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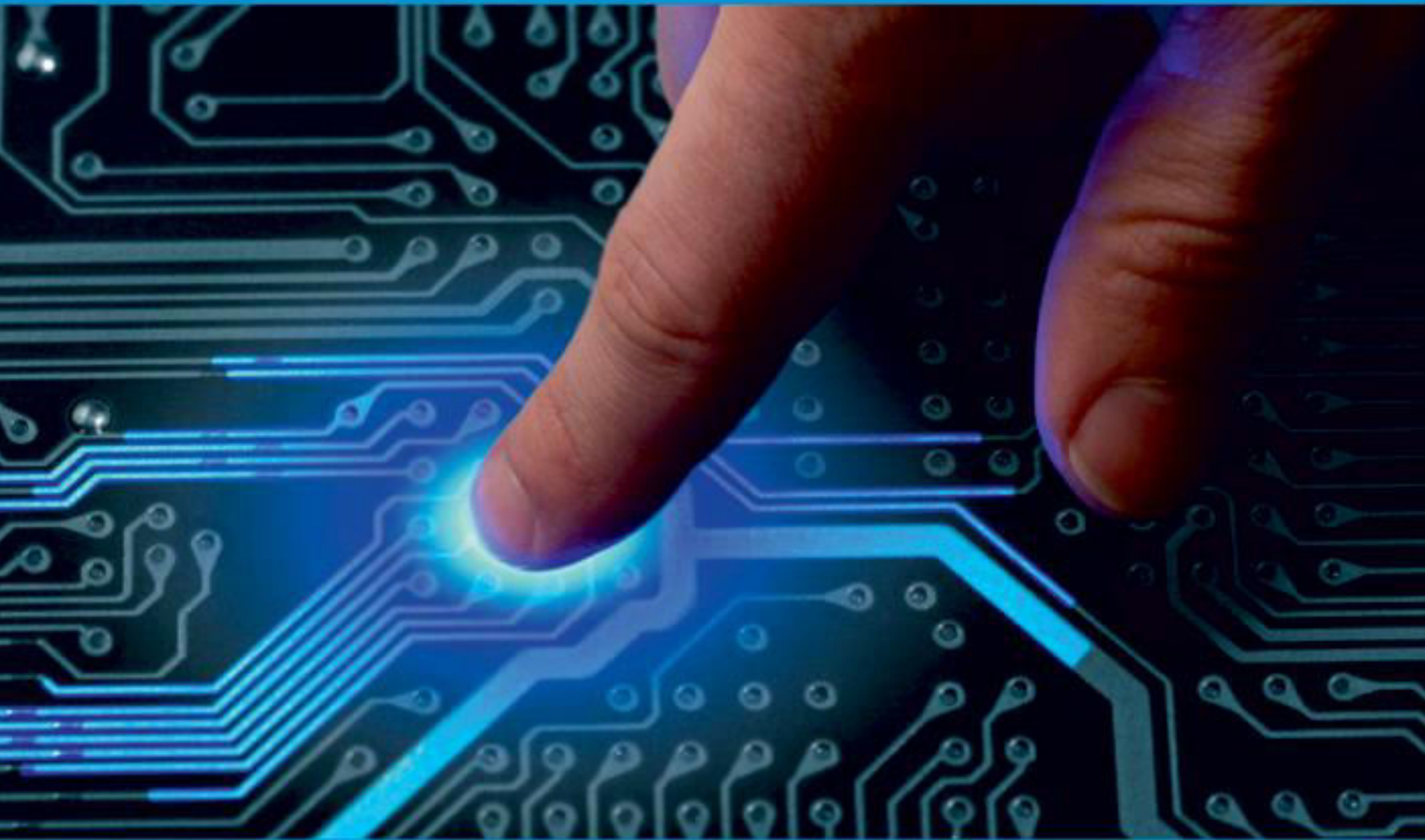

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Deep Harvest: Leveraging Deep Learning Algorithms and Advanced Analytics to Improve Crop Yields

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ABSTRACT: India is the second largest populated country in the world and one of the largest food exporters in the world. Most people who live in India by inheritance or environmental choices opt for farming as their occupation. Farmers often grow crops repeatedly every year with the same pattern of crop types and use the same fertilizers, which makes the soil lose their nutrients and minerals and also they struggle to find the right disease. These are some of the issues or problems faced by the farmers. There has been many schemes and plans conducted by the government to educate the farmers about the crops and to make farmers adaptable to the technologies. This paper helps the farmers to know the right crop to grow in their location and to get more information about the disease and get suggestions about the right fertilizer to be used. The system also includes a community section where farmers can post or update their problems related to crops, which can be viewed by any individual and can suggest them in the process to cure the disease. With the help of machine learning algorithms and predictive analysis, the farmers are offered to grow healthy crops and recommend fertilizers and help through problems of the disease of the crops. With the help of Flask and Heroku, a farmer-community-based blog can be developed, allowing farmers to communicate and share their problems.

