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Crop Recommend System Using Random Forest Algorithm

Ms.Konudula Neeharika[1],Muchumarri Himaja[2], Alluri Bharathi[3], Muppuri Divya[4], Dasannagari Malleswari[5], Nallagondu Gangadhar Reddy[6]

[1]Guide, [2,3,4,5,6]Student
[1,2,3,4,5,6]Department Of Cse, Tadipatri Engineering College,Tadipatri.

ABSTRACT:

In rural India, farming is the primary source of income for many people and plays a significant role in the economy of the nation. But compared to other nations, fewer crops are produced per hectare. Due to the low yield, small farmers find it difficult to make a living, which can result in financial difficulties and even suicides. This study offers a user-friendly method that uses pesticide and meteorological data to assist farmers in forecasting crop yields. The system employs GPS to locate the farmer and is accessible as a mobile app. Farmers input information about weather, pesticide use, soil type, and land size. After that, the system makes recommendations for the best crops to plant or forecasts the yield of a selected crop using machine learning. Support Vector Machine (SVM), Artificial Neural Network (ANN), Random Forest (RF), Multivariate Linear Regression (MLR), and K-Nearest Neighbor (KNN) are among the machine learning techniques used by the system. With a 95% accuracy rate, the Random Forest approach produced the greatest results out of all of these. With ANN at 92%, SVM at 90%, KNN at 88%, and MLR at 85%, other techniques also demonstrated strong performance. The algorithm not only forecasts yields but also gives farmers advice on when to use pesticides and fertilizers to enhance crop development. This technology uses meteorological and pesticide data to help farmers make better decisions, produce more crops, and earn more money.

KEYWORDS: rural India, farming, low yield, GPS weather, pesticide use, soil type, land size, crop recommendations, Random Forest, better decisions

1. INTRODUCTION

Agriculture in India has a long history. Recently, India ranked second within the world in terms of agricultural production. Agriculture-associated industries, which includes forestry and fishing, accounted for six.6 percentage of GDP in 2009 and approximately 50 percentage of overall employment. The financial contribution of agriculture to India's GDP is declining. Crop yields are a crucial supply of earnings inside the agricultural area. Performance relies upon on many elements, inclusive of climate, geography, organic and economic factors. Uncertain tariffs make it tough for farmers to decide while and which vegetation to plant. As Wikipedia notes, India's loss of life fee rose from 1.4% to at least 1.8%, or 100,000 humans, in 10 years. Due to the uncertainty of weather situations, farmers now not know what flowers to develop, when and where to begin. The use of numerous fertilizers is also uncertain because of

seasonal adjustments in weather and number one sources such as soil, water and air. In this example, the overall performance gradually decreases. Farmer's Hassel Approach is a clever, clean-to-use advice engine. Yield forecasting is a primary problem in agriculture. Each farmer strives to achieve a yield, whether or now not it meets his expectations, particularly by predicting the yield based on his experience with a selected crop. Agricultural productivity often depends on climate, pests, and crop management.

Accurate records on crop history are crucial for making agricultural chance control selections. In this paper, we proposed a version to resolve these issues. The novelty of the proposed scheme is to help farmers maximize yield and offer the maximum effective crop in a selected location. The proposed version prioritizes flora in financial and environmental situations, further to the production of the most essential flora, to sooner or later make a contribution to the growth of food call for in the United States. The proposed model predicts performance using rainfall, temperature, region, season, soil type, and so forth. The device also facilitates decide the proper time for theory. Modern systems that suggest performance are completely hardware-based, steeply-priced to keep, or hard to accumulate. Tamil Nadu is the 7th biggest state in India and has the 6th largest population. It is the biggest agricultural producing U.S.A. Inside the international. Agriculture is the main source of earnings of Tamil Nadu. Agriculture has a robust voice in this competitive world. Cauvery is the principle source of water. Kaveri Delta is called the paddy subject of Tamil Nadu. Rice is the maximum essential crop in Tamil Nadu. Other plants grown encompass rice, sugarcane, cotton, coconut and peanuts. Organic fertilizers are produced correctly. Agriculture is a critical supply of employment in lots of places. Agriculture has a substantial effect on a rustic's economic system.

