RAJALAKSHMI
ENGINEERING COLLEGE
An AUTONOMOUS Institution
Affiliated to ANNA UNIVERSITY, Chennai

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CS19643-FOUNDATIONS OF MACHINE LEARNING

DISEASE PREDICTION IN PLANTS AND RECOMMENDATION OF FERTILIZERS USING CNN AND RANDOM FOREST ALGORITHM

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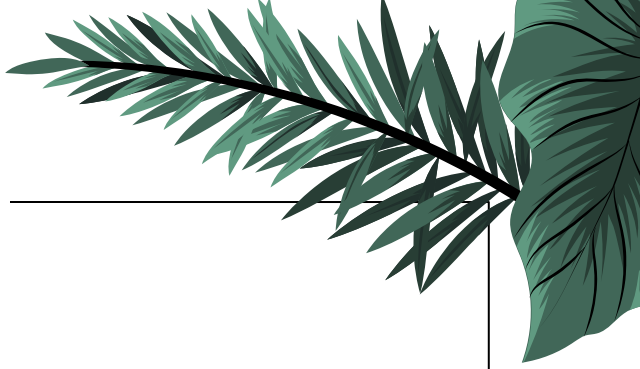
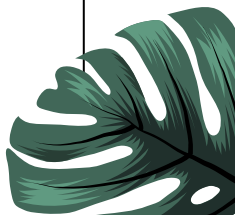




ABSTRACT

Usually, farmers or professionals keep a close eye on the plants in order to identify diseases. The goal of this project is to create a Disease Recognition and fertilizer recommendation Model. To detect plant diseases, we were utilizing image processing with a Convolution neural network (CNN) and Random Forest Algorithm(RFA) for recommending suitable fertilizer. A convolutional neural network (CNN) is a form of artificial neural network that is mainly suited for image recognition and image classification by analyzing visual data. After diagnosed the disease then we use to integrate with a Random Forest algorithm for recommending suitable fertilizers based on the identified disease through the class name of the dataset.

