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Implementation of Prediction of Crop Using SVM Algorithm

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Abstract: Crop forecasting is the process of predicting the yield or production of crops for a given period based on historical data, weather and other relevant factors. The prediction can be used to inform crop planting, harvesting and marketing decisions. Machine learning and artificial intelligence techniques are increasingly being used to improve the accuracy of crop forecasting. These techniques use algorithms to analyze large amounts of data, such as weather patterns, soil conditions, and crop history, to predict future crop yields.

Crop prediction models can be used by farmers, agribusinesses, and governments to optimize crop management, reduce waste and maximize profit. Accurate crop forecasting can also help mitigate the impact of climate change on agricultural production by enabling farmers to adapt to changing weather conditions and other environmental factors.

Keywords: Cropyield Prediction, SVM Algorithm, Machine Learning, Agriculture, Supervised Learning.

I. INTRODUCTION

Machine learning crop prediction is an application of artificial intelligence that enables farmers to make more informed crop management decisions. It involves using historical data on weather conditions, soil quality and crop yields to create predictive models that can predict future crop yields.

Machine learning algorithms such as Random Forest, Support Vector Machines (SVM) and Artificial Neural Networks (ANN) can be used to predict crop yields. These algorithms analyze historical data and identify patterns that can be used to predict future crop yields. Using machine learning for crop prediction has several advantages. Farmers can make more informed crop management decisions, such as the best time to plant, fertilize or irrigate crops. Predictive models can also help farmers estimate future crop yields and plan harvest and storage accordingly. Machine learning can also be used to identify early signs of crop diseases or pests. By analyzing historical data on pest and disease outbreaks, machine learning algorithms can identify potential risks and alert farmers to take preventative measures.

In summary, machine learning crop prediction is a valuable tool for farmers to optimize crop management and maximize crop yields. By using historical data to create predictive models, farmers can make more informed crop management decisions and identify potential risks before they become major problems.

II. LITERATURE SURVEY

1) Crop Yield Analysis Using Machine Learning Algorithms by Fatin Farhan Haque, Ahmed Abdelgawad, Venkata Prasanth Yanambaka, Kumar Yelamarthi (2020): The paper processes Machine Learning approach for Crop yield analysis using Support vector regression (SVR) and Linear Regression (LR). After going through a series of data recognition the result has been satisfiable depending on the per step taken on validation of the result. The uncontrollable environment parameter helped in understanding the effect on the yield, further assessment with the controllable environment would suffice the everyday need for yield measurement.
2) Crop Yield Prediction using Machine Learning Techniques by Ramesh Medar, Vijay Rajpurohit, and Shweta (2019): This paper concluded that we can improve using Naïve Bayes and K-NN classifier the performance by checking the accuracy between different crops. It helps in selecting the proper crop for their selected land and selected season and helps in getting the maximum yield rate of the crops.
3) A Study on Various Data Mining Techniques for Crop Yield Prediction by Yogesh Gandge, Sandhya (2017): They concluded that predicting a crop well in advance requires a systematic study of huge data coming from various variables like soil quality, pH, EC, N, P, K, etc. According to the study, there is still scope for improvement in the result because most of the authors do not use a unified approach where all the factors affecting the crop yield can be utilized simultaneously for predicting the crop yield.

4) Crop prediction using predictive analytics by P. S. Vijayabaskar, Sreemathi R, Keertanaa E (2017): The paper processes IoT for crop prediction. Application is mainly developed for the farmers to help to the soil fertility and suggest which crop has to be planted. It also suggests the fertilizer which has to be added to the soil to increase the crop yield.
5) Supervised Classification of Spectral Signatures from Agricultural Land-Cover in Panama Using the Spectral Angle Mapper Algorithm by Javier E. Sanchez-Gal (2019): The paper concluded that The Spectral Angle Mapping algorithm (SAM) is used for the supervised classification of the agricultural coverages in the database. On the one hand, results indicate the possibility of using this classification technique for the automatic determination of crops and even different phenological stages in a crop via a satellite image.
6) Supervised Machine learning Approach for Crop Yield Prediction in Agriculture Sector by DR. Y. Jeevan, Nagendra Kumar (2022): The paper processes supervised learning for crop yield prediction using Convolution Neural Network and Tensorflow. Implement a system to predict crop production from the collection of past data. This work is employed to search out the gain knowledge about the crop that can be deployed to make efficient and useful harvesting. The accurate prediction of different specified crops across different districts will help farmers in India.
7) Crop yield prediction using machine learning by Mayank Champaneri, Chaitanya Chandvidkar, Darpan Chachpara, and Mansing Rathod (2020): They concluded that using supervised learning and based on the climatic input parameters the study provided the demonstration of the potential use of data ming techniques in predicting the crop yield based. The developed webpage is user-friendly and the accuracy of prediction is above 75% in all the crops and districts selected in the study indicating higher accuracy of prediction.
8) Crop yield prediction using Deep Neural Networks by Saeed Khaki, and Lizhi Wang (2019): The approach used deep neural networks to make yield predictions based on genotype and environment data. The performance of the model was found to be relatively sensitive to the quality of weather prediction, which suggested the importance of weather prediction techniques. To make the model less of a black box, we performed feature selection based on the trained DNN model using the backpropagation method. The feature selection approach successfully found important features and revealed that environmental factors had a greater effect on crop yield than genotype.