Agriculture is destroyed due to the exchange of natural elements. These days Sunlight, humidity, soil type, precipitation, high and coffee temperatures, climate, fertilizers, insecticides, and so on. Without delay impact agriculture. Knowledge of a successful harvest is necessary for agricultural progress. Step 1: Winter is a season in India that lasts from December to March. Phase 2: Summer is from April to June. Phase three: Rainy season from July to September. Phase 4: October to November is the publish-monsoon or autumn season. Due to the variety of seasons and rainfall, it's far necessary to assess appropriate crops for cultivation. Crop management, expected yield and effective performance are the primary worries of farmers. Farmers and farmers call for correct help for vegetation due to the fact these days many young people are inquisitive about agriculture. The IT sector's effect on assessing actual-international issues is increasing. The facts will increase day by day in the discipline of agriculture. With the advent of the Internet of Things, there are ways to exploit large information in the agricultural world. There is a need for a device that can absolutely evaluate agricultural records and extract and use important facts. It is important to discover ways to extract information from statistics.

2. LITERATURE SURVEY

Steps to preserve soil nutrients in case of deficiency, soil fertilizers are added. A widespread hassle among Indian agronomists is to select the closest amount of fertilizer and upload it manually. Too a whole lot or too little fertilizer can damage flora and reduce yields. This paper offers an outline of the numerous mining techniques used in making ready soil datasets for fertilizer recommendations. Agriculture is the maximum vital device, in particular in growing international locations like India. The use of records in agriculture can alternate choice making and farmers can increase their productivity. Data mining plays a vital function in decision making in numerous factors of the agricultural sector. Examines the position of

statistics mining in agriculture and analyzes the work of numerous authors in agriculture. He additionally talks approximately diverse facts mining applications aimed toward fixing many agricultural troubles. This registry brings together the art work of numerous authors in one area, so it'll be useful for experts to attain information on the USA's leading archival extraction and packaging within the context of rural themes [1]. This article helps the concept of making AgroNutri as an Android software to offer percentage statistics and exercise fertilizer dosing. The concept is to calculate the amount of NPK compound produced primarily based at the virgin amount of the hobby crop. This application is primarily based absolutely on the paintings accomplished by means of the farmer, that's considered an input that he can offer. The destiny of agro nutrition is assumed to be due to the fact GPRS can be used to supply nutrients to the web page. Furthermore, this software can be stored as part of precision agriculture, in which through sensors the quantity of NPK gift within the soil can be determined, and this amount can be subtracted from the offers and we are able to deliver a certain diploma of unique additives. It is crucial to provide it [2].

It is a rural region that has now not adapted to the times and achievements. Indian farmers must come together with a commonplace schedule. Machine studying is a native idea that can be implemented to any domain with all inputs and outputs. You have successfully evolved your abilities in software applications and software program measurements. Machine getting to know algorithms have progressed the accuracy of synthetic intelligence machines and built sensor systems used in precision agriculture. This article evaluates numerous contexts of using machine mastering in agriculture. It offers an insight into the dangers confronted by way of Indian farmers and how they can be triumph over thru these technology [3].

In the approaching decades, humanity will demand more food at the fee of a great deal much less land and water. This study evaluates meals manufacturing for 4 eventualities decided on from the Millennium Ecosystem Assessment and the Special Report on Emissions Scenarios. Impacts on land and water assets because of human development and particular modifications are considered comprehensively and comprehensively, even as forests and agriculture require changes related to population growth and economic progress. Document the effect of profits on nutrient necessities thru the usage of dynamic flexibilities. Between 2010 and 2030, the location of agricultural land international is expected to boom by about 14%. Restrictions on deforestation have a big effect on land and water charges, but little impact on global food production and costs. While predicted adjustments in profits have the best impact on according to capita meals intake, populace growth is same to increases in universal food production. By adjusting the depth of land manage, the impact of the technological opportunity is accelerated or weakened [4].