KEYWORDS: Machine learning, Convolutional neural networks, Resnest, and Image recognition.

I. INTRODUCTION

The key economic engine of India is its agri-business industry. India's population of 70% is completely reliant on agriculture.

Selecting the proper yield is the main concern of young Indian ranchers. Depending on the underlying conditions.This script makes novel by using simple parameters like state, district, season, and area and the user can predict the yield of the crop the user wants. Because of this, users face a genuine difficulty in efficiency. Our work proposes to assist ranchers with deciding the dirt quality by examining its different boundaries and recommending crops dependent on the outcomes acquired utilizing the information mining approach. In order to benefit farmers, the system is being developed utilizing machine learning techniques. Based on information like meteorological characteristics, the system would recommend the ideal crop for the land. Also, the system offers details on the types and amounts of fertilizers needed for production. So, farmers may grow a new variety of crops, boost their profit margin, and prevent soil contamination by using this technology.

The model also offers a function where a farmer may upload a picture of a plant or leaf that is sick and receive instructions on how to take care of the plant and fertilizer for the next step. Also, this method explains the origin of diseases and offers plant-care warnings. This system even offers a blog for the farmer community where the farmers can share their opinions on the suggested item or crop diseases that are being contracted. Everyone can see that and respond to it.They are all part of the Flask web app, which gives users the choice of going to crops, fertilizer, disease detection, or the community to acquire the required results..

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II. LITERATURE SURVEY

During the past few years, academics and automakers have researched this issue statement in great detail to develop a solution. All of their ideas diverge based on how they analyzed the crop or fertilizer prediction. Below are a few of the studies that were done:

The work of P. A, S. Chakraborty, A. Kumar and O. R. Pooniwala .[1]in 2021 is the inference is that he used different types of algorithms for the recommendation of the system but there are other ways to increase the efficiency of the model.

Some studies were conducted using different ML algorithms, primarily, through Random Forest Classifier, SVM. It has been used to show differences in how the soil reacts to the rainfall and what kind of crop must be used, and the fertilizers can be used.

Based on the work done by Mrs.S. Vaishnavi, M. Shobana, R. Sabitha and S. Karthik in 2021 [2]This model is purely based on the season and the crops cultivated in that season but the system can also take many other attributes to get the crop efficiently.On the analysis of the work by Mr. Suresh, G., M[3] in 2021Used various types of different algorithms to predict the type of fertilizer but failed in getting better accuracy. The system can even consider using crop and get it better.

Mr. Kodimalar Palanivel and C.Surianarayanan. [4]in 2021 has developed a model that works on Prediction using Big Data Techniques in which it is a unique way to do these kinds of models and it didn’t show many good results in the accuracy and to improve that he can use the mix of the ML and Big Data to yield still better results.

On the inference of S.P.Raja, G.Mariammal, A.Suruliandi and E.Poongothai (2021) [5] has given a different kind of approach based on soil with hardware using modified recursive feature elimination technique with various classifiers.

Based on the inferences given by Nischitha, K.Mahendra, N.DhanushVishwakarma, and Manjuraju, MR.Ashwini. [6]in 2020 This research recommends the crop by using different kinds of algorithms but mainly based on the factor rainfall factor which isn’t much recommendable

Mr. Patil.P, Panpatil.V and Kokate.S [7] developed a model in 2020 based on KNN and various kinds of decision tree algorithms with processing in large data sets. But the final decision is to go with Random Forest Classifier which doesn’t seem well, while the other models can also achieve better accuracy.

Based on the inferences by Mr. Ghadge, R., Kulkarni, J., More, P., Nene, S., & Priya, R. L. (2019). Prediction of crop yield using machine learning. Int. Res. J. Eng. Technol.(IRJET), 5.[8] Used different types of Techniques in solving the problem statement and yet did not succeed in finding the efficient way due to not used updated algorithms.

