IARJSET

ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024

DOI: 10.17148/IARJSET.2024.11714

Crop Production Enhancement Portal for Farmers

Pavankumar P[1], Vishvanath A G[2]

M.C.A 4th Sem, Dept. of MCA, Bangalore Institute of Technology, Bangalore[1]

Professor, Bangalore Institute of Technology, Bangalore[2]

Abstract: The Agriculture Portal is an innovative platform that improves crop yields by providing farmers with easy access to agricultural information, resources and tools. The portal offers a wide array of features such as weather predictions, crop planning tools and real time market prices. This technical paper describes the development and implementation of the Agriculture Portal, focusing on its features and functionality. The paper also discusses the benefits of the portal for farmers, including increased productivity, improved decision-making, and increased profitability. The portal is based on a robust technology platform that is scalable and adaptable to the needs of farmers of different sizes and geographical locations. It is designed to be user-friendly and accessible on multiple devices including mobile phones and tablets. Agriculture portals represent a major advancement in the use of technology in agriculture and have the potential to transform agriculture and increase crop yields around the world by giving farmers easy access to information and resources.

Keywords: Agriculture portal, Crop yield, Farmer, User friendly.

I. INTRODUCTION

Agriculture is the backbone of any country and has become the fastest growing sector across the world due to population growth. Around 60% of our country's population is engaged in agriculture, which contributes significantly to our country's GDP and employment. The biggest challenge for agriculture is to improve its efficiency and quality to meet the rapidly growing demand for food. In addition to the growing population, climatic conditions also pose a major challenge for agriculture. In our project, we use ML algorithms to help farmers predict future crop yields and favorable weather forecasts. It also helps farmers sell their crops directly to customers.

An agriculture portal is an online platform that provides farmers and other stakeholders in the agriculture industry with access to various resources and services. The main objective of such portals is to help farmers improve their crop yields and profitability by providing information, tools and services that help them make informed decisions and adopt best practices.

Some of the basic concepts central to an agriculture portal for achieving better crop yields are:

Market Intelligence: This refers to the information farmers need to make informed decisions about when and at what price to sell their harvest. Agriculture portals give farmers access to real-time market information that helps them achieve the best possible outcomes.

Weather Data: As weather is very important for agriculture, farmers need to be able to plan their planting and harvesting schedules according to the weather. It is important to. The Agriculture Portal gives farmers access to weather alerts and forecasts that help them make decisions about pest control, irrigation, and other operations. Exemplary Practices.

Best Practices: Because agriculture is a complex and constantly evolving industry, farmers need to stay up to date with the latest best practices and procedures. Farmers will have access to a wide variety of tools and inputs that can help them improve their farming practices.

II. LITERATURE SURVEY

[1] The features used most are temperature, precipitation and soil type while the models use Artificial Neural Networks. The author used factors like State, district, season, and area. The user can determine the crop yield in a given year. For example, the paper has utilized Kernel Ridge Regression and Lasso which are advanced regression techniques to predict yield of maize as well as Stacking Regression that enhances the algorithms for better forecasts.

IARJSET

ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024

DOI: 10.17148/IARJSET.2024.11714

[2] In this article, the authors explain that yield forecasting was performed taking into account farmers' experience with a particular field and crop. In agriculture, various data mining techniques are used and evaluated to estimate next year's crop yield. This is achieved by applying association rule mining on agricultural data. This research focuses on creating a predictive model that can forecast future crop yields. This article presents a brief analysis of crop yield forecasting using association rule-based data mining techniques for a selected region.

[3] The author describes how the old farming data can be utilized to depict the future expectation of harvests and yield. It likewise proposes to the ranchers what kind of yield can be developed utilizing the climate station data and gives the appropriate data to incline toward the precise season for cultivating. The curse on the harvest yield is broken down by utilizing different ecological elements and Regression Analysis (RA), Linear Regression (LR) Algorithms utilizing the various data mining strategies how to improve harvest production.