Agricultural technology produces facts that lets in analysts to don't forget complicated problems or make informed agricultural decisions. The rich history of this technological know-how lends itself to the wealthy fashion of maps and scales it has worked on and taken into consideration. The exhibit, an essential tool of agricultural technological know-how, was evolved by means of researchers from special countries who contributed their thoughts and tools over six decades. Agricultural researchers are actually studying the patterns, information and elements of "human beings on foot" that are imagined to help clear up the problems of society's precarious and failed structures. A - Innovation and choice to mirror at the attention of all factors of the issues involved. To this quit, right here we outline a historical account of agricultural structures, demonstrating and figuring out strategies that helped manual the formation and improvement of diagnosed and complicated agricultural equipment and methods. The various characteristics past,

normally mixed with growth in numerous sectors, have made a actual contribution to the development of agricultural demonstration systems, in addition to upgrades in farm animals and breeding fashions totally based on strategies, clinical methods based totally in verifiable assumptions, in addition to economic optimization. Reproduction. . Examples of family team spirit and stability from the neighborhood to the world. The attributes of Grameen Rupa models have changed lots in terms of integrated structures, scale and scope, which has stimulated their propagation and use with the assist of professionals in many fields of control. Recent examples of crucial collaborative paintings across institutions, within groups, and across vast and character categories of human beings suggest crucial advances in rural information systems essential to current fashions and databases. Educational subjects and selection of emotional aid topics. Archival practices must be considered to assist keep away from obstacles and difficult conditions while the network produces these and future horticultural maps [5]. Tripathy et al. It provided a pesticide control system for growing vegetation the usage of a given mining system. Developed a proprietary Bose SNN version for space-time evaluation with regression estimation. Shreya S. Bamose makes use of a crop and gives a predictive model. The okay-manner clustering set of rules predicts crop yields and crop water requirements. In the present system, simplest the precise country has been considered, and not all states and other parameters. Relatively sluggish to build. Interpretation is difficult. Computation all highly-priced.

3. PROPOSED SYSTEM

Yield relies upon on many agronomic parameters. Based on particular tables of fruit manufacturing from preceding years, farmers can propose plants. These suggestions will pressure the farmer to understand if this fruit will supply true yields inside the coming years. Crop diseases, water troubles and plenty of different motives can reduce agricultural production. By looking at manufacturing, growers can see which vegetation have the highest volume on the market this yr. From there, the grower can determine plant trends for future years. Farmers can get hold of recommendations based totally often on the developing season of the crops. Project announcement to indicate farmers use a selection classifier. The key approach of this venture is that we can offer pre-processing statistics, that's used to prepare the model to be updated and related to the uterus UI to offer the entire and final result. The version additionally recommends the maximum worthwhile crop and prescribes the length of the crop. The most important objective is to achieve the first-rate kinds of crops that may be grown in the season. The proposed machine will assist lessen the problems faced by farmers in choosing a crop and maximizing yield. The automated acquisition of expertise about strategies definitely offers an explanation of the sample in conjunction with the information and allows us make predictions. Agricultural troubles related to crop availability, crop rotation, water wishes, fertilizer needs and conservation may be solved. For various motives associated with weather and the environment, its miles important to have a green system that facilitates the cultivation of plant life and enables farmers in production and manage. This will assist destiny farmers to improve their agriculture. An advisory machine may be furnished to assist the grower circulate their plant life via the mines. To make stronger this method, plants are endorsed based on climatic factors and quantity. Data analytics paves the way to growth useful extracts from agricultural databases. In our proposed machine, we have used a huge statistics set that includes all the states of India, whereas in the current system, simplest a specific country has been taken into consideration. Does not require company or scales Easy to build. Easy to interpret computationally less expensive.

