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# PLANT DISEASE IDENTIFICATION

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***Abstract:*** As we all know that to keep this mother earth alive, it is necessary to maintain a pollution free environment so as to keep the nature sustained followed by the other living beings which help us indirectly in various aspects like farming, milk, etc. Total 1,00,000 living beings including trees, animals, etc get infected through wide spread of diseases every year out of which some of them survive whereas the remaining ones die. There have been several reports and analysis of the real life data which was stored by capturing various real life events in the form of records, tables, models, images, etc. With the help of technology and devices, it has become quite easy to store and retrieve such large amount of data for various purposes like education, development, etc. The following project analyzes the data of trees and identifies the condition of them using CNN algorithm which is nothing but a deep learning algorithm.

***Index Terms*** - plant disease identification, datasets, cnn working, prototype, advantages, disadvantages, etc.

## I. INTRODUCTION:

The project 'Plant Disease Identification' is based on Deep Learning which will use Convolutional Neural Network algorithm to detect and identify the diseases amongst healthy, unhealthy and infected plants by analyzing the datasets in the form of images that were captured in laboratory and outdoors. Convolutional Neural Network is an algorithm that analyzes the image based dataset and determines the characteristics, quality and condition of it. This project mainly focuses on the usage of CNN algorithm and deep learning aspects. The data contains the input in the form of image datasets which comprises of various leaves of different plants in healthy, unhealthy and infected conditions. A dataset is a library that contains several classes or blueprints of the data in the form of text or images depending upon the collection type.

**Table No.1 – Dataset Table**

| Name | Merged Dataset |
|---|---|
| Apple Plant Disease | All |
| Corn Plant Dataset | All |
| Tomato Plant Dataset | All |
| Grape Plant Full | All |
| Potato Dataset | All |

## II. LITERATURE REVIEW:

**[1]** Lili Li, Shujuan Zhang, Bin Wang, et al. have also conveyed through their research that in order to realize the rapid and accurate identification of apple leaf disease, a new lightweight convolutional neural network RegNet was proposed. A series of comparative experiments had been conducted based on 2141 images of 5 apple leaf diseases (rust, scab, ring rot, panonychus ulmi, and healthy leaves) in the field environment. The results show that RegNet-Adam with a learning rate of 0.0001 obtained an average accuracy of 99.8% on the validation set and an overall accuracy of 99.23% on the test set, outperforming all other pre-trained models.

**[4]** The proposed system of Jahnavi Kolli, Dhara Mohana Vamsi, V. M. Manikandan, et al. consists of two parts, a preprocessing step, and a CNN-based classification step. In the preprocessing step, the leaf images are converted into grayscale images, followed by a segmentation process to obtain the leaf regions. The segmented leaf regions are then resized to a fixed size, and a feature extraction process is applied to generate the feature vectors for the training and testing phase.

**[6]** David P. Hughes, Marcel Salathe et al. have proposed a research paper which states that they trained deep convolutional neural network to identify 14 crop species and 26 diseases (or absence thereof) of a public dataset of 54,306 images which includes diseased and healthy plant leaves collected under controlled conditions.

**[7]** As proposed by the research of Sammy V. Militante, Bobby D. Gerardo, Nanette V. Dionisio, et al. their study provides an efficient solution for detecting multiple diseases in several plant varieties specifically apple, corn, grapes, potato, sugarcane, and tomato. The system can also detect several diseases of plants. Comprised of 35,000 images of healthy plant leaves and infected with the diseases, the researchers were able to train deep learning models to detect and recognize plant diseases and the absence these of diseases. The trained

model has achieved an accuracy rate of 96.5% and the system was able to register up to 100% accuracy in detecting and recognizing the plant variety and the type of diseases the plant was infected.

**[8]** Singh et al. proposed a dataset of field images called PlantDoc, a dataset for visual plant disease detection containing 2,598 data points across 13 plant species and up to 17 classes of diseases. Although it contains many laboratory images, PlantDoc has been used in some studies on plant disease detection, but has achieved very low performance.

## III. PROPOSED METHOD:

The proposed system supports five datasets as it uses many tools to produce effective and robust results which are enough to satisfy the needs, predicting and forecasting the cure for the disease followed by its solution. It has separate technologies used at the frontend and backend to provide better user experience. All these five datasets will be first merged into one folder which will be linked into the python program for training and model creation purpose. The GUI part will be including functions like taking input, processing and showing the output on screen within seconds with the intervention of the python programs and algorithms.