[4] This paper uses machine learning algorithms, direct relapse demonstrated from insights, and two enhancement techniques, the Normal condition strategy, and the Gradient plunge technique to anticipate the weather based on a couple of parameters. This work utilizes the ordinary condition model's speculation and contrasts it and the angle plunge model to give a superior thought of the productivity of the models. This paper is about the use of machine learning algorithms, direct relapse demonstrates from inside, and two enhancement techniques.

[5] This paper explores a semiparametric deep neural network approach to modeling of yields that accounts for complex, nonlinear relationships in large datasets and known parametric structure with unobserved heterogeneity across cross-sections. It is demonstrated here that this method outperforms the traditional statistical techniques as well as fully nonparametric neural networks in its ability to predict the withheld year yields. Our approach is less pessimistic in the warmest regions as well as in warmest scenarios.

[6] This paper predicts agricultural crop yields for all crops grown in India. This script is unique because it only needs basic information like state, district, season, and area to work. By referring to any year of choice, this paper can also show the crop yield forecasted for that year. Different yield prediction models such as Lasso, ENet, and Kernel Ridge were used in this paper and Stacking Regression was applied to improve these models' accuracy.

[7] This paper anticipate things like rainy, windy, sunny, stormy, floods and variations in temperature, etc. Nowadays, the weather is making a bad impact, as society is growing more and more, causing much damage, injury, and loss of life for farmers. Weather forecasting is very important in case of agriculture and terrace gardening. Weather forecasting will help remote areas for better crop production. In this paper, a low-cost solution for weather forecast prediction is discussed.

[8] This report includes several algorithms, such as Random Forest, Support Vector Machine, Weather, and k-nearest neighbors, that are referred to as being able to give the results of the weather parameters prescribed in a specific period with higher accuracy. Their team also collects soil and weather data such as soil type, soil fertility, maximum temperature, minimum temperature, and rainfall which are employed to determine appropriate crops for given farms or land.

[9] A set of information is collected from a variety of sources and the data provided is used for analysis (descriptive and diagnostic). For the past ten years annual crop summaries have been used. The datasets accept the behavior of anarchic time series. Combining the primary and necessary abstracts the Random Forests approach is used for Global and Regional Crop Yield Predictions. To anticipate prospective possibilities Commanded device learning algorithms can be devoted to what has existed comprehended in history utilizing labeled instances. After a sufficient amount of practicum, the method can yield marks for any untested practical information.

[10] Pre-product costs and reflect costs for the next 12 months are recommended. The flash- based website is used to display data and the website operates with an adequate machine to understand algorithms and communication technologies that are easy to use for users. The job data sets used provide information showing the cost and demand of the market plants. This program allows farmers to solve their problems and increase their income .Various algorithms such as decision trees, vector support machines, neural networks, in-depth learning, etc. are used to predict crop prices. The proposed model uses a machine.

III. PROPOSED SYSTEM

The suggested portal is a web application that allows farmers to sell their products directly to consumers without a middleman. The process aids in product development and testing.

IARJSET
ISSN (O) 2393-8021, ISSN (P) 2394-1588
International Advanced Research Journal in Science, Engineering and Technology
Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024
DOI: 10.17148/IARJSET.2024.11714

While implementing the front end, we are concerned with how it appears. After creating it, we test it and discuss what to do next and how we can improve. In order to give farmers and customers quick access to important data and tools that can aid in better decision-making, increased production, and improved livelihoods, we have developed an online platform.

IV. METHODOLOGY

1. Data Acquisition and Preprocessing:

- Identify the problem statement and the type of data required to solve it.
- Collect the required data from different available sources like databases, APIs, or web scraping.
- Clean the data by removing any irrelevant or inconsistent entries, handling missing values, and dealing with outliers.
- Preprocess the data by performing tasks like normalization, feature scaling, feature engineering, and encoding categorical variables.

2. Model Development:

- Choose an appropriate machine learning algorithm or a combination of algorithms based on the problem type and the nature of the data.
- Split the preprocessed data into training and validation sets. The training set is used to train the model and the validation set is used to tune its parameters and evaluate performance during development.
- Define the model architecture or structure, including the number and type of layers (in the case of neural networks) or the configuration of the algorithm.
- Set hyper parameters, such as learning rate, regularization strength, and batch size, which control the learning process.