4. SYSTEM ARCHITECTURE

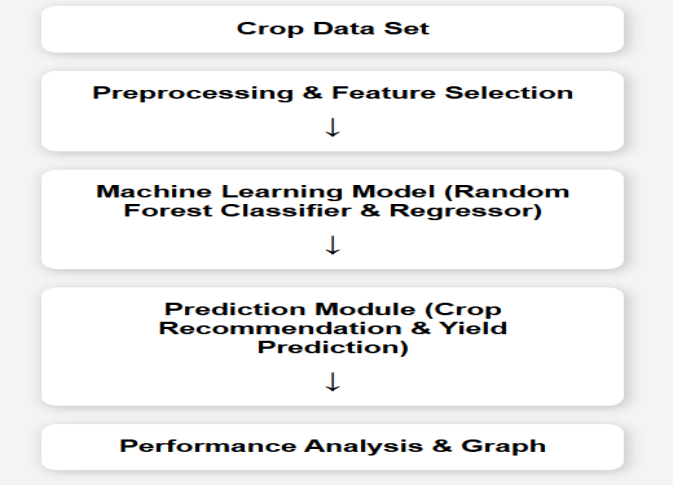

Fig 1: System Architecture

Several cryptographic approaches are used in the proposed e-healthcare system to guarantee privacy and safe data sharing. Only authorized individuals can decrypt patient health records thanks to identity-based encryption. By allowing the cloud server to convert encrypted data for authorized users without disclosing private keys, proxy re-encryption facilitates safe data exchange. Secure re-encryption procedures are supported by cryptography based on bilinear pairing. Users can examine encrypted medical records without first decrypting them thanks to searchable encryption using a trapdoor method, protecting patient privacy. Inverted index-based search optimization, often known as the bloom filter, increases search efficiency and speed while protecting data. When combined, these techniques provide safe, confidential,

Data Preparation:

This is the first real step towards the real development of a machine learning model, collecting data. This is a critical step that will cascade in how good the model will be, the more and better data that we get, the better our model will perform. There are several techniques to collect the data, like web scraping, manual interventions and etc. The dataset used in this crop recommendation in India taken from some other source.

a. Calculate Yield Of Production:

In this project, crops price is calculated by quality of the crop is identified using ranking process. By this process the min and max rate of crop production is also notified. The importance of crop production is related to harvested areas, returns per hectare (yields) and quantities produced. Crop yields are the harvested production per unit of harvested area for crop products.

b. Predict Crop Value:

In this module the crop value is predicted by applying machine learning algorithms to the collected and train data. So that we can know the crop min max value of the crop at any particular area i.e. based on the input.

c. Accuracy on Test Set:

We got an accuracy of 90.7% on test set.

5. RESULT & DISCUSSION

The concept involves considering past, present, and future rainfall totals in addition to last year's prices. Based on these factors, machine learning algorithms are employed to estimate crop prices, yielding more precise forecasts. A well-performing crop price forecasting system can provide customers with more options that will satisfy them. They are ultimately shown as a web application to make the results easily accessible to poor farmers. In a revolutionary way, machine learning-based price prediction combines technical and fundamental analysis methods.

TABLE

Algorithm	Accuracy (%)
Random Forest (RF)	95%
Support Vector Machine (SVM)	89%
Artificial Neural Networks (ANN)	92%
Multivariate Linear Regression (MLR)	85%
K-Nearest Neighbors (KNN)	88%