Militante, Sammy V., Bobby D. Gerardo, and Nanette V. Dionisio [9] The system is good with the algorithm and gives efficient results but detects only less no . of diseases.

Subramanian, Kanaga Suba & Rishi, R. &Sundaresan, E. &Valliappan, Srijit. (2017) [10] Recommends only based on the demand but need to consider other factors to even decrease the cost of farming.

III. METHODLOGY

Any machine learning system may depend heavily on the data. We choose to focus on the Indian state of Maharashtra while putting the system into practice. It was required to gather data at the district level due to the fact that the climate varies from place to place. In order to put the system into place, historical information about the crop and the local climate was required. These facts was obtained from several official websites. The data on the climate was obtained from www.imd.gov.in after www.data.gov.in was used to collect information about the crops in each district of Maharashtra. Precipitation, temperature, overcast, pressure, and the frequency of rainy days are the climatic factors that have the biggest effects on the crop. So, the data about these climatic parameters was gathered at a monthly level.

• Dataset Collection: During this stage, data is gathered from multiple sources and datasets are created. additionally, the provided dataset can be used for analytics (descriptive and diagnostic). Online resources abound, including Data.gov.in and indiastat.org. The yearly abstracts of a crop will be used for at least ten years. These datasets typically permit time series with anarchic behavior. The primary and necessary abstracts were combined. Global and Regional Agricultural Yield Forecasts Using Random Forests.

•Data Partitioning: The entire dataset is divided into two sections, with, for instance, 25% of the data set being set aside for model validation and 75% of the information set being used to train the model. To anticipate upcoming events using label examples, supervised machine learning algorithms can use prior knowledge to make connections between

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previously learned concepts and incoming data. The system may provide targets for any new input after sufficient training. The training algorithm can distinguish between results that are the right, intended output and errors in order to adjust the model appropriately. Unsupervised learning: In contrast, when the knowledge-based train is neither labelled nor categorized, unsupervised machine learning techniques are used. Unsupervised learning does analysis of how systems can infer a function to explain a hidden structure from unlabelled data. so as to explain hidden structures from unlabelled data the system doesn't work out the correct output, but it examines the data and might draw inferences from datasets.

• Random Forest Classifier: The most well-known and effective supervised machine learning algorithm, known as random forest, can perform both classification and regression tasks. It works by building a jumble of decision trees during training and producing outputs for the class that represent the mean prediction (for classification) or mode of the classes (for regression) of the individual trees. The prediction is more reliable the more trees there are in the forest.

IV. IMPLEMENTATION

Data gathering: Gathering the necessary data is the initial phase. Data on past crop productivity, the temperature, the soil, and other pertinent data sources may be included.

Data pre-processing: is the process of cleaning, formatting, and preparing data for analysis once it has been collected. To do this, the data may need to be cleaned up, missing values filled in, and normalised.

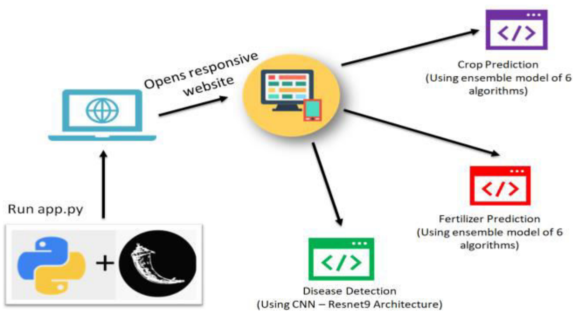
The next step is to choose and develop pertinent traits that can be utilised to forecast crop output. This could entail picking the proper weather factors, soil characteristics, and other elements that can influence crop growth.

•Model selection: After the features are selected, the appropriate machine learning algorithm needs to be chosen for the task. This may involve selecting a regression algorithm, a decision tree algorithm, or other suitable algorithms.

•Model training: With the prepared data, the chosen algorithm must be trained. This entails dividing the data into training and testing sets and teaching the algorithm to predict crop yields based on the chosen attributes using the training set.

•Evaluation of the model: When the model has been trained, it must be assessed using the testing set. This will make it easier to assess the model's accuracy and dependability.

•Deployment: The model can be used after it has been trained and assessed. The model may then be integrated into an existing agricultural system or a user interface may be developed for farmers or agricultural specialists to input their data and obtain forecasts.