3. Model Training:

- Feed the training data into the model and use an optimization algorithm (e.g., gradient descent) to update the model's parameters iteratively.
- Monitor the model's performance on the validation set during training to detect overfitting or under fitting and adjust hyper parameters accordingly.
- Continue training until the model achieves satisfactory performance on the validation set or converges to a stable state.

4. Model Testing:

- Once training is complete, evaluate the trained model's performance on a separate, unseen test dataset.
- Calculate various evaluation metrics (accuracy, precision, recall, F1 score, etc.) to measure the performance and assess its suitability for the problem.
- Analyze the performance and make any necessary adjustments on results.

5. Deployment:

- Prepare the model for deployment by packaging it in a format suitable for the chosen deployment environment (e.g., a serialized model file or a containerized application).
- Integrate the model into the target system, which may involve writing code to handle input/output, data preprocessing, and interacting with other components of the system.
- Test the deployed model thoroughly to ensure it functions correctly in the production environment.
- Monitor the performance of the and collect feedback from real-world usage to continuously improve and update the model if necessary.

ARCHITECTURE

There are 3 modules in our project, farmer module, customer module and admin module.

The below figure 4.1 is the design of our project Farmer's assistance portal for better crop production. The Farmers and customers can login to the portal and make use of various options available in their respective domain.

IARJSET
ISSN (O) 2393-8021, ISSN (P) 2394-1588
International Advanced Research Journal in Science, Engineering and Technology
Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024
DOI: 10.17148/IARJSET.2024.11714

