

INTELLIGENT CROP AND PESTICIDE RECOMMENDATION PORTAL USING ML AND AI

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ABSTRACT

Recommendation system and image analyzing is the study of analysis of given parameters and input and give the proper recommendation. A farming operation can be very complex. Unfortunately, farmers often don't have enough time to research all they need to know when it comes down to making decisions; that's why they rely on Agricultural Advisers. Unfortunately, they are not always available when the farmer needs them most. Expert Systems were identified as a powerful instrument with much potential during these tough economic times! Using precision agriculture, these farmers are being offered information based on advanced technology and scientific research to determine what precisely their land should be planted with. Rather than picking out of a hat and trying something they've never grown before, these farmers are choosing the best crops to suit their terrain resulting in higher yields. The main goal is to create a expert system that analyze the soil characteristics and environmental characteristics and recommend a precise crop to yield, also recommending correct pesticide based on the image analysis of the pest. We suggest developing a intelligent crop system for farmers employing an interactive transfer learning approach on an android or web-based platform in this study.

Keywords: Recommendation System, Machine Learning, Open CV, Image Acquisition, Neural Netrowk.

I. INTRODUCTION

Recommender systems have become very popular recently. There are a number of different applications of them such as in shopping websites and online product recommendation services. It generally works by people providing feedback about things they like and then things are recommended to people who might like those things as well on the basis of their tastes.

The choice a farmer makes to grow certain crops is generally based on intuition and other factors such as a desire for quick capital, an underestimation of how much the soil can support, and so on. It might seem like these mistakes could strain his family financially, but in fact they lead to a multitude of suicide cases even today in news reports that we read daily.

In countries that have economies centered around agriculture, such as India, an erroneous judgment on what crop to grow can prove to be very costly. Every year the Indian farmers assume a great risk making far-reaching decisions about which crops to plant based on the lands' particular climate and soil quality. In order to help these men and women make better informed decisions about which crops to cultivate during a season, there is need to design a system in which various factors could be considered correctly for instance the geographical distribution of weather conditions specific for every state or region in India. If a farmer had access to such data, he or she could decide how much water and fertilizer will be required for each crop type being planted. This would garner enormous profits for the entire region of India because not only would it guarantee sustainability but also promote overall growth.

In this way, we propose a smart system that uses multiple sources to evaluate the suitability of a crop for growing in specific areas. The system considers environmental factors like temperature and rainfall as well as soil composition, pH and the presence of nutrients. If a pesticide is needed, the smart system analyzes the image of pest and recommends the appropriate pesticide for the crop.

II. PROBLEM STATEMENT

The following project proposes the development of intelligent crop portal for farmers using android or web based interface interactive transfer learning technique. It aids to develop an artificial intelligence based platform that aids farmers to get crop recommendation and pesticide recommendation.

Method and analysis which is performed in your research work should be written in this section. A simple strategy to follow is to use keywords from your title in first few sentences.

2.1 EXISTING SYSTEM

More and more researchers in India are studying how climate change is affecting the agricultural sector in India. A new approach (Regularized Greedy Forest) has been proposed to determine an appropriate crop sequence for a given time period, which could help prevent further damage to the crops. An approach has also been proposed using historical data on weather patterns as the initial training set of data to predict ongoing seasonal weather patterns based on previous distributions of rainfall, temperature and humidity. A computer model is designed to determine the optimal planting conditions for apple growing. It identifies weather patterns that will reduce produce, and it uses a variety of algorithms to predict how much fruit each different type of weather yield when creating a statistical prediction of total apples expected. Additional features include suggestions on which pesticides to use, and online trading based on crop production value.

One shortcoming that we identified in each of these notable published works is that their authors concentrated on a single parameter (either weather or soil) when it comes to predicting the suitability of crop growth. However, we think that both of these factors should be taken into consideration at the same time because one soil type may be best for supporting one type of crop, but if the weather conditions for that area aren't suitable, it won't do well.

2.2 PROPOSED SYSTEM

We to eliminate the aforementioned drawbacks, we propose an Intelligent Crop Recommendation system- which takes into consideration all the appropriate parameters, including temperature, rainfall, location and soil condition, to predict crop suitability. This system is fundamentally concerned with performing the primary function of Agro Consultant, which is, providing crop recommendations to farmers algorithms. We also provide the profit analysis on crops grown in different states which gives the user an easy and reliable insight to decide and plan the crops. We also provide the pesticide recommendation by analysing the image of pest.

III. METHODOLOGY

An overview of proposed system is shown in block diagram (fig. 1) below. In first module the soil characteristics like Nitrogen, Potassium, Phosphors and pH value are get input from the user, also the environmental characteristics like Temperature, Humidity, Rainfall are get from the user. A model is developed using a voting classifier. In voting classifier machine learning algorithm SVC, SVM, Random Forest, GNB, KNN are used to train the dataset with each algorithm. By using voting classifier, a highly accurate model is generated on dataset. The which is entered by the user is pass through the model and crop which is appropriate for the soil and environmental conditions entered by the user.

In second module user need to upload a picture of the pest on the plant. An RGB (Red, Green, Blue) image is suitable for this project. After acquiring the picture from user, we developed a model using CNN, The suggested system is capable of recognize a wide range of pest. As a result, we are utilizing data sets to the greatest extent feasible. We can analysis the image using CNN model and detect which pest photo is uploaded. From the data set the pest is matched and the pesticide required for particular pest is shown to the user.

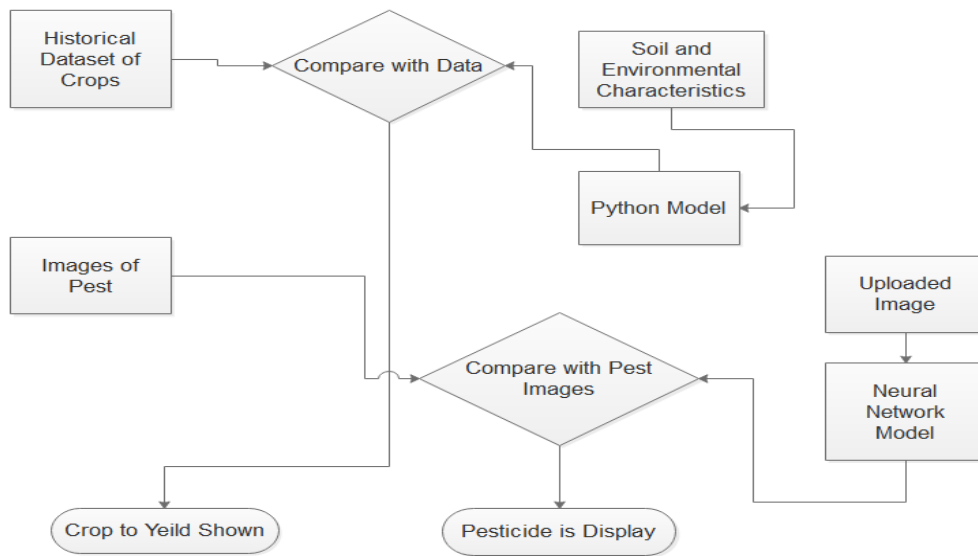


Figure 1: Overview of intelligent crop and pesticide system.

IV. MODELLING ANALYSIS

The project’s architecture is depicted in the diagram above. For first module the input of soil and environmental characteristics are entered it passes through the model which is created using voting classifier. The model recommends the crop according to the input soil and environmental characteristics.

For second module, the user upload the image of pest. Then we utilize the python library known as Keras. In this library we get CNN algorithm which we used to train the model by taking the different pests images. The image uploaded by the user is pass through the model and classify and compare with the dataset and recognize the pest. The pesticides for the particular pest is get from the dataset of pesticides and the pesticide is shown to the user.

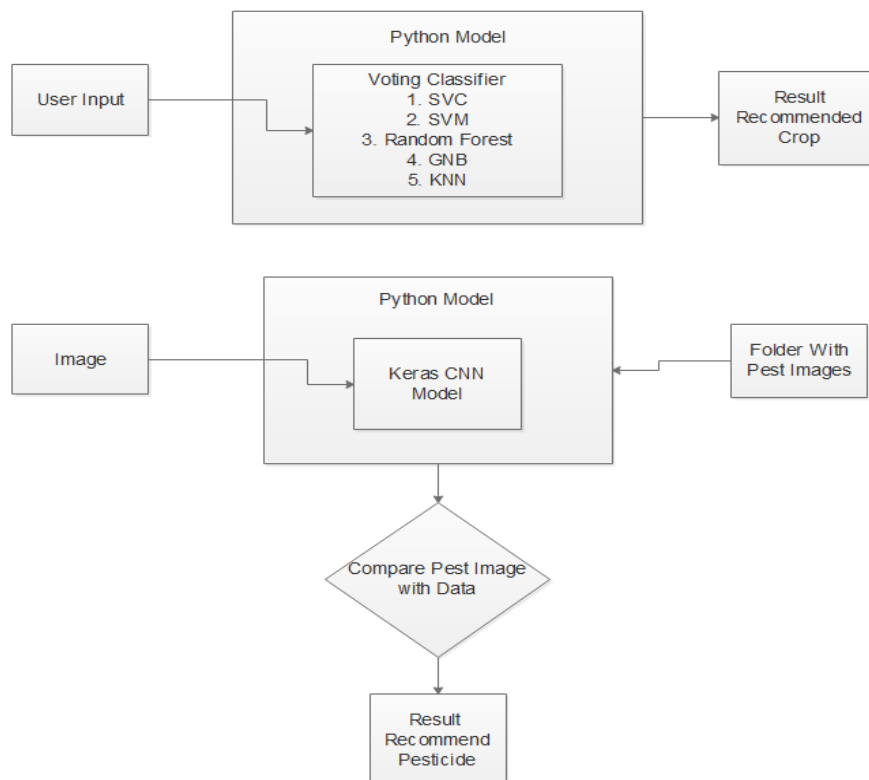
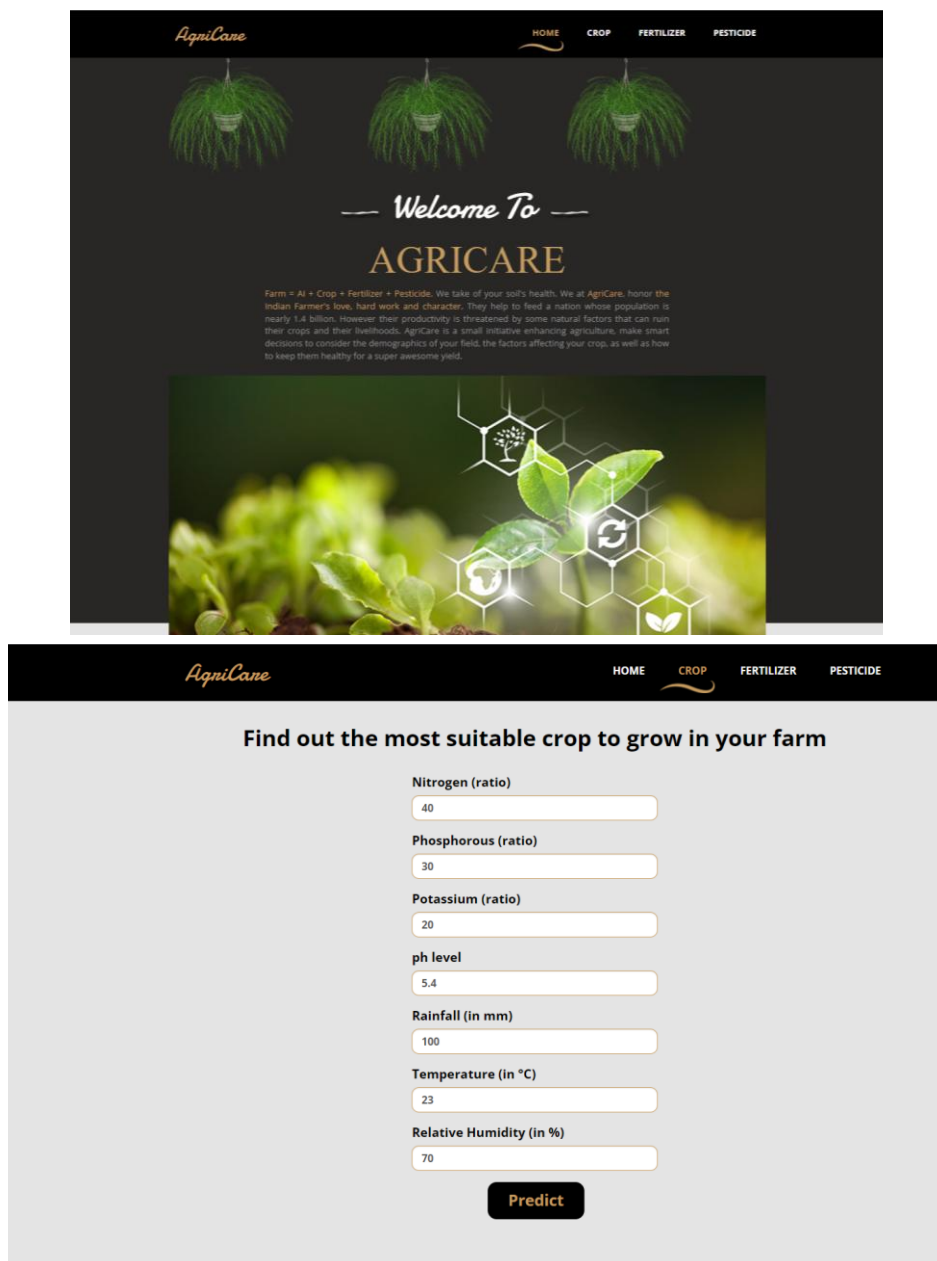


Figure 2: Architecture of System

V. RESULT AND DISCUSSION

The machine learning and neural network model that was created is so adaptable that it can be used with any platform, such as Web application, Android, IoT and so on. The Django framework is used for web integration. Django is a high-level Python web framework that enables rapid development of secure and maintainable websites. The modules we have created is highly compatible with Android platform, which is the most used smartphone operating system that is compatible with Keras library. The majority of consumers will come via Android. Because the module is opensource and free to download, it is much easier to utilize as an a android application.

The Internet of Things (IoT) is a popular technology these days. By using Raspberry Pie, Audreno, and N, P, K, pH, and Humidity sensor we can automatize this manual value entering system. The integration of Raspberry Pie, Python libraries and Sensors makes a portable device.



The screenshot shows the AgriCare website interface. At the top, there is a navigation bar with the AgriCare logo and menu items: HOME, CROP, FERTILIZER, and PESTICIDE. The main content area features the text "You should grow *mango* in your farm" above a photograph of a mango tree with ripe, yellow-orange fruit.

The screenshot shows the AgriCare website interface for pest prediction. It includes the AgriCare logo and navigation bar. The main text reads "Recommended pesticide based on pest" followed by the instruction "Please upload the picture which clearly shows the pest, so that we can recommend you, the pesticide accordingly!". Below this is a file upload section with a "Choose File" button and the filename "jpg_42.jpg", and a "Predict" button.

The screenshot shows the AgriCare website interface displaying the results of a pest prediction. The text "Identified Pest: *ballworm*" is shown. Below this is a section titled "Recommended Products" which lists four products with their respective images and application doses:

- Product 1:** A green bottle of "AZLAN". Dose: 160-280 ml/Ha.
- Product 2:** A green tub of "BIOCLIN". Dose: 220 gm/Ha.
- Product 3:** A blue and yellow bottle of "FULSTOP". Dose: 1000 ml/Ha.
- Product 4:** A green bottle of "KOSKA". Dose: 600-100 ml/Ha.

VI. FUTURE WORK

The main Machine Learning module that was created is so adaptable that it can be used with any platforms, such as Web Application, Android Application, IoT devices and so on. When we integrate the module on public platforms there will be an issue of privacy and security of the user data. This data is undoubtedly useful in

many areas including medical research, law enforcement and national security, hence the storage of the data and the access of the data should be done efficiently, but security and privacy are very important concerns.

VII. CONCLUSION

The main goal is to create a intelligent crop and pesticide recommendation system that analyses the user inputs and give the appropriate recommendation. The user is then informed to which crop to cultivate and recommend which pesticide to be used for the pest on the crop. Precision agriculture (PA) is an approach to farm management that uses information technology (IT) to ensure that crops and soil receive exactly what they need for optimum health and productivity. Based on artificial intelligence and machine learning, we propose a intelligent farmers system for Android or web as in this study.

VIII. ACKNOWLEDGMENTS

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