V. RESULTS & CONCLUSION

Results

The results can vary depending on the accuracy and effectiveness of the model used, as well as the quality and availability of the data used. However, some potential results and conclusions that can be drawn are:

Increased crop yields: Accurate crop predictions can help farmers optimize their crop management practices, leading to higher yields and increased profits.

Cost savings: By predicting crop yields and identifying potential issues early on, farmers can save on costs associated with fertilizers, pesticides, and other inputs.

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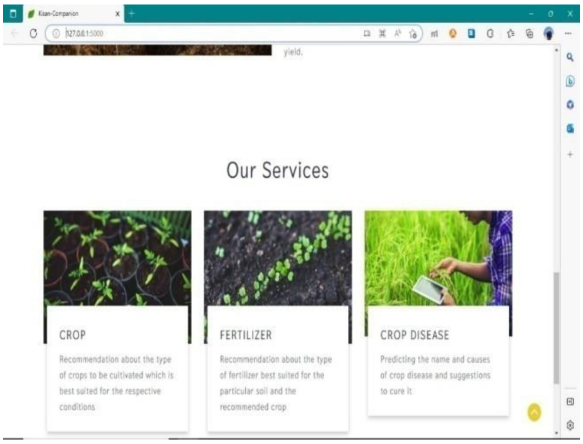
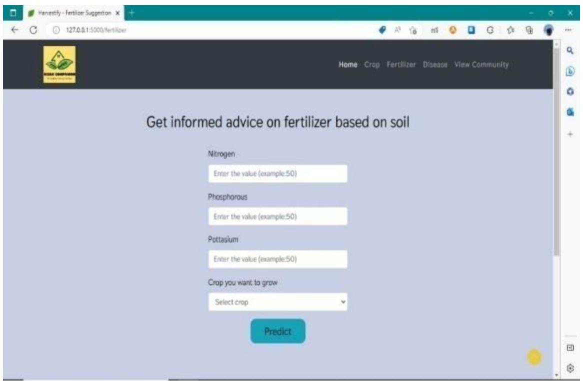
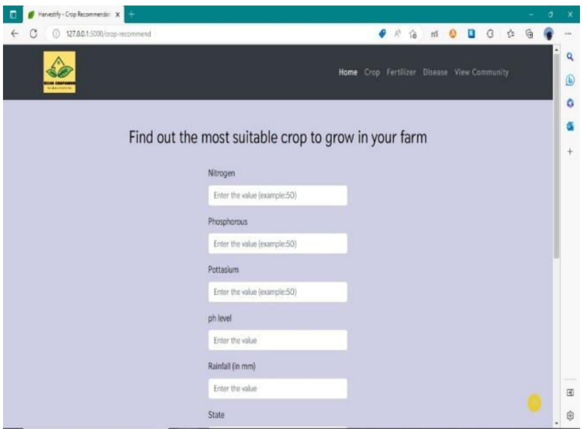
Improved resource management: Crop predictions can help farmers make more informed decisions about resource allocation, such as water usage, which can improve resource efficiency.
Enhanced resilience to climate change: Crop predictions can help farmers anticipate and adapt to changes in weather patterns, improving their resilience to climate change.
Data-driven decision making: By using data and analytics to inform decision-making, farmers can make more informed and data-driven choices, leading to improved outcomes. Challenges and opportunities: It is possible to identify new challenges or opportunities that were not previously considered or understood.







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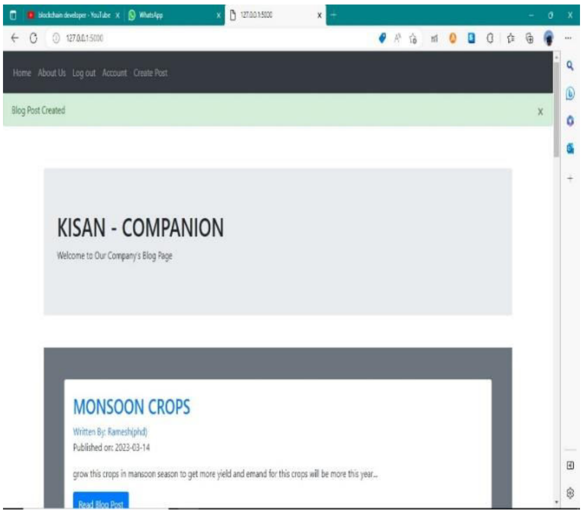

Conclusion

To sum up, it have the potential to offer farmers useful information and advantages, enabling them to optimize their crop management techniques and raise their overall productivity and profitability. This model can predict crop yields with accuracy and dependability by using data from a variety of sources, including weather, soil, and satellite imagery. This enables farmers to make informed decisions about resource allocation, pest control, and other crucial aspects of crop production.