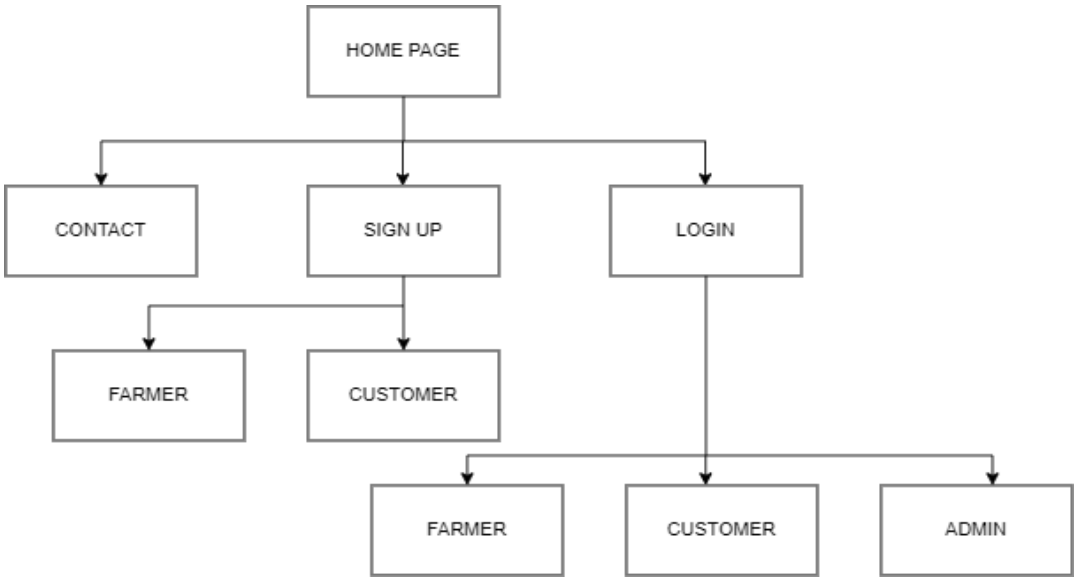

Figure 4.1. Architectural Design

V. COMPONENT DESIGN

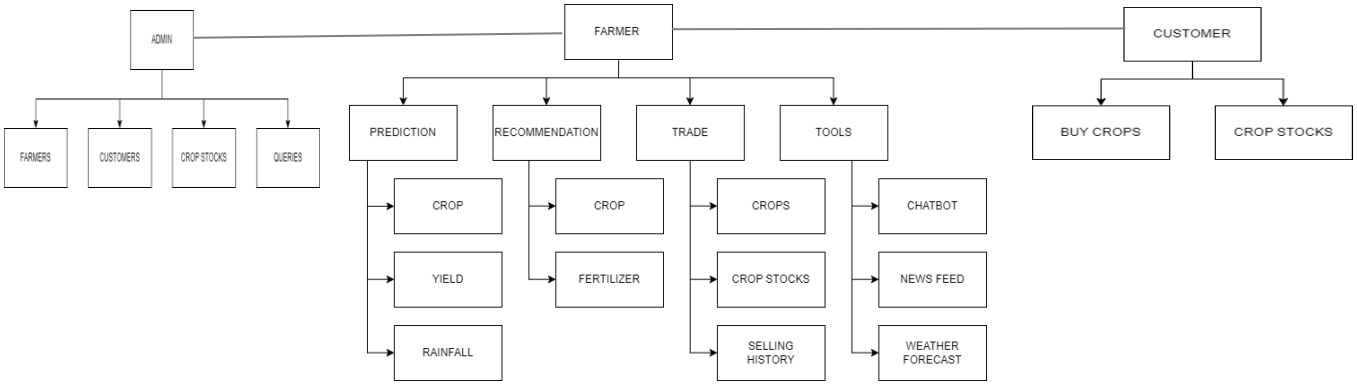

Figure 5.1 Component Design

In admin module of above figure 5.1. First the admin has to signup/login to the portal. Later the admin will be redirected to his/her profile. The admin will have access to the various options that are available after logging in to the portal. The various options the admin can make use of are farmers list, customers list, crop stock and queries. In farmers list, the admin will be having access to the list of farmers who have registered to the portal. In customers list, the admin will be having access to the list of customers who have registered to the portal. In crop stocks, the admin will have the list of available crops which the customers can buy. In queries, the admin will be getting the queries which the user of the portal has sent through the contact us option.

In Farmer module of above figure 5.1. First the farmer has to signup/login to the portal. Later the farmer will be redirected to his/her profile. The farmer can make use of various options that are available after logging in to the portal. The farmer can make use of prediction, recommendation, trade and other tools. In prediction, farmer will be getting predictions for crop, yield and rainfall. In the recommendation, the farmer will be getting recommendations about crop and fertilizers that can be used. In trade, the farmer will be able to enter the crops that he/she wishes to sell and then the farmer has access to view the crop stocks. The farmer will also be having history of the sales. In tools, the farmer has options such as Newsfeed and weather forecast. If farmer has any queries, then he/she can clarify the doubts through chat bot. The farmer will be getting new updates related to agriculture through news feed.

IARJSET
ISSN (O) 2393-8021, ISSN (P) 2394-1588
International Advanced Research Journal in Science, Engineering and Technology
Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024
DOI: 10.17148/IARJSET.2024.11714

In customer module of above figure 5.1. First the customer has to signup/login to the portal. Later the customer will be redirected to his/her profile. The customer can make use of various options that are available after logging in to the portal. The various options the customer can make use of are buying of crops and crop stocks. In buy crops, the customer first has to add the crop which he/she wants to buy and later the farmer has to proceed with the payment. After the successful payment, the farmer will be getting the invoice of his/her payment. In crop stocks, the farmer will have the available crops. With the crop stocks the farmer can purchase the required crops.

VI. ALGORITHMS

Machine learning techniques such as Random Forest, Support Vector Machine (SVM), and Decision Tree are essential for utilizing agricultural data in crop recommendation prediction, enabling farmers to receive precise and meaningful suggestions. An ensemble learning technique called Random Forest combines several decision trees to provide reliable predictions. It is proficient in identifying the best crop selections based on complex agricultural characteristics including soil composition, weather dynamics, and geographical features since it is good at both type of tasks such as classification tasks and also the regression tasks.

Farmers can receive trustworthy suggestions from Random Forest that take into consideration the inherent diversity in agricultural datasets by combining forecasts from many decision trees.

