JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Crop Yield Prediction and Disease Detection Using Machine Learning

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Abstract : Agriculture is considered to be one of the most important traditions practiced in India. But the very effect of climate change and its unpredictability has had a profound effect on agriculture. Predicting crop yields has therefore become a very important step in crop production and management. This paper proposes a brief analysis of yield predictions using machine learning algorithms such as Stacked Regression Algorithms. Early diagnosis is important for agriculture to have a good crop yield. Bacterial spot, late rot, Septoria leaf spot and yellow curved leaf diseases affect the quality of tomato plants. Automatic methods of distinguishing plant diseases also help to take action after detecting the symptoms of leaf diseases. This paper introduces the Convolution Neural Network (CNN) model for the diagnosis and diagnosis of tomato leaf disease.

***IndexTerms* - Advanced Reading, Feature releases, Backbone, CNN, diagnostics etc.**

I. INTRODUCTION

Predicted Analysis In order to increase productivity and efficiency of crop production, agricultural systems are more efficient. The population, however, is slowly growing, while plant production is declining day by day. Traditionally, farming involves planting or harvesting crops according to a set schedule. Accurate farming requires the collection of real-time weather data, air quality, soil, crop maturity, machinery, labor costs and current data availability. This predictable analysis can be used to make wise decisions in the field of agriculture. Farmers, in their experience, predict diseases, however this is not the right approach. Oculus specialist surveillance is the most widely used method of diagnosing and diagnosing plant diseases.

Machine learning involves computers to learn how to do tasks without having to be clearly programmed to do so. Includes computerized study of data provided to perform specific tasks. With simple tasks assigned to computers, it is possible to configure algorithms to tell the machine how to perform all the necessary steps to solve an existing problem; on the computer side, no reading required. With highly advanced functions, it can be challenging for a person to perform the required algorithms. In fact, it may be more effective to help the machine improve its algorithm, than to have human programmers specify all the necessary steps.

Machine learning instruction uses a variety of computer training methods to accomplish tasks where no fully satisfactory algorithm is available. In cases where there are a number of possible answers, one way is to label some of the correct answers as valid. This can be used as computer training data to improve the algorithm it uses to determine appropriate responses. For example, to train the digital character recognition system, MNIST's handwritten digital data set is commonly used.

There are many machine learning algorithms. The choice of algorithm is based on purpose.
In the machine learning example below, the task is to predict the type of flower among the three species. Predictions are based on the length and width of the petal. The diagram shows the results of ten different algorithms. The image at the top left is a database. Data is divided into three categories: red, light blue and dark blue. There are certain collections. For example, from the second picture, everything at the top left it is of the red phase, in the middle part, there is a mixture of uncertainty and blue while the lower is associated with the black phase.

II. PRELIMINARIES

2.1 Motivation

Today technology plays an important role in all fields, but to this day they still use the old methods of agriculture. As such, forecasting will help affiliated companies plan their business plans. The SVM Algorithm is used to predict the yield of a tomato plant. Crop identification plays an important role in successful planting. Some diseases are visible to the naked eye and can be easily detected and bought. Leaf detection is required to evaluate agricultural production, increase market value and meet quality standards.

2.2 Defination and Problem

The reason for this decline in the agricultural industry is because farmers are not empowered and because of the lack of IT in the agricultural sector. Farmers know very little about the crops they grow. We often overcome this obstacle by using machine learning techniques to predict crop and word by considering various factors such as temperature, rainfall, Season and location.

III. LITERATURE SURVEY

In the present system there is no computer program to identify plant disease, as we have said before, the existing popular MIL methods with neural networks are treated at different times as embedded objects, and then use a deep neural network to convert them to embedded sites. In the existing system basically use a machine learning model to predict the disease in place of numerical data.

Aruvansh Nigam, Saksham Garg, Archit Agrawal [1] conducted experiments on the Indian government database and it was found that the Random Forest machine learning algorithm provides the highest accuracy of crop prediction. The consecutive Simple Recurrent Neural Network model performs better in predicting rainfall while the LSTM is ready to predict temperature. This paper covers features such as rain, temperature, season, location etc. to predict the harvest. The results show that Random Forest is the best category when all the parameters are combined.