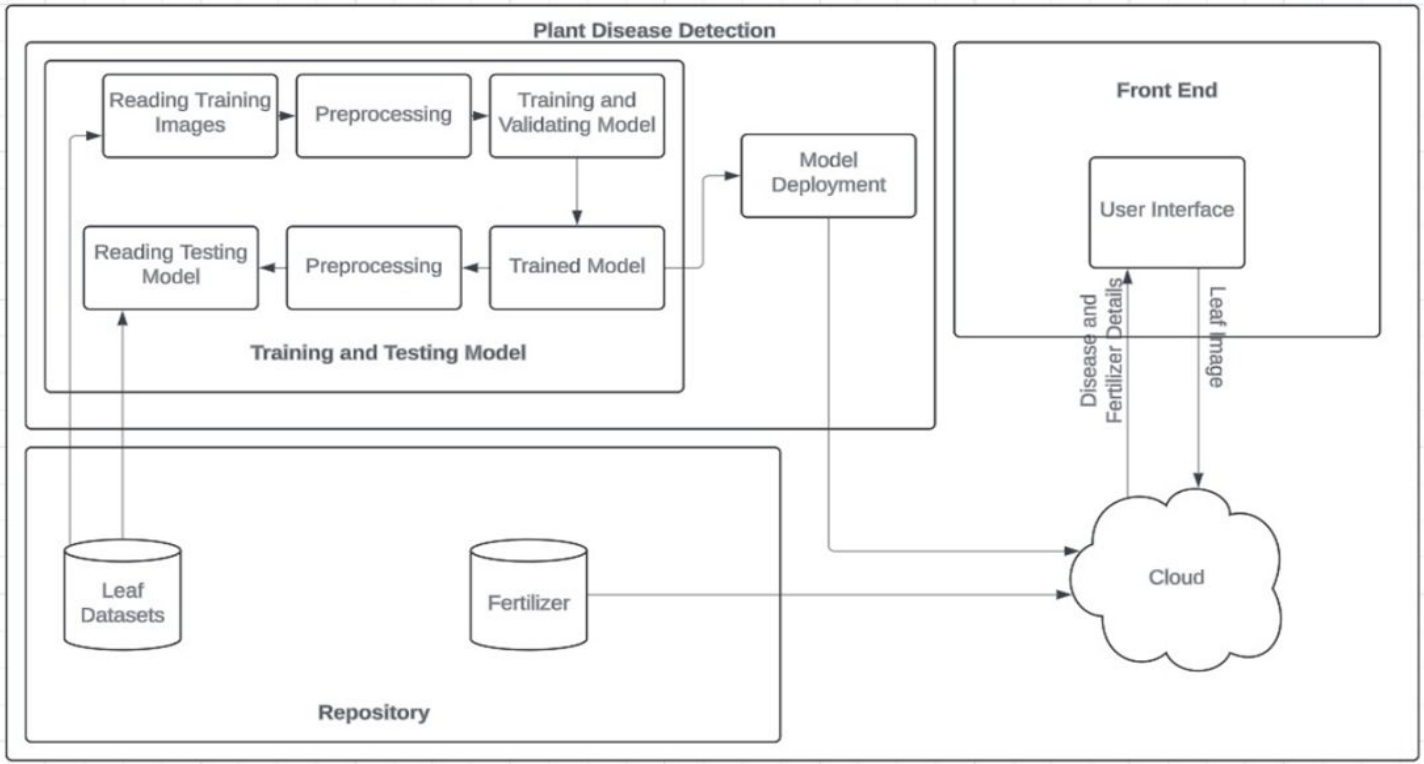
EXISTING SYSTEM

In the numerous studies CNN model is used to predict the disease of the plant. In the paper titled “Plant disease detection using image processing and machine learning” by P. Kulkarni, A. Karwande, T. Kolhe, and S. Kamble which is the base paper for our project which uses CNN model to predict the plant disease. In the existing system they used CNN model to predict the disease of the infected plant but it does not recommends suitable fertilizer for that infected plant and also it takes more computational time.

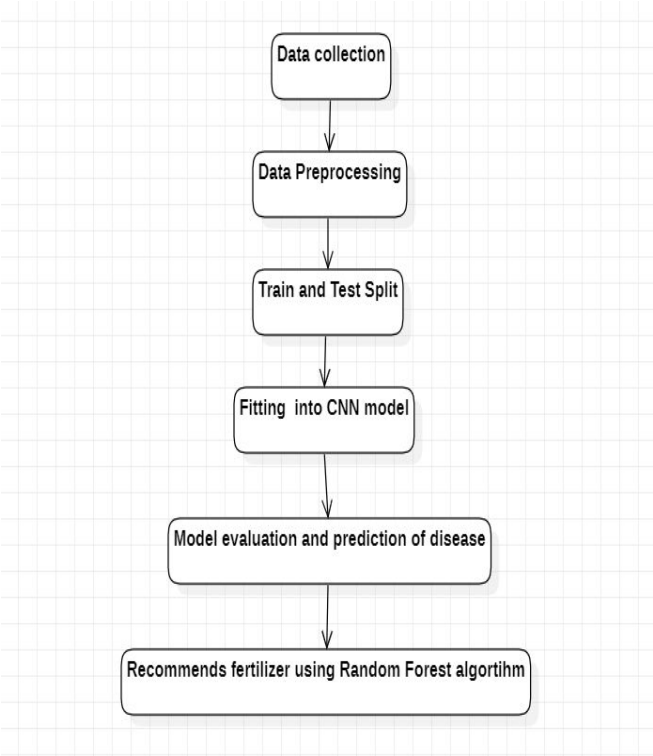
PROPOSED SYSTEM

The proposed system uses CNN and Random Forest Algorithm to train the model using leaf image dataset. Among these, Convolution Neural Network (CNN) classify the disease using image classification technique. It will be employed to accurately identify and classify plant diseases from leaf images by comparing its features. Following disease detection, the Random Forest algorithm (RFA) is used to provide precise fertilizer recommendations by analyzing the predicted for the identified plant.