VII. PERFORMANCE ANALYSIS

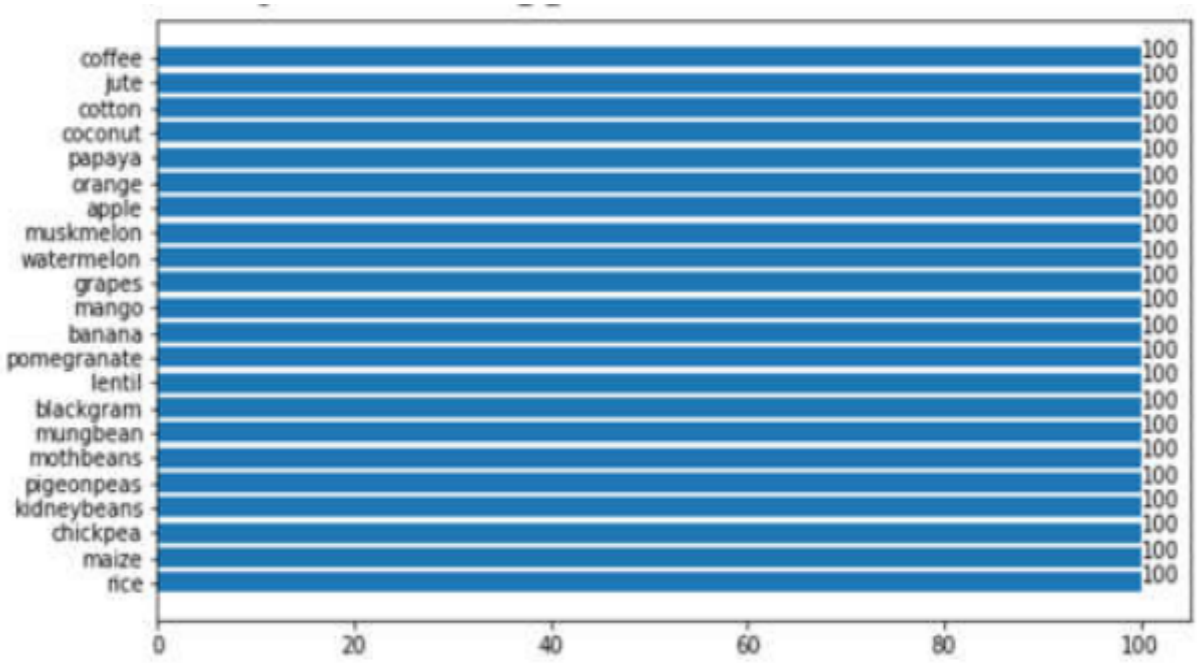

Figure 7.1 Different Labels of Corp

Figure 7.1 represents a horizontal bar chart with numerous crops indicated on the y-axis, and every one of these has a matching value on the x-axis, which is scaled from 0 to 100. Interestingly, each and every crop listed—from drinks like coffee, to grains like cotton and jute, to fruits like apples and oranges, and to staples like maize and rice—all have the same value of 100.

This uniformity across the board shows that the chart might be displaying a certain element where each crop achieves the same amount of a given metric, either a standard, quota, or a level of importance. But because there isn't a clear distinction or comparable scale offered, it's difficult to determine the exact interpretation with the available data. Only with more background or information will it be possible to fully comprehend the significance of the value 100 assigned to each crop and the true intent behind its creation.

IARJSET
ISSN (O) 2393-8021, ISSN (P) 2394-1588
International Advanced Research Journal in Science, Engineering and Technology
Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024
DOI: 10.17148/IARJSET.2024.11714