Leo Brieman [2], focuses on accuracy and power and the interaction of the random forest algorithm. The random forest algorithm creates tree trees from different data samples and predicts data from each subset and by voting provides the best system response. Random Forest used a wallet method to train data. In order to improve accuracy, random injections should reduce affinity while maintaining strength.

Balamurugan [3], used the prediction of crop yields using only a random forest divider. Various factors are taken into account such as rainfall, temperature and time of year to predict crop yields. Some machine learning algorithms have not been applied to databases. In the absence of other algorithms, comparisons and measurements were not available and therefore could not provide a valid algorithm.

Mishra [4], in theory, has described various machine learning techniques that can be used in a variety of predictive environments. However, their function fails to use any algorithms and thus cannot provide a clear understanding of the functionality of the proposed function.

Drs. Y. Jeevan Nagendra Kumar [5], concluded that Machine Learning algorithms can predict the target / outcome using Supervised Reading. This paper focuses on supervised reading strategies for predicting crop yields. In order to obtain the output output it needs to produce the appropriate function with a set of specific variables that can map the input variables to the output output. The paper conveys that predictions can be made with the Random Forest ML algorithm that achieves crop prediction at a very accurate rate considering a small number of models.

IV. METHODOLOGY

4.1 Pre-Processing

For the data set provided, there are several 'NA' values filtered in python. Moreover, since the data set contains numerical data, we used a solid scale, exactly the same as normal, but instead used the interquartile range while customization is a factor that reduces data by 0 to 1. B.

4.2 Stack Loosening

This is a kind of integration but a small improvement in scale. In this case, we add a meta model and use non-binding specimens to other models used to train the main meta model.

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. Repeatedly, the first three steps are completed.

For example, if we take 5 stacks, we divide the training data into 5 folds first. We will repeat it 5 times. We train each base model in 4 folds in each repetition and predict the remaining folds (roll holdings). So, after 5 repetitions, we will make sure that all the data will be used out - folded predictions that we will use as a new feature in step 4 to train our meta model. We measure the estimates of all the base models in the speculative segment test data and use them as meta features when the meta model is finally predicted. Here, our meta model is the Lasso Regressor and is the reason for its high ranking.

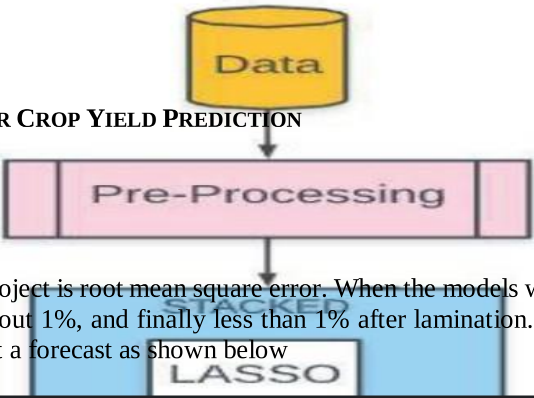

FIGURE 1 METHODOLOGIES USED FOR CROP YIELD PREDICTION

V. RESULT

The performance metric used in this project is root mean square error. When the models were individually applied, ENet was about 4%, Lasso about 2%, Kernel Ridge about 1%, and finally less than 1% after lamination. A user or farmer can enter the following data through the web application to get a forecast as shown below