Overall, this category is a crucial field for study and development since they have the potential to benefit farmers greatly and increase the security of the world's food supply.

VI. LIMITATIONS & FUTURE SCOPE

Limitations

Limited data availability and quality: The accuracy of crop prediction models can be limited by the quality and quantity of available data. Limited data availability or poor data quality can lead to inaccurate or unreliable predictions.

Inability to account for all factors: Crop prediction models may not account for all factors that can influence crop yield, such as pest infestations, disease outbreaks, or unexpected weather events.

Limited scalability: Some crop prediction models may struggle to scale up to larger datasets, which can limit their effectiveness and applicability in larger agricultural settings.

Limited adoption: Adoption of crop prediction technology may be limited by factors such as cost, technical expertise, or lack of awareness among farmers.

Future scope

Incorporating more data sources: Advances in technology can enable more data sources to be incorporated into crop prediction models, leading to more accurate and reliable predictions.

Developing more sophisticated models: Advances in machine learning and artificial intelligence can enable more sophisticated models that can account for a wider range of factors and provide more accurate predictions.

Improved adoption: By addressing barriers to adoption, such as cost and technical expertise, crop prediction technology may become more widely adopted by farmers, leading to improved agricultural productivity and sustainability.

Integration with precision agriculture:

Crop prediction models can be integrated with precision agriculture techniques, such as variable rate technology, to enable more precise and targeted application of inputs.

Predictive analytics for supply chain management: Predictive analytics can be used to anticipate crop yields and market demand, enabling more efficient supply chain management and reducing waste. Overall, the future scope includes improving the accuracy and reliability of predictions and making the technology more accessible and widely adopted among farmers, leading to more sustainable and efficient agricultural practices.

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REFERENCES

[1]. Ghadge, R., Kulkarni, J., More, P., Nene, S., & Priya, R. L. (2018). Pre-diction of crop yield using machine learning. Int. Res. J. Eng. Tech-nol.(IRJET), 5.

[2]. Militante, Sammy V., Bobby D. Gerardo, and Nanette V. Dionisio. "Plant leaf detection and disease recognition using deep learning." 2019 IEEE Eurasia conference on IOT, communication and engineering (ECICE). IEEE, 2019.

[3]. Nischitha, K., Mahendra N. Dhanush Vishwakarma, and Manjuraju MR Ashwini. "Crop prediction using machine learning approaches." Interna-tional Journal of Engineering Research & Technology (IJERT) 9.08 (2020).

[4]. Niketa Gandhi, Leisa J Armstrong, RiPtkar, OwaizPetkar, Amiya Kumar, "Rice crop yield prediction in India using support vector machines", Inter-national Joint Conference on Computer Science and Software Engineering, 2016, IEEEexplore.

[5]. P. A, S. Chakraborty, A. Kumar and O. R. Pooniwala, "Intelligent Crop Recommendation System using Machine Learning," 2021 5th Interna-tional Conference on Computing Methodologies and Communication (ICCMC), 2021, pp. 843-848,doi:10.1109/ICCMC51019.2021.9418375.

[6]. Palanivel, Kodimalar, and ChellammalSurianarayanan. "An approach for prediction of crop yield using machine learning and big data techniques." International Journal of Computer Engineering and Technology 10.3 (2019): 110-118.

[7]. Patil, Pavan, Virendra Panpatil, and Shrikant Kokate. "Crop prediction system using machine learning algorithms." Int. Res. J. Eng. Tech-nol.(IRJET) 7.02 (2020).

[8]. S. P. Raja, G. Mariammal, A. Suruliandi and E. Poongothai, "Prediction of Land Suitability for Crop Cultivation Based on Soil and Environmental Characteristics Using Modified Recursive Feature Elimination Technique With Various Classifiers," in IEEE Transactions on Computational Social Systems, vol. 8, no. 5, pp. 1132-1142, Oct. 2021, doi: 10.1109/TCSS.2021.3074534.

[9]. S. Vaishnavi., M. Shobana., R. Sabitha. and S. Karthik., "Agricultural Crop Recommendations based on Productivity and Season," 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS), 2021, pp.883-886,doi:10.1109/ICACCS51430.2021.9441736.

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