ARCHITECTURE DIAGRAM

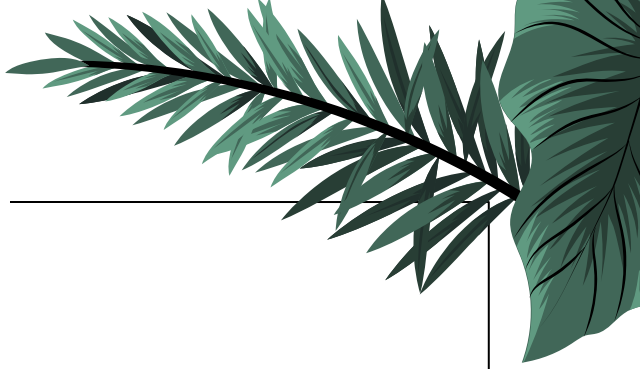


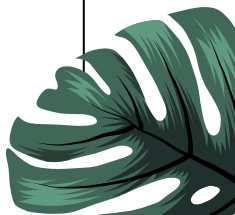
FLOW DIAGRAM



MODULES

- DATA COLLECTION
- DATA PREPROCESSING
- MODEL TRAINING
- TESTING AND EVALUATION
- RESULTS AND DISCUSSION





MODULES

- **DATA COLLECTION**

  The dataset consists of healthy and unhealthy leaf pictures(.jpg) of 87K RGB images having 38 classes out of which We have selected only 6 classes for experimentation of our algorithm.

- **DATA PREPROCESSING:**

  Data preprocessing is a crucial process involves resizing , transforming, normalization and organizing raw data into a format suitable for analysis.

MODULES

- **MODEL TRAINING**

  Here the data set is splitted into training validation and test sets. 70% training, 20% validation and 10% testing. In this Convolutional neural network(CNN) is used to train the model. By training the model we adjust the pixel values and resizing the images to the fixed dimension.

- **TESTING AND EVALUATION**

  The trained model is tested using the test dataset to determine the performance of the model by evaluating the accuracy of the trained model.

MODULES

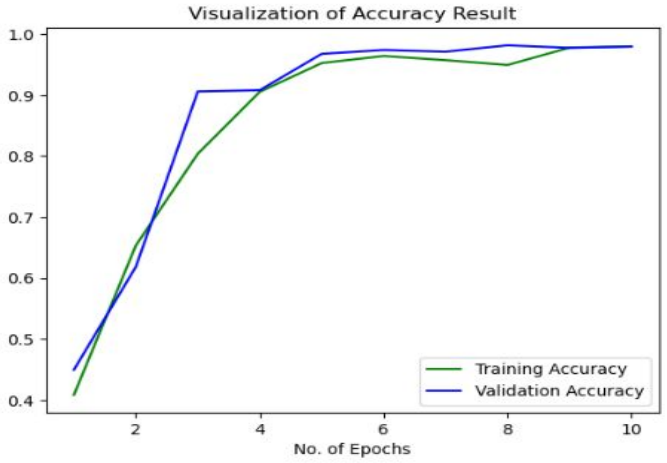
- ## RESULT AND DISCUSSION

In our contrast, Our proposed solution uses CNN to classify the disease using image classification technique. It will be employed to accurately identify and classify plant diseases from leaf images by comparing its features and the extracted features are used to recommend fertilizer by using Random forest algorithm. Compared to the existing system our proposed solution has the additional features by recommending suitable fertilizer, Our proposed solution has obtained the accuracy of 98%. The accuracy of the model will be further increased by training the model with more number of iterations but it will also take more computation time.

RESULT AND DISCUSSION

TRAINING AND ACCURACY GRAPH:

The proposed model is evaluated and the validation and training accuracy graph is obtained. Splitting the dataset into train, test and validation .



RESULTS AND DISCUSSION

PERFORMANCE ANALYSIS

The following is the performance analysis for training the dataset and as well as the model to achieve the required accuracy.

```
#Training set Accuracy
train_loss, train_acc = cnn.evaluate(training_set)
print('Training accuracy:', train_acc)
```