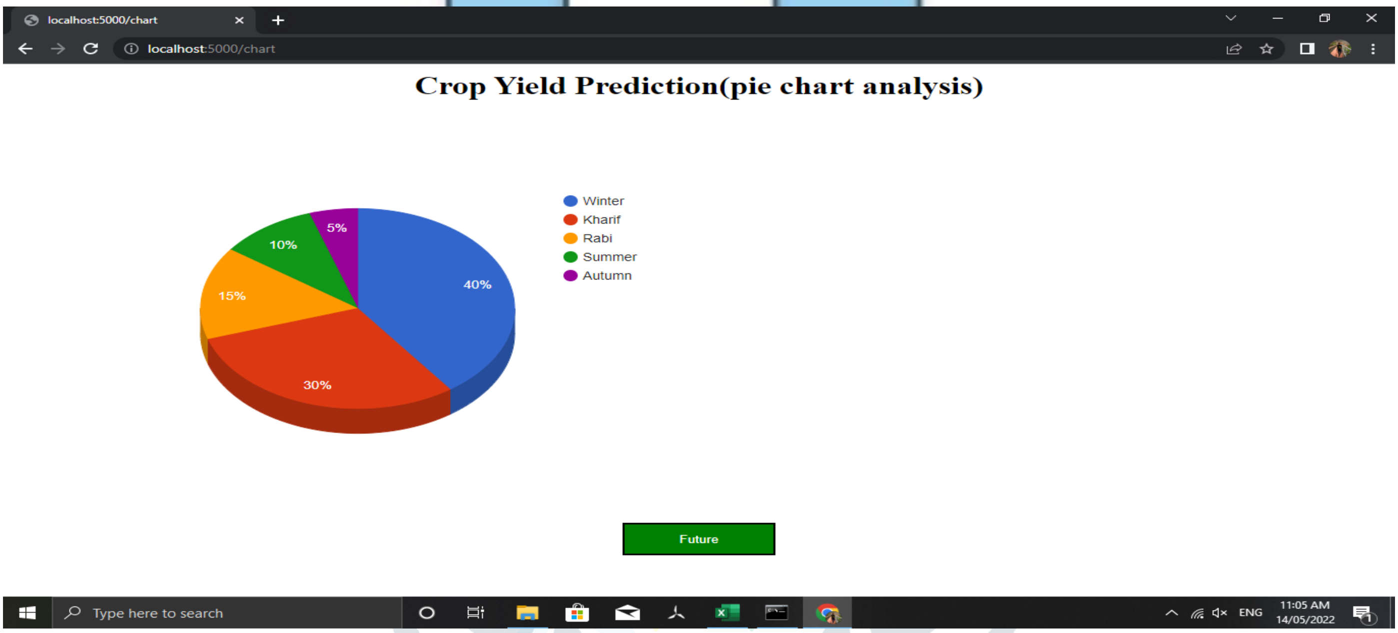

Figure 4 Crop Yield Prediction Pie chart analysis

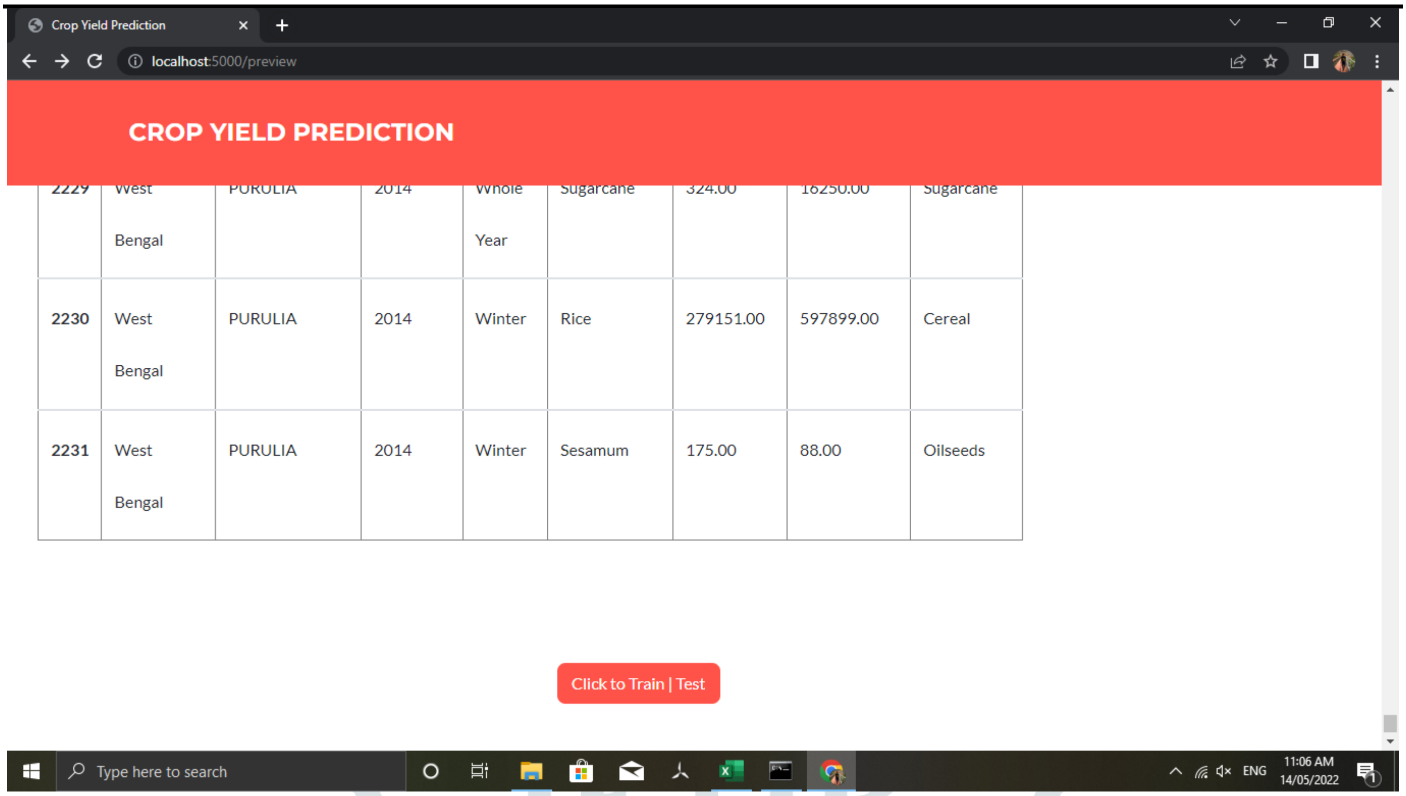

Figure 5 Training dataset for Crop Yield Prediction

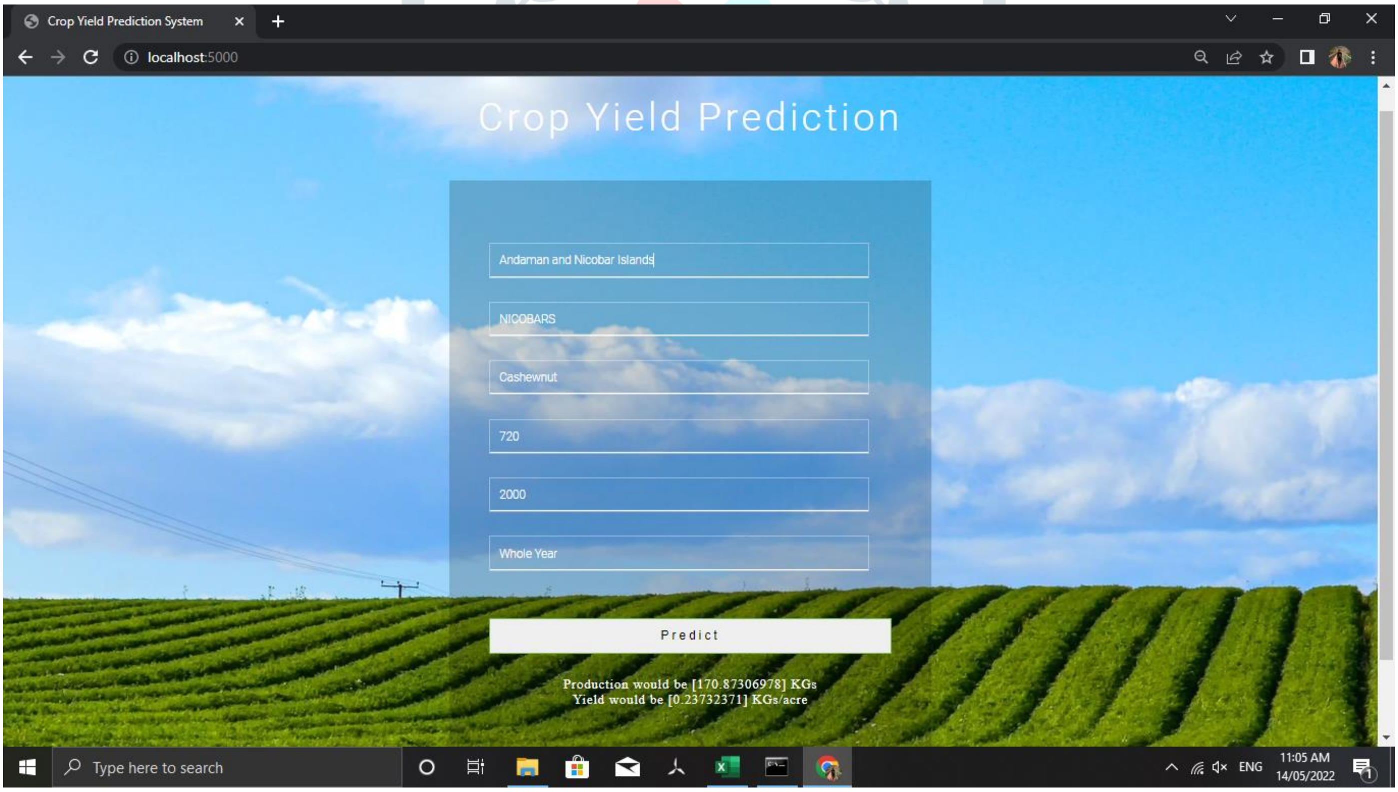

Figure 6 Region wise Crop Yield Prediction

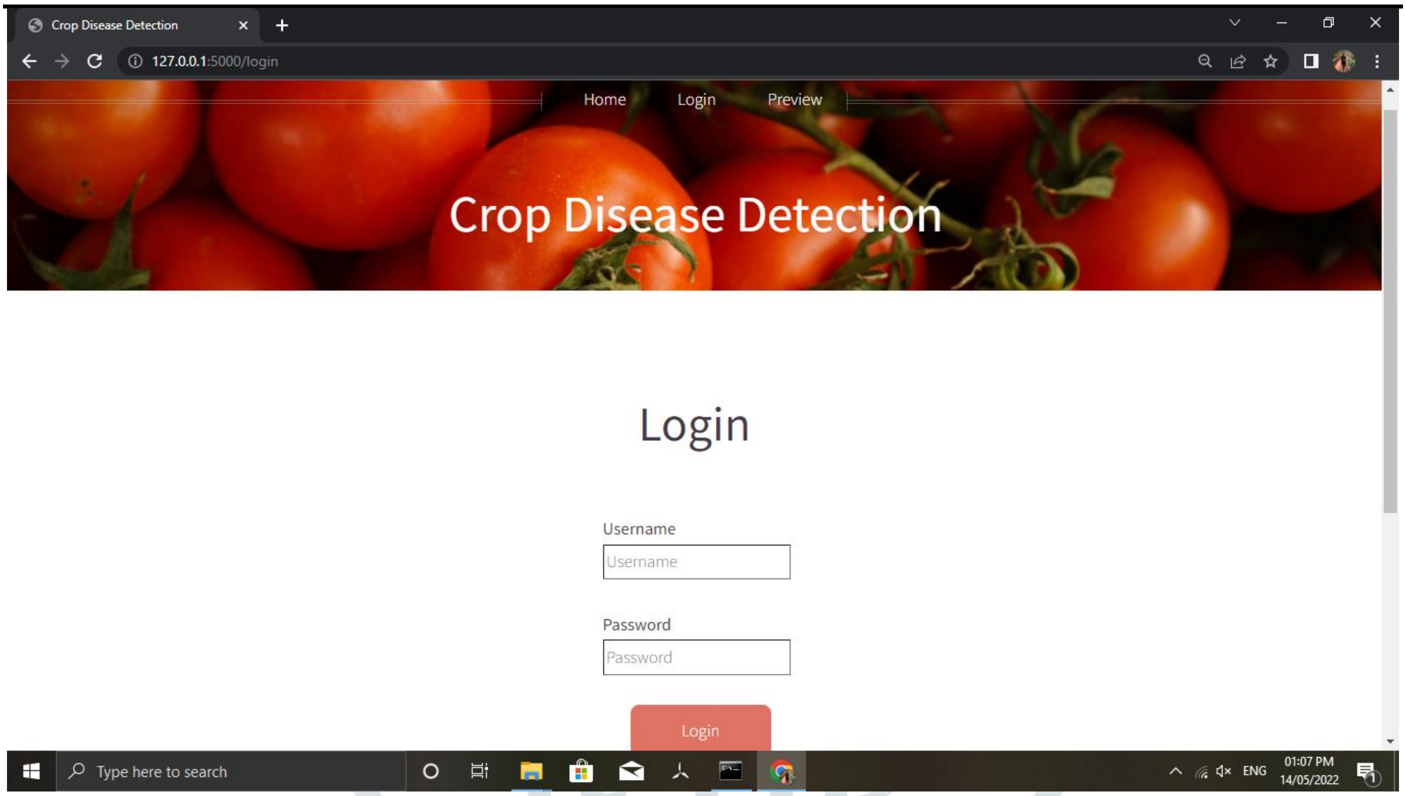