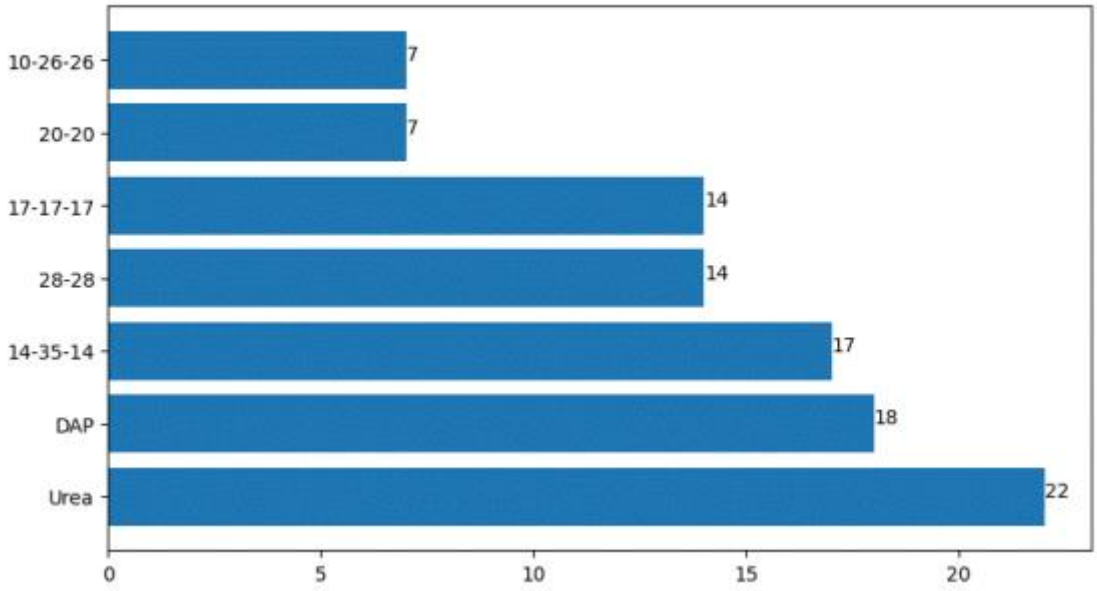

Figure 7.2 Different Labels of Fertilizer

Figure 7.2 displays a horizontal bar chart with different bars labelled with what appear to be fertilizer varieties. Every bar depicts a different type of fertilizer, and its length indicates how many instances of that type of fertilizer there are in a broader dataset. By choosing the unique values from the "Fertilizer Name" column, the labels on the y-axis represent the unique names of the fertilizers, which are obtained from the dataset. On the x-axis are the counts, which show the number of times each fertilizer name appears in the dataset. In the chart, the bars are sorted in ascending order based on count values, with the lowest counts at the top and the highest at the bottom. There is a numerical value representing the count for that specific fertilizer next to each bar. This value represents the frequency of each fertilizer in the dataset and correlates to the bar's length. The fertilizer that has the largest number is labelled "Urea," and its count of 22 indicates that it is the fertilizer that appears most frequently in the dataset. Other fertilizers, like the two at the top of the chart, each with a count of 7, have lower counts.

VIII. CONCLUSION

This paper brings in various Machine Learning algorithms to predict crop yield based on weather and other conditions. This project will develop a portal that utilizes machine learning algorithms that predict crop yield, weather, and recommended fertilizers. Decision trees will provide the most accurate predictions for crop yield, weather, and recommended fertilizers.

The forecasting system will take the user's input and provide the best and most accurate crop yield prediction analysis. The portal will also convey information on the best plants and the specific fertilizers required for those plants. The results also showed that the Random Forest classifier provides the highest accuracy in weather forecasting and fertilizer recommendations. This portal also helps in cost control. This enables farmers to make informed decisions regarding crop selection, fertilizer usage, and overall cost control. The robustness and reliability of our system is confirmed by experiments conducted on a reliable dataset.

IX. FUTURE ENHANCEMENT

As a future scope, the web-based application can be made more user-friendly by targeting more populations by including all the different regional languages in the interface and providing a link to upload information instead of entering the test value manually. To attain a recommended output of agriculture production and distribution for farmers, research work can be further developed. By using the recommender system, the farmers will be in a position to make their own decisions such as which season to sow which crop in to ensure better profits for themselves. This system works for structured datasets or databases.

