nitrogen, Phosphorous, Potassium, PH Value, Humidity, Temperature, and Rainfall. By using this research we can increase productivity of the country and produce profit out of such a technique. In this manner the farmer's can plant the right crop increasing his yield and also increasing the overall profitability of the country. This investigation has expressed the recommendation of various crops of India using different machine learning algorithms like Decision Tree, Naïve Bayes, Support Vector Machine, Logistic Regression, Random Forest and XGBoost.

The Analysis has been performed on these six types of machine learning algorithms and out of these six algorithms XGBoost achieved best accuracy result."

."The system can be enhanced further to add following functionality:"

1. "The main future work's aim is to improved dataset with larger number of attributes."
2. "We need to build a model, which can classify between healthy and diseased crop leaves and also if the crop has any disease, predict which disease is it."
3. "To build website and mobile app for easy to use." The investigation depicts the abilities of different calculations in foreseeing a few climate wonders, for example, temperature, rainstorms, precipitation and inferred that real systems In this paper, we have proposed an examination of the soil information utilizing distinctive calculations and forecast strategy. From the investigation in this paper, we presumed that there is as yet a need of research in the Agricultural field to improve precision. Utilizing group techniques is a decent method to guarantee better precision of the framework. Additionally, on the off chance that we need to think about just a single calculation for the proposal framework, we can utilize SVM because of its basic computational necessities. In future work crops proposal makes difference agriculturists

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related on crops and climate determining. Yet, imperative in Agriculture is, all yields creation depends on the soils since soils are essential to horticulture advancement and harvests generation. On the off chance that soil isn't appropriate for specific harvest, ranchers can't get benefit generation. So prescribe the crops with determining of climate and related on soil will help to ranchers for effectively recognize reasonable harvests. In our proposed work we execute framework for agriculturists to suggest the harvests based climate forecast and reasonable soil. We anticipate the sort of crop which one is reasonable for that specific soil, climate condition, temperature, etc. So for, we are utilizing machine learning with the arrangement of dataset we are recognize the harvest for the relating soil.

This proposed framework serves to ranchers to precisely recognize crops without stressing of future climate and coordinated soils. By this framework agriculturists can get more harvests generation and benefit.

REFERENCES

[1] Shreya S. Bhanose, Kalyani A. Bogawar (2016) "Crop And Yield Prediction Model", International Journal of Advance Scientific Research and Engineering Trends, Volume 1,Issue 1, April 2016

[2] Tripathy, A. K., et al.(2011) "Data mining and wireless sensor network for agriculture pest/disease predictions." Information and Communication Technologies (WICT), 2011 World Congress on. IEEE.

[3] Ramesh Babu Palepu (2017) " An Analysis of Agricultural Soils by using Data Mining Techniques", International Journal of Engineering Science and Computing, Volume 7 Issue No. 10 October.

[4] Rajeswari and K. Arunesh (2016) "Analysing Soil Data using Data Mining Classification Techniques", Indian Journal of Science and Technology, Volume 9, May.

[5] A.Swarupa Rani (2017), "The Impact of Data Analytics in Crop Management based on Weather Conditions", International Journal of Engineering Technology Science and Research, Volume 4,Issue 5,May.

[6] Pritam Bose, Nikola K. Kasabov (2016), "Spiking Neural Networks for Crop Yield Estimation Based on Spatiotemporal Analysis of Image Time Series", IEEE Transactions On Geoscience And Remote Sensing.

[7] Priyanka P.Chandak (2017)," Smart Farming System Using Data Mining", International Journal of Applied Engineering Research, Volume 12, Number 11.

[8] Vikas Kumar, Vishal Dave (2013), "KrishiMantra: Agricultural Recommendation System", Proceedings of the 3rd ACM Symposium on Computing for Development, January.

[9] Savae Latu (2009), "Sustainable Development : The Role Of Gis And Visualisation", The Electronic Journal on Information Systems in Developing Countries, EJISDC 38, 5, 1-17.

[10] Nasrin Fathima.G (2014), "Agriculture Crop Pattern Using Data Mining Techniques", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, May.

[11] Ramesh A.Medar (2014), "A Survey on Data Mining Techniques for Crop Yield Prediction", International Journal of Advance Research in Computer Science and Management Studies, Volume 2, Issue 9, September.

[12] Shakil Ahamed.A.T.M, Navid Tanzeem Mahmood (2015)," Applying data mining techniques to predict annual yield of major crops and recommend

planting different crops in different districts in Bangladesh", ACIS 16th International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD),IEEE,June.

[13] Shreya S.Bhanose (2016),"Crop and Yield Prediction Model",International Journal of Advanced Scientific Research and Engineering Trends, Volume 1,Isssue 1,ISSN(online) 2456- 0774,April.

[14] Agaj i Iorshase, Onyeke Idoko Charles,"A Well-Built Hybrid Recommender System for Agricultural Products in Benue State of Nigeria", Journal of Software Engineering and Applications,2015,8,581-589

[15] G. Adomavicius and A. Tuzhilin(2005), "Toward the Next Generation of Recommender Systems: A Survey of the State-of-the- Art and Possible Extensions," IEEE Trans. Knowledge and Data Eng., vol. 17, no. 6, pp. 734-749, June.

[16] Avinash Jain, Kiran Kumar (2016),"Application ofRecommendation Engines in Agriculture", International Journal of Recent Trends in Engineering & Research, ISSN: 2455-1457.

[17] Kiran Shinde (2015),"Web Based Recommendation System for farmers", International Journal on Recent and Innovation Trends in Computing and Communication, Volume 3,Issue 3, ISSN:2321-8169,March.

[18] Konstantinos G. Liakos, " Machine Learning in Agriculture: A Review", Sensors 2018, 18, 2674; doi:10.3390/s18082674

[19] S.Vaishnavi, M.Shobana, N Geethanjali, Dr.S.Karthik, "Data Mining: Solving the Thirst of Recommendations to Users", IOSR Journal of Computer Engineering (IOSR-JCE), Vol.16, no.6, 2014.