Figure 7 Crop Disease Detection using Deep Learning

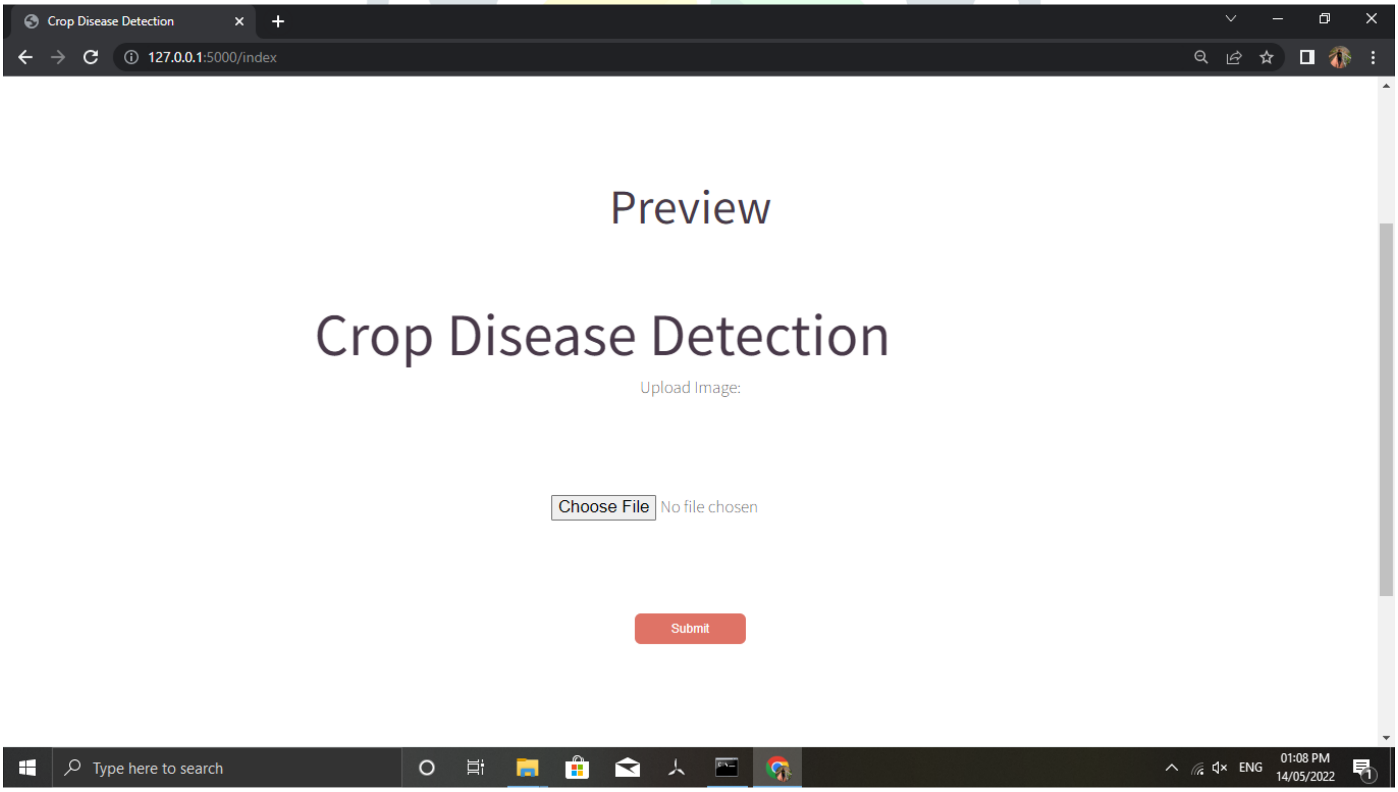

Figure 8 Input Image to the system and submit for getting actual result

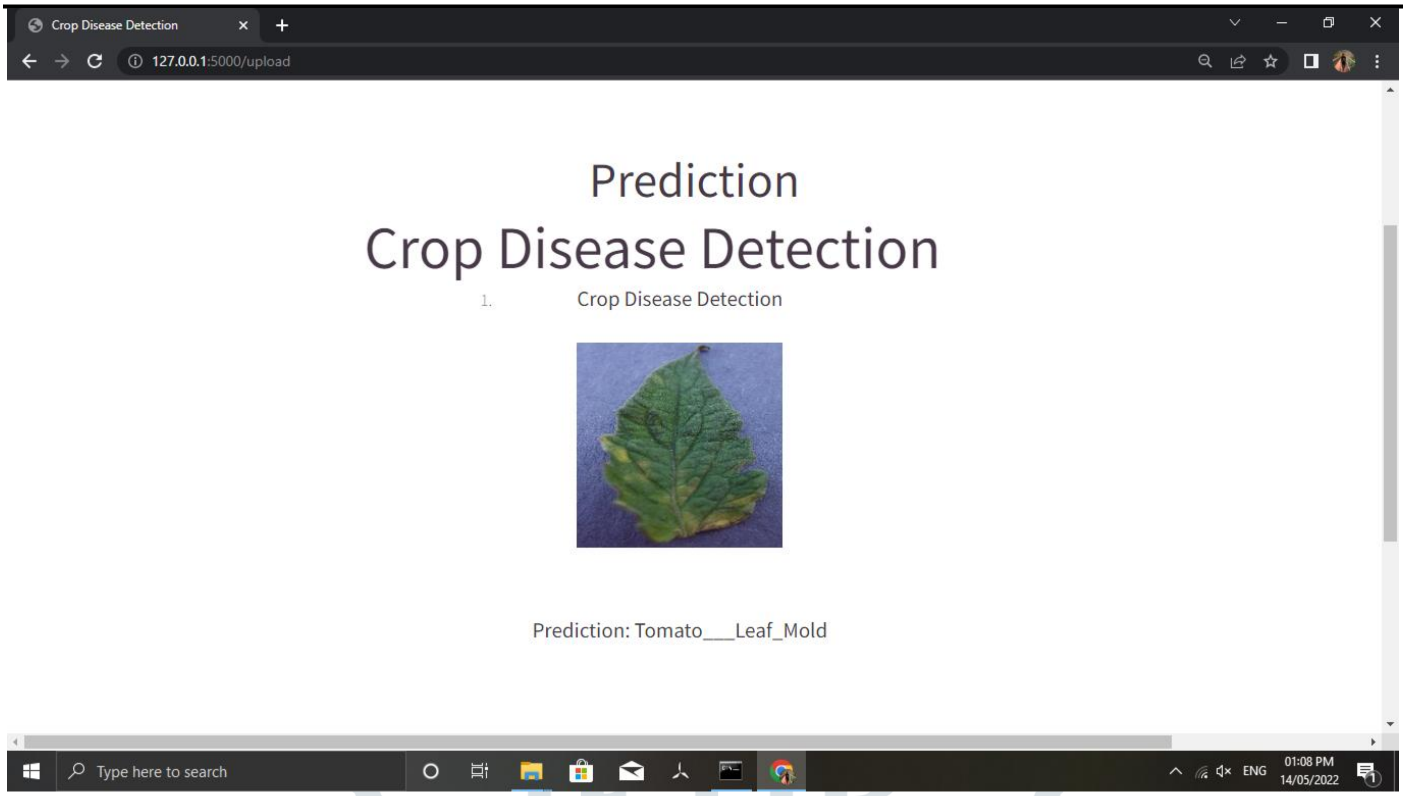

Figure 9Crop Disease Detection result using deep learning

VI. CONCLUSION

When we apply stacked regression, the result has been so improvised than when those models were applied individually. The output which has been shown in figure is currently a web application, but our future work would be building an application where the farmers can use it as app and converting the whole system in their regional language. This paper proposed a VGG16 Architecture model based leaf disease identification model; this inspiration comes from RDN in the image super resolution task. By adjusting the model architecture, we transformed it into a classification model, which obtained a higher accuracy than state-of-the- art models. Because this model is suitable for the leaf dataset, we will attempt to perform transfer learning from the one plant dataset to other plants through the model adjustment to improve the generalization ability. In the future, we hope to apply this work in practical work to make a small contribution to developing agricultural intelligence.

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