Comparison Table of Algorithms

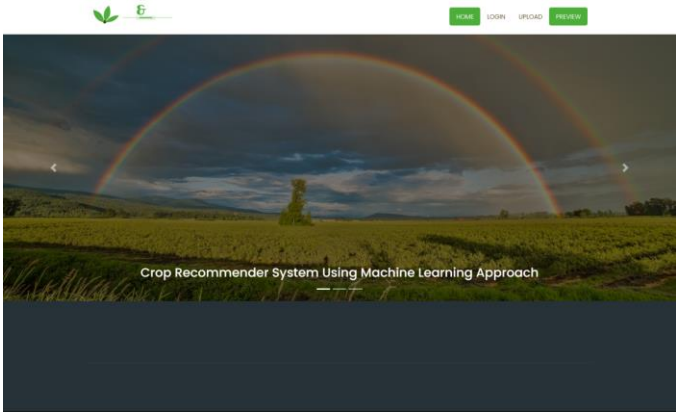

Fig 2: Figure of Home Page

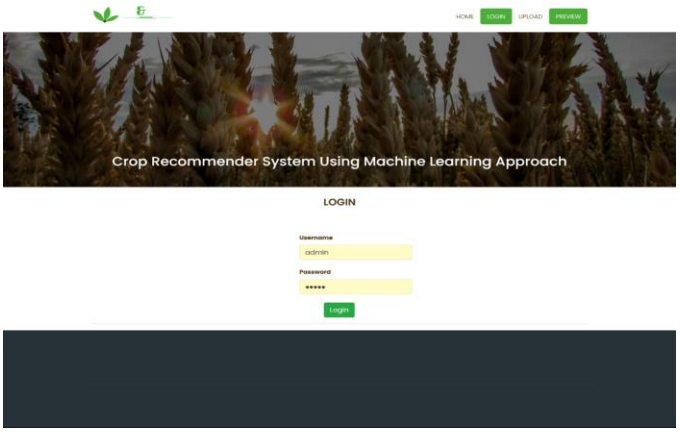

Fig 3: Figure of Login Page

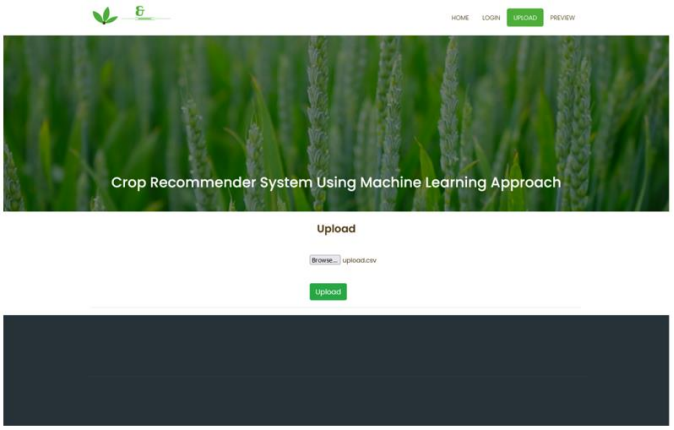

Fig 4: Figure of Upload Page

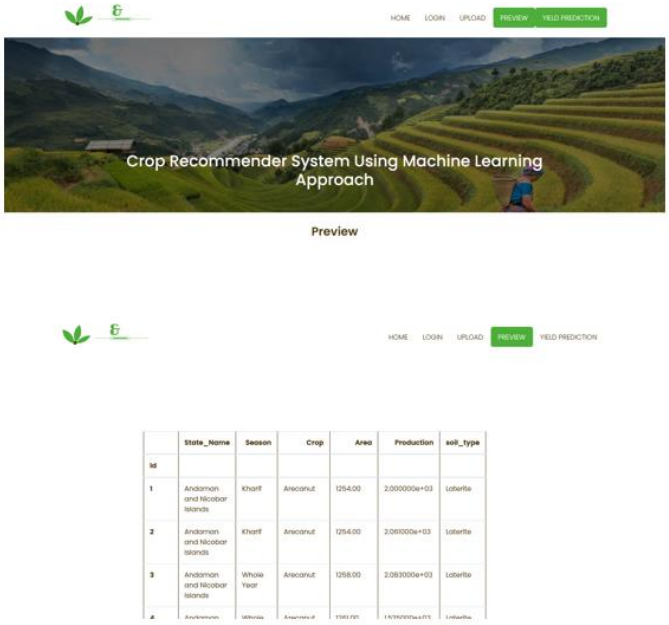

Fig 5: Figure of Preview the data page

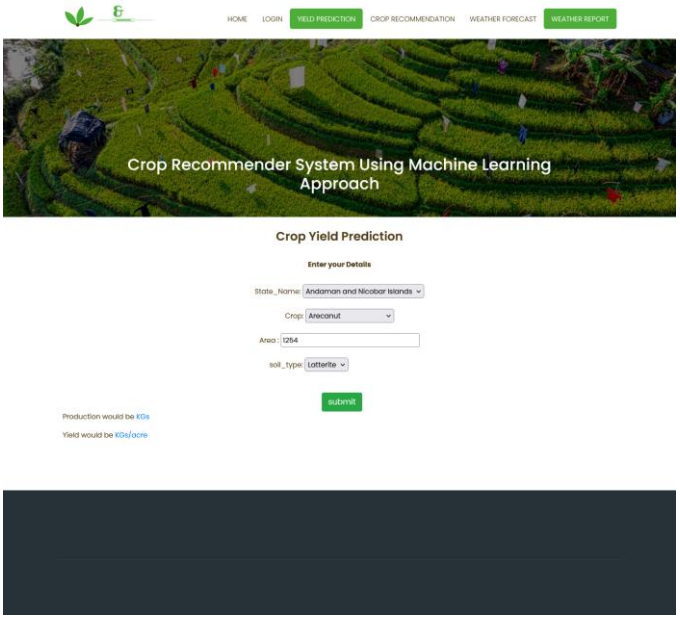

Fig 6: Figure of crop yield predication details box

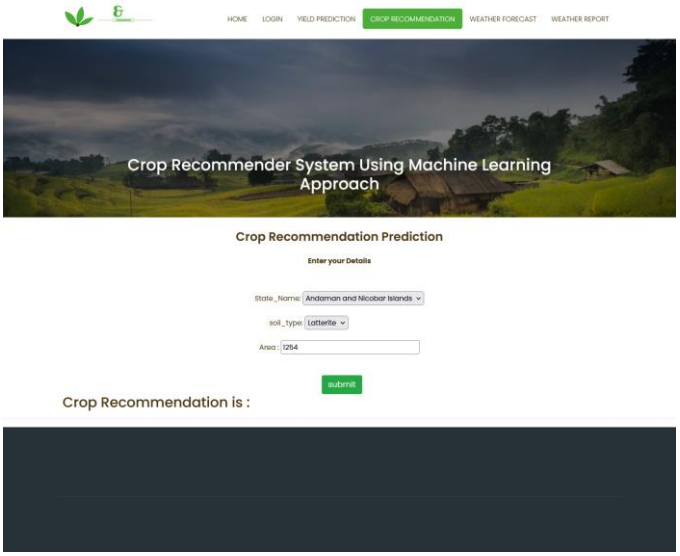

Fig 7: Figure of Crop Recommendation Prediction details box

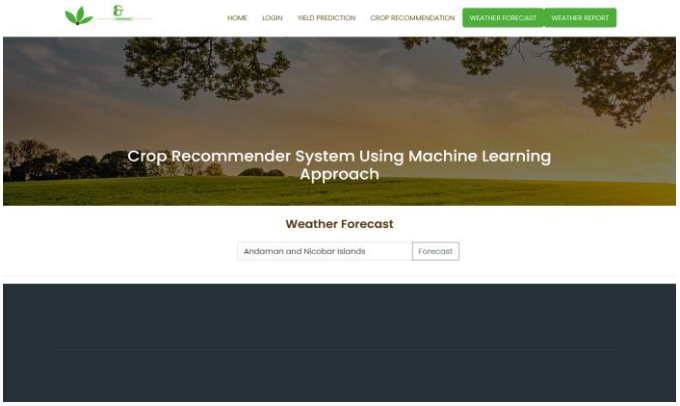

Fig 8: Figure of Weather Forecast page

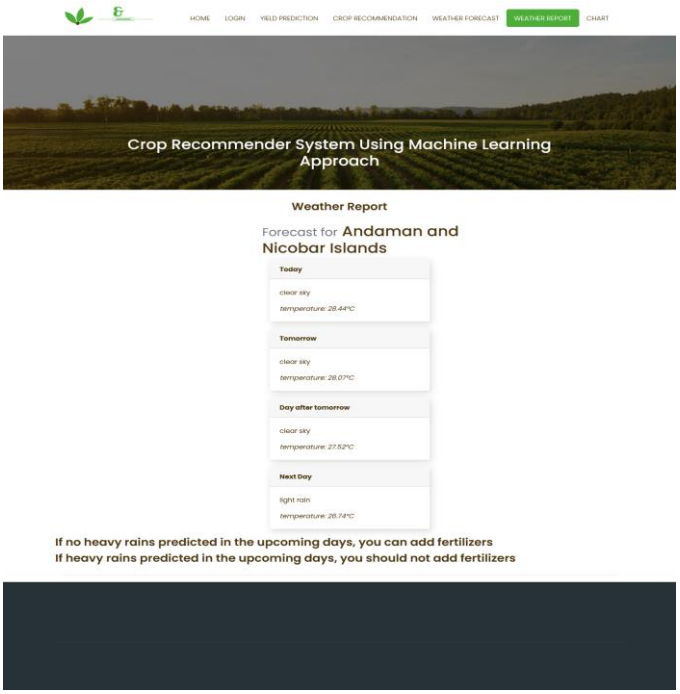