IARJSET

ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 7, July 2024

DOI: 10.17148/IARJSET.2024.11714

REFERENCES

[1] "Crop Yield Prediction Using Machine Learning Algorithms: A Systematic Review" by S. Singh and S. Bajwa (DOI: 10.3923/jas.2020.3677.3685)

[2] "Crop Recommendation System Using Machine Learning Techniques" by S. Sharma and A. K. Singh (DOI: 10.5120/ijarcet2020936448)

[3] "A Survey of Crop Recommendation Systems Based on Data Mining Techniques" by R. P. Gupta et al. (DOI: 10.5220/0009828600610070) Chatbot Development:

[4] "Design and Implementation of Chatbot for Agriculture Domain" by S. Gupta and A. Goyal (DOI: 10.5120/ijca2020921742)

[5] "A Review of Chatbot Implementation in Various Domains" by M. B. Sood and S. Kaur (DOI: 10.5120/ijca2019918585)

[6] Weather Forecasting in Agriculture: "Weather Forecasting for Agriculture: A Comprehensive Review" by A. K. Dube and P. K. Vishwakarma (DOI: 10.26724/ijcscs.2018.10.12.169) "

[8] Role of Weather Forecasting in Agriculture: A Review" by S. R. Prasad and S. Kumar (DOI: 10.20546/ijcmas.2019.805.075)

[9] E-commerce in Agriculture: "E-commerce in Agriculture: Challenges and Opportunities" by M. H. Qureshi et al. (DOI: 10.7287/peerj.preprints.26970v1)

[10] "The Role of E-commerce in Agricultural Marketing: A Review" by A. K. Singh and P. K. Jha (DOI: 10.1108/jadee-10-2018-0138

[11]. Ansarifar, J., Wang, L. & Archontoulis, S.V. An interaction regression model for crop yield prediction. Sci Rep 11, 17754 (2021). https://doi.org/10.1038/s41598-021- 97221-7 [12]. Crop Yield Prediction using Machine Learning Algorithms (2021)

[12]. Ranjani Dhanapal et al 2021 J. Phys.: Conf. Ser. 1916 012042 Crop price prediction using supervised machine learning algorithms

[13]. Jain, Ayush & Marvaniya, Smit & Godbole, Shantanu & Munigala, Vitobha. (2022). Towards Context-based Model Selection for Improved Crop Price Forecasting. 10.1145/3493700.3493725. (January 2022).

[14]. AIGGPA; Crop price prediction using machine learning in Madhya Pradesh; A pilot study, Atal Bihari Vajpayee Institute of Good Governance and Policy Analysis, March 2020.

[15]. Ghutake, I., Verma, R.K., Chaudhari, R., & Amarsinh, V. (2021). An intelligent Crop Price Prediction using suitable Machine Learning Algorithm. ITM Web of Conferences.

[16]. Ashoka, D. V., Abhilash, C. B., & Bharath, M. B. (2019, March). A Framework for Enhancing the Agriculture yield using Cloud Clusters. In 2019 1st International Conference on Advanced Technologies in Intelligent Control, Environment, Computing & Communication Engineering (ICATIECE) (pp. 162- 166). IEEE.

[17]. Chetan, R., Ashoka, D.V., Ajay Prakash, B.V. (2021). Smart Agro-Ecological Zoning for Crop Suggestion and Prediction Using Machine Learning: An Comprehensive Review. In: Chiplunkar, N., Fukao, T. (eds) Advances in Artificial Intelligence and Data Engineering. Advances in Intelligent Systems and Computing, vol 1133. Springer, Singapore. https://doi.org/10.1007/978- 981-15-3514-7_94

[18] "Towards Context-based Model Selection for Improved Crop Price Forecasting", 5th Joint International Conference on Data Science & Management of Data (9th ACM IKDD CODS and 27thCOMAD), 2022

[19] "Crop Yield Estimation in India Using Machine Learning", 2020 IEEE 5th International Conference on Computing Communication and Automation (ICCCA), 2020 Publication.

[20] Meta-Learning Based Adaptive Crop Price Prediction for Agriculture Application", 2021 5th International Conference on Electronics, Communication and Aerospace Technology (ICECA), 202