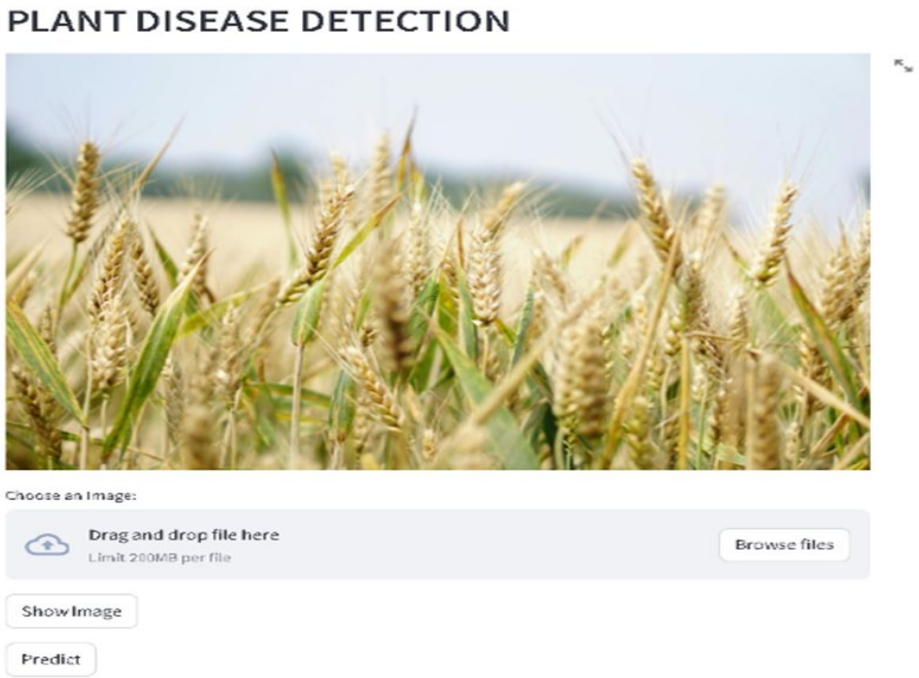
```
179/179 ━━━━━━━━━━━━━━━━━━━━ 35s 193ms/step - accuracy: 0.9859 - loss: 0.0442
Training accuracy: 0.985619068145752
```

```
#Validation set Accuracy
val_loss, val_acc = cnn.evaluate(validation_set)
print('Validation accuracy:', val_acc)
```

```
45/45 ━━━━━━━━━━━━━━━━━━━━ 8s 179ms/step - accuracy: 0.9732 - loss: 0.0700
Validation accuracy: 0.9796633720397949
```

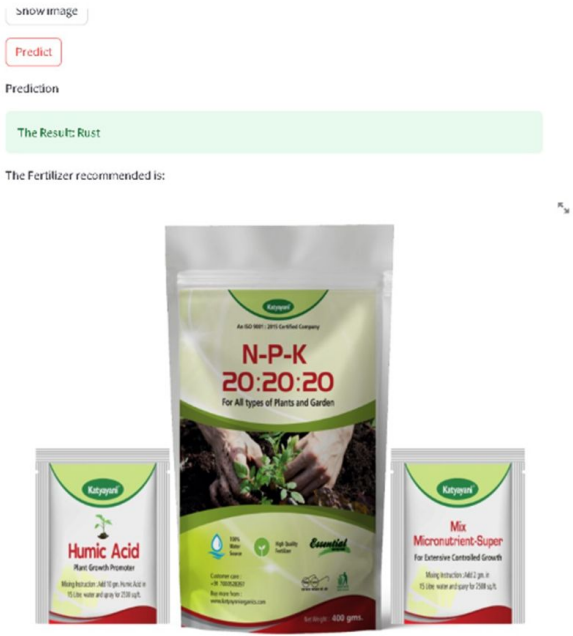
OUTPUT

Home page for uploading the image of the infected plant



OUTPUT

Based on the predicted disease it recommend the suitable fertilizer for the plant.



CONCLUSION

The proposed model is an important step forward in the fields of plant disease prediction and its management. By using CNN and RFA this system predicts the disease of the infected plants and recommends suitable fertilizer. The created approach has exhibited extraordinary accuracy, reaching a 98% identification rate for infected plants using visual characteristics retrieved from trained dataset. Through accurate disease prediction, farmers can proactively mitigate the impact of diseases on crop yields, while targeted fertilizer recommendations it ensure optimal nutrient management, leading to improved productivity and sustainability in agriculture.

FUTURE ENHANCEMENT

Real Time Monitoring: Connect the identification system to Internet of Things (IoT) devices, such as smart cameras or sensors, deployed throughout the supply chain.

Authenticity and accessibility: Create user-friendly mobile apps or web platforms that allow customers to check the authenticity of Healthy plant items by scanning QR codes or submitting photographs.

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THANK YOU….