Fig 9: Figure of Weather Forecast Report Page

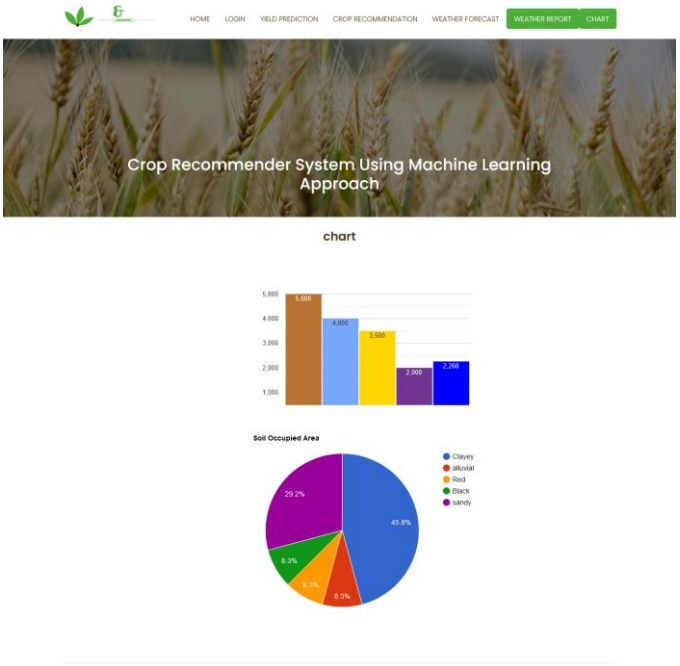

Fig 10: Graph & Pie Chart view of Crop Recommender System

6. CONCLUSIONS

In this paper, significance of management of crops was studied vastly. Farmers need assistance with recent technology to grow their crops. Proper prediction of crops can be informed to agriculturists in time basis. Many Machine Learning techniques have been used to analyze the agriculture parameters. Some of the techniques in different aspects of agriculture are studied by a literature study. Blooming Neural networks, Soft computing techniques plays significant part in providing recommendations. Considering the parameter like production and season, more personalized and relevant recommendations can be given to farmers which makes them to yield good volume of production.

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 Advence 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-theArt and Possible Extensions,” IEEE Trans. Knowledge and Data Eng., vol. 17, no. 6, pp. 734-749, June.
16. Avinash Jain, Kiran Kumar (2016),”Application of Recommendation Engines in Agriculture”, International Journal of Recent Trends in Engineering & Research, ISSN: 2455-1457