Indian Institute of Information Technology, Lucknow

Plant Disease Detection And Classification

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