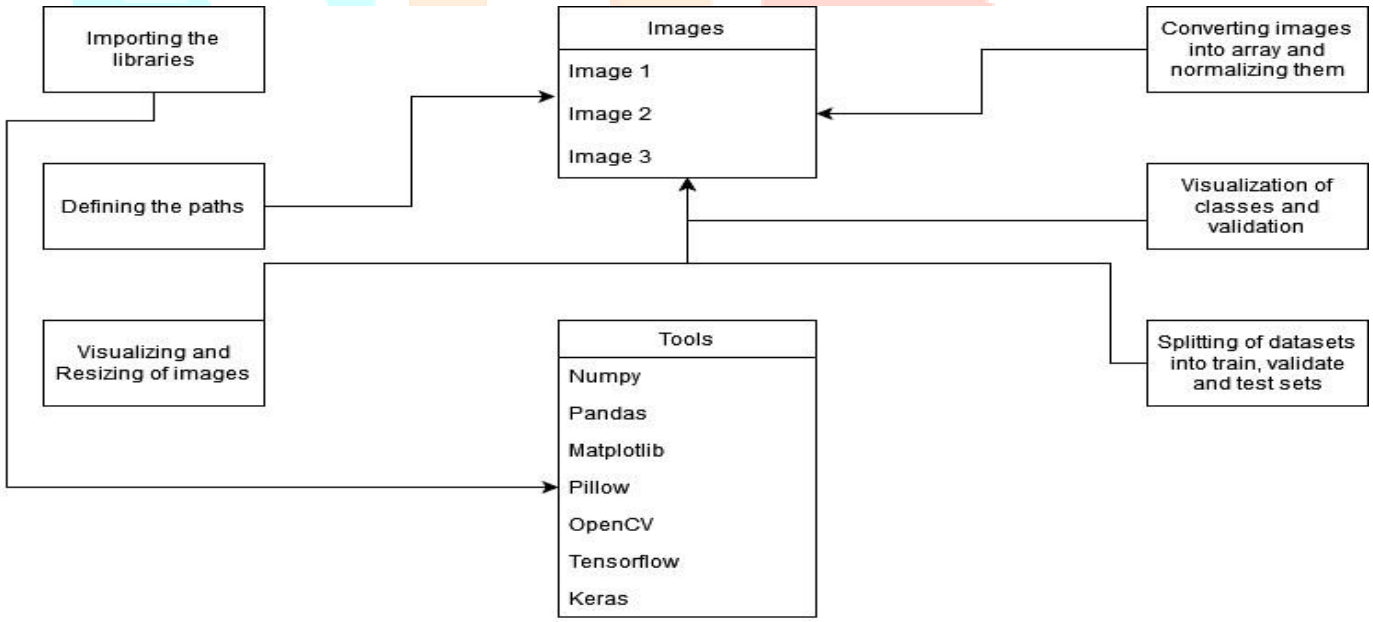


**Fig: - DFD Diagram**

The models will then be created into the root directory i.e. where the main python program exists along with the templates which will be broadcasted over the server using flask right after the python program is executed. Every image of the dataset will be analyzed, trained and shown along with the results like condition, cure or solution after it is uploaded manually through file picker.

## IV. ALGORITHM:

Algorithm for proposed system is given below:-

1. Import the libraries and train the test split before loading the classes of the model through CNN program.
2. If the model isn't present then create one using the datasets as the input with the help of CNN and model programs.
3. Create a flask server and broadcast the static templates over the web to fetch the data from user, process the data and showcase the same with the intended result.

Algorithm for existing system is given below:-

**1.** Importing, loading and defining the libraries, model and classes respectively.

**2.** Defining the constraints of the window panel along with the components such as label, buttons for the primary form.

**3.** Assigning the actions of conversion, display, resize and prediction to submit button respectively in a structured flow such that the image gets converted to opencv before displaying and resizing it, thereby getting finally converted to four dimension followed by the prediction.

## V. EXISTING SYSTEM:

The existing system could only identify up to four images and some infections whereas the current keras model only supports some species of plants and also with lot of glitches and bugs such that the complexity went to near impossible with the current system and tools. All these five datasets are merged into one folder which will be linked into the python program for training and model creation purpose and as per the limit and restrictions of the current system, the datasets named ‘Tomato’, ‘Corn’ and ‘Potato’ have been used to test the program. The test images are taken as input from the user after which they are analyzed by converting the images into OpenCV format and making predictions for the same. The condition of the plant is then identified and shown at last after performing the required calculations and final touches.

## VI. CONCLUSION:

This project has extensively used the technologies and tools to the edge and is in the process to create a digital product to identify the condition of plants and provide solution for the same in the safest method at an ease. Furthermore, on the developer side, it gives in-depth knowledge about web and application development sectors along with deep learning, algorithms and data binding strategies.

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