III. EXISTING SYSTEM

1) In existing system, traditionally without knowing the type of soil, without knowing suitable crop.
2) Farmer plants his farm and it many times gives him loss. Farmer don't have the knowledge of crop and soil also.

IV. PROPOSED SYSTEM

1) We need to know the features and characteristics of various soil types to understand which crops grow better in certain soil types.
2) Machine learning techniques can be helpful in this case.
3) Then apply apriority Mining process to generate an association rule for finding suitable crops for the specific soil.
4) Soil series and land type combine represents the soil class in the database.
5) The machine learning methods are used to find the soil class (i.e. soil series and land type). Algorithm are used: SVM.

V. ARCHITECTURE

The architecture for machine learning (ML) crop prediction generally follows a similar pattern, consisting of the following components:

1) *Data Collection:* The first step is to collect data related to crop production, including historical yield data, weather data, soil data, crop management data, and any other relevant information that may affect crop yield or quality.
2) *Data Preprocessing:* Collected data needs to be cleaned, preprocessed and formatted to be suitable for use by ML algorithms. This includes tasks such as data cleaning, data normalization and data augmentation.
3) *Trait Selection:* The next step is to identify relevant traits or variables that can help predict crop yield. Feature selection can be done using techniques such as correlation analysis, principal component analysis, and mutual information analysis.
4) *Split the Data:* Split the pre-processed data into training and test sets. The training set is used to train the machine learning model, while the test set is used to evaluate the performance of the model.

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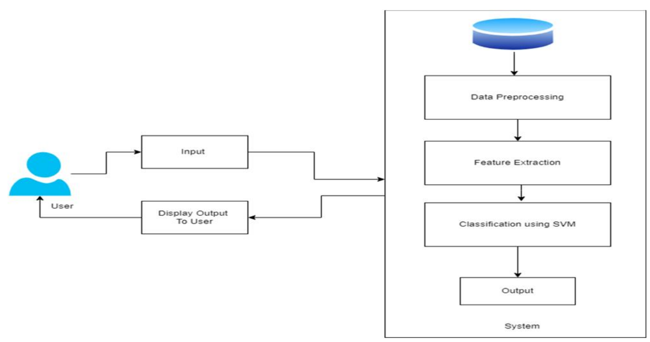
5) *Model Selection:* After selecting the features, an appropriate ML model must be selected. This will depend on the type of data and the problem being addressed. Popular models for crop yield prediction include random forest, support vector machines, artificial neural networks, and K-nearest neighbors.
6) *Model Training:* The selected ML model needs to be trained on pre-processed data. This involves splitting the data into training and validation sets and then using the training set to train the model.
7) *Model Evaluation:* Once the model is trained, it needs to be evaluated using a validation set. This includes testing the accuracy and performance of the model and fine-tuning the model parameters to improve its performance.
8) *Deploy the Model:* Once you are satisfied with the performance of the machine learning model, deploy it in a production environment where it can be used to make crop predictions on new data. This could be in the form of a web or mobile app that farmers can use to get recommendations on which crops to plant and when to plant them.
9) *Prediction:* After the model is trained and validated, it can be used to make predictions on new data. For example, based on weather and soil data for a specific period, a model can predict the yield of a crop for that period.
10) *Monitor and Improve:* Continuously monitor the performance of the machine learning model and gather feedback from farmers and other users. You can use this feedback to improve the model and refine it over time.

Overall, the architecture for ML crop prediction includes data collection and preprocessing, selection of relevant features, selection and training of an appropriate ML model, evaluation of model performance, and prediction on new data.

This architecture provides a general overview of the steps involved in using machine learning for crop prediction. The specific details and requirements of each step may vary depending on the specific problem.

Note: This architecture is a general overview of the process and may vary depending on the specific requirements and constraints of the crop prediction system.



VI. BLOCK DIAGRAM

As in Fig.1, below is the in-general process of how the prediction of the crop is done using Machine Learning:

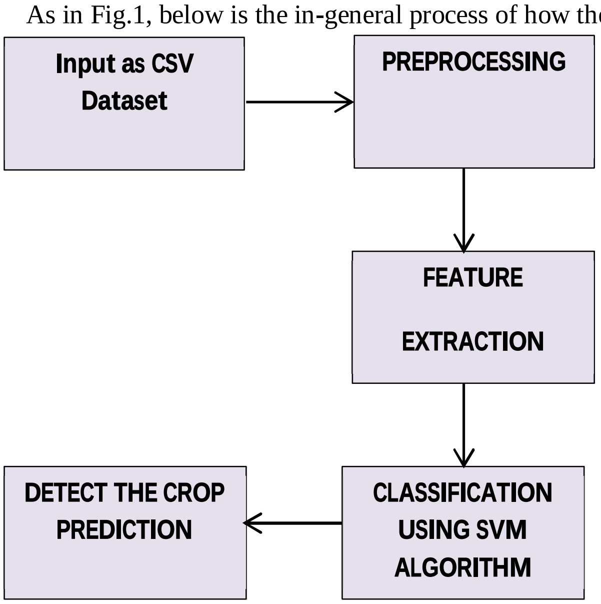


Fig.1 A general workflow of Crop Prediction

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VII. ALGORITHM REQUIRED

SVM Algorithm:-Support Vector Machine (SVM) is a supervised machine learning algorithm used for both classification and regression. Although we call regression problems, they are best suited for classification. The goal of the SVM algorithm is to find a hyperplane in N-dimensional space that distinctly classifies the data points. SVMs are used in applications such as handwriting recognition, intrusion detection, face detection, email classification, gene classification, and web pages. This is one of the reasons why we use SVM in machine learning. It can process both classification and regression on linear and non-linear data**.**

VIII. RESULT ANALYSIS

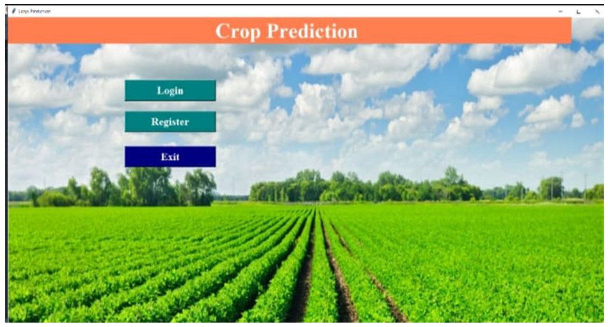

Fig.1 Main page

Fig.2 Registration Page

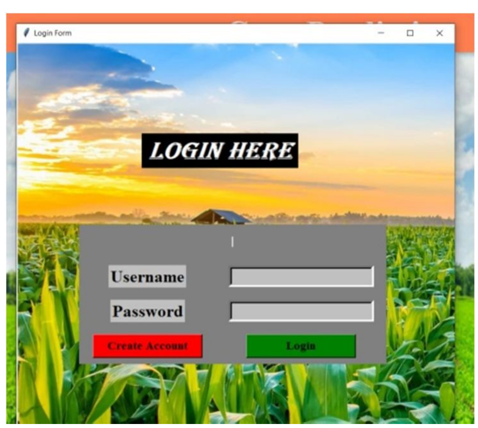

Fig.3 Login page

Fig.4 Master page

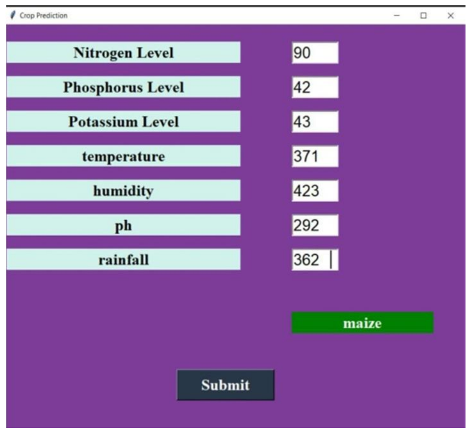

Fig.5 Prediction Page

IX. CONCLUSION

In conclusion, the use of machine learning for crop prediction has shown promising results in recent years. Using various techniques such as data analysis, statistical modeling, and pattern recognition, machine learning algorithms can accurately predict crop yield, disease outbreaks, and optimal harvest times. This technology is particularly useful for large-scale farming operations, where timely and accurate forecasting of crop yield and potential problems can significantly impact productivity and profitability. However, it is important to note that machine learning models require a large amount of data to train and optimize the algorithms. In addition, the quality and accuracy of the data used can significantly affect the performance of the models. Therefore, it is essential to ensure the quality and accuracy of the data used in crop prediction in order to obtain reliable and useful results.

Overall, the use of machine learning in crop prediction can revolutionize agriculture by providing farmers with accurate and timely information, enabling better planning and decision making.

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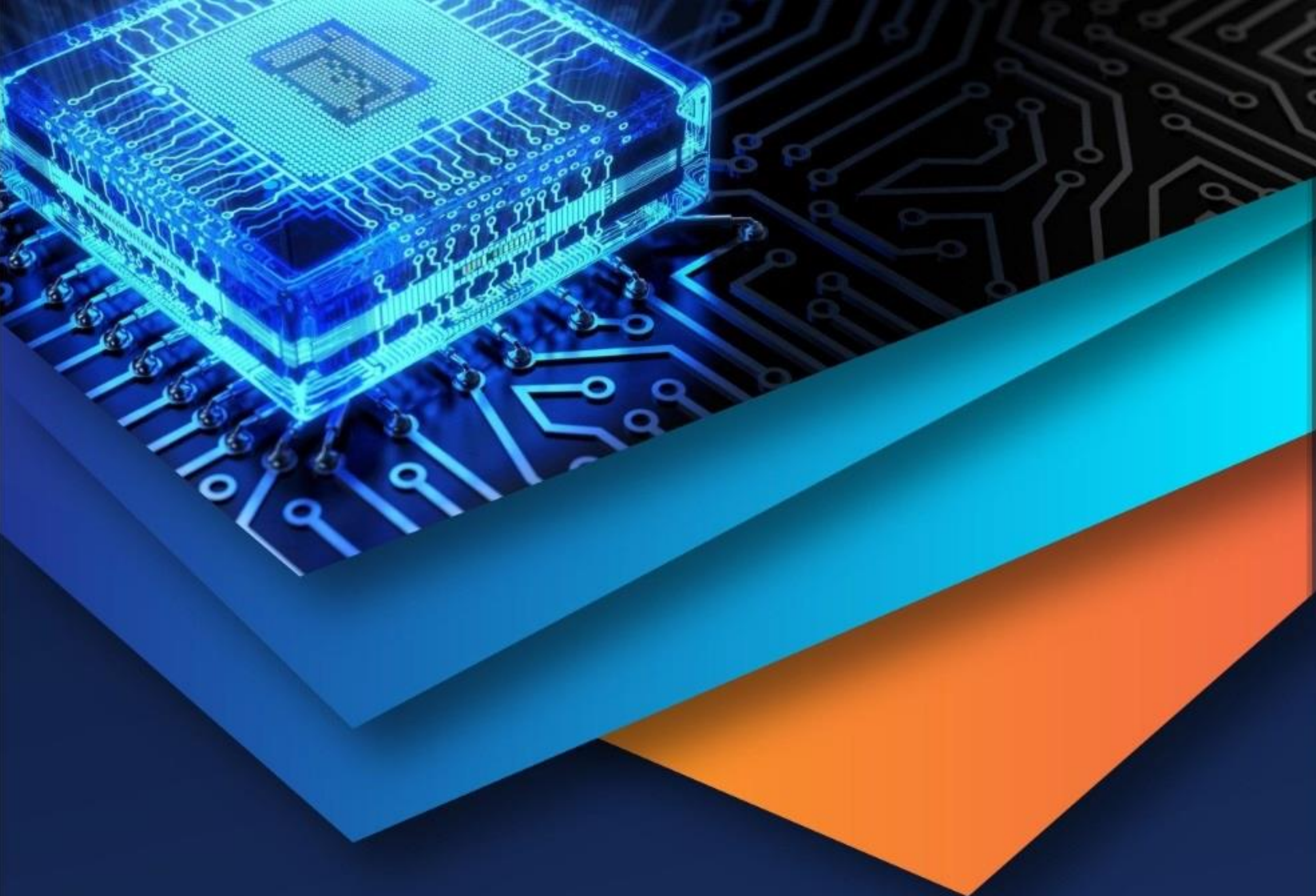

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