CROP YIELD PREDICTION AND DESEASE DETECTION USING MACHINE LEARNING

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Abstract :

One of India's most revered customs is its agricultural culture. Agriculture has been severely impacted by climate change and its inherent volatility. The ability to accurately forecast crop yields has therefore become a crucial part of modern agricultural practice. Machine learning techniques, such as Stacked Regression techniques, are proposed and briefly analysed in this study to make yield forecasts. In agriculture, a high crop yield depends on timely diagnosis. Tomato plants are susceptible to bacterial spot, late rot, Septoria leaf spot, and yellow curved leaf diseases, which all reduce its quality. After recognizing the signs of leaf diseases, it is helpful to take action using automatic techniques of differentiating plant diseases. In this study, we present the Convolution Neural Network (CNN) model for the detection and analysis of diseases affecting tomato leaves.

Keywords

The latest in Diagnostics, Advanced Reading, Feature Releases, the Backbone, CNN, and more!

INTRODUCTION

Forecasted Study Improved agricultural systems allow for greater productivity and efficiency in the cultivation of crops. However, the population is rising at a slower rate as agricultural output steadily falls. Typically, farmers adhere to rigid schedules for planting and harvesting their crops. Collecting up-to-date information on the weather, air quality, soil, crop maturity, equipment, labour costs, and data availability is essential for successful farming. This forecasting study may help farmers make informed choices. Farmers have the expertise to foresee the onset of illnesses, but this is not the best strategy. The most common approach for detecting and identifying plant diseases is oculus expert monitoring. Machine learning allows computers to pick up new skills automatically, without being explicitly taught them.

Features computational analysis of available data with the purpose of accomplishing predefined goals. When computers are given straightforward jobs, programmers may set up algorithms to instruct the software through each stage of a problem's resolution without the need for human intervention or reading. It may be difficult for a human to carry out the necessary algorithms for very complex operations. Helping the computer improve its algorithm may be more efficient than having humans detail every step. The goal of machine learning training is to improve computer performance in areas where there is currently no best-practice algorithm. Identifying some of the right responses as "valid" is one approach of dealing with situations with several viable replies. This information may be utilized to train a computer's response-determination algorithm. For instance, the MNIST handwritten digital data set is often used to train digital character recognition systems. Numerous algorithms for machine learning exist. The algorithm used serves a specific function. Predicting which of three kinds of flower is shown in the following machine learning example. The measurements of the petal's length and breadth are used to make the forecast. Ten distinct algorithms' outputs are shown in the figure. The picture of a database may be seen at top left. The information is color-coded from red to light blue to dark blue. Certain assemblages may be found. In the second figure, for instance, the upper left corner represents the red phase, the central area represents a combination of uncertainty and blue, and the bottom corner represents the black phase.

PRIOR STEPS 1 Inspiration

Even though technology plays a key part in every industry today, traditional farming practices are still widely used. As a result, related firms may use forecasting to inform their strategic planning. Predicting a tomato plant's harvest using the SVM Algorithm. Correctly identifying crops is crucial for productive planting. Some illnesses may be seen by the naked eye, and treatments are readily available for purchase. In order to assess agricultural output, boost market value, and maintain quality requirements, leaf detection is necessary.

Explanation of the Issue

The collapse of agriculture may be attributed to a lack of farmer empowerment and information technology (IT) in the business. Most farmers have a limited understanding of the crops they tend. Taking into account elements like temperature, rainfall, season, and location, we are able to use machine learning algorithms to estimate crop and word.

Literature Survey

As we've said previously, the most well-known MIL techniques nowadays employ neural networks to model embedded objects, which are subsequently converted to embedded sites with the use of deep learning. However, there is currently no such computer program for identifying plant diseases. Instead of using hard numbers, the current system relies on a machine learning model to make illness predictions. The Random Forest machine learning method delivers the greatest accuracy in crop prediction, according to trials done by Aruvansh Nigam, Saksham Garg, and Archit Agrawal [1]. Precipitation forecasting is best served by the sequential Simple Recurrent Neural Network model, whereas the Long Short-Term Memory (LSTM) is primed and ready to forecast temperature. This article examines variables including precipitation, temperature, season, latitude, and longitude to forecast crop yields. When considering all of the factors together, the findings indicate that Random Forest provides the best classification. Leo Brieman [2] examines the random forest algorithm's interplay with precision and strength. Through the use of a voting mechanism, the random forest method determines the optimal system response by constructing prediction trees from several data sets. The data for Random Forest was trained using a wallet approach. Reduced affinity without compromised strength is the goal of random injections designed to enhance precision.

Balamurugan [3] used a random forest classifier for agricultural production prediction. Predicting agricultural yields involves a number of variables, including weather conditions and seasonality. Not all machine learning techniques have been used with database systems yet. Since there were no existing algorithms to compare and measure against, no reliable algorithm could be developed. Several machine learning methods, as defined theoretically by Mishra [4], are applicable to many different types of prediction settings. However, they don't use any algorithms in their function, thus it's difficult to grasp how the suggested function works. According to the research of Drs. Y. Jeevan Nagendra Kumar and Kumar [5], Supervised Reading may be used by Machine Learning algorithms to anticipate the desired result. Predicting agricultural yields using supervised reading procedures is the topic of this article. The output output can only be obtained by generating the proper function with a specified set of variables that can map the input variables to the output output. The research explains how the Random Forest ML algorithm, using a very small number of models, can make highly accurate predictions about crops.

Methods Four, Stage One Processing

Several 'NA' values were filtered out of the given data set using Python. Furthermore, as the dataset comprises numerical data, we used a solid scale, just like usual, however, we used the interquartile range while customisation is a factor that lowers data by 0 to 1.

Relaxing the Stack

That's an integration of sorts, albeit it's not a huge one. In this scenario, we use a meta model and train the primary meta model using non-binding specimens from other models.

Step 1: The complete training set is further divided into two separate sets. (train and hold)

Step 2: Train the selected basic models for the first part (train).

Step 3: Examine the second part. (catch)

Step 4: Now, the predictions found in the test section are to be included in a high-level train reader called a meta-model.

The first three procedures are performed over and over again.

If we use 5 stacks, for instance, we will first fold the training data into 5 subsets. We'll say it five more times. Each time around, we anticipate the remaining folds (roll holdings) after training the basic model in 4 folds. As a result, we will ensure that all of the data is used up after 5 iterations by out-folding the predictions we will utilize as a new feature in step 4 to train our meta model. In order to anticipate the meta model, we quantify the estimations of each of the base models using the test data from the speculative segment. In this case, its good standing may be attributed to our meta model, the Lasso Regressor. Fig. 1

PREDICTION METHODS FOR AGRICULTURAL PRODUCTIONS

OUTCOME

The root mean square error is the performance statistic for this project. Without lamination, ENet was about 4%, Lasso around 2%, Kernel Ridge around 1%, and eventually below 1%. Below is an example of the information a user or farmer may input into the web app to get a forecast:

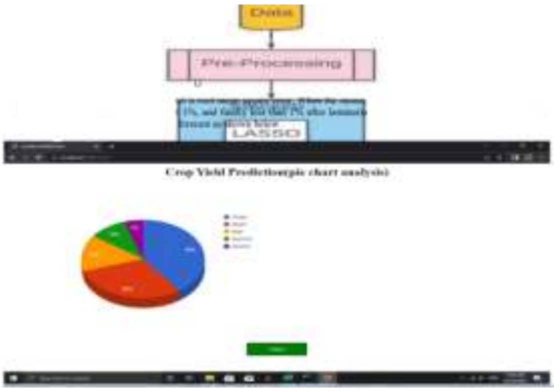

Figure 1 Crop Yield Prediction Pie chart analysis

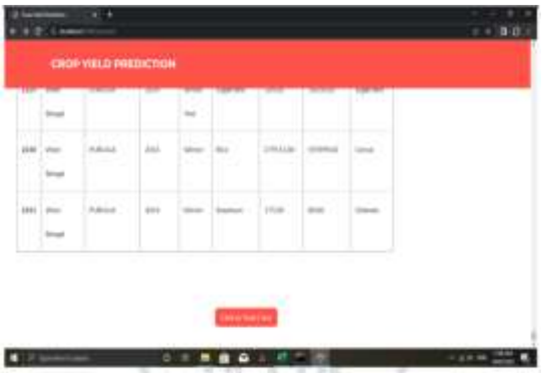

Figure 2 Training dataset for Crop Yield Prediction

Figure 3 Region wise Crop Yield Prediction

Figure 4 Crop Disease Detection using Deep Learning

Figure 5 Input Image to the system and submit for getting actual result

Figure 6Crop Disease Detection result using deep learning

Conclusion

The outcome is much more ad hoc when layered regression is used as opposed to using the individual models. In the future, we want to adapt the whole system into the farmers' native language and create an app for them to use. The present output displayed in the image is a web application. Inspired by RDN's work in the picture super resolution problem, this research proposes a VGG16 Architecture model-based leaf disease diagnosis model. We adjusted the model's architecture and turned it into a classification model, which outperformed state-of-the-art algorithms in terms of accuracy. We will try to adapt the model to increase its generalizability from the leaf dataset to other plant datasets since it is well-suited to that dataset. Our long-term goal is to use this research in the field so that we may contribute, however little, to the advancement of AI in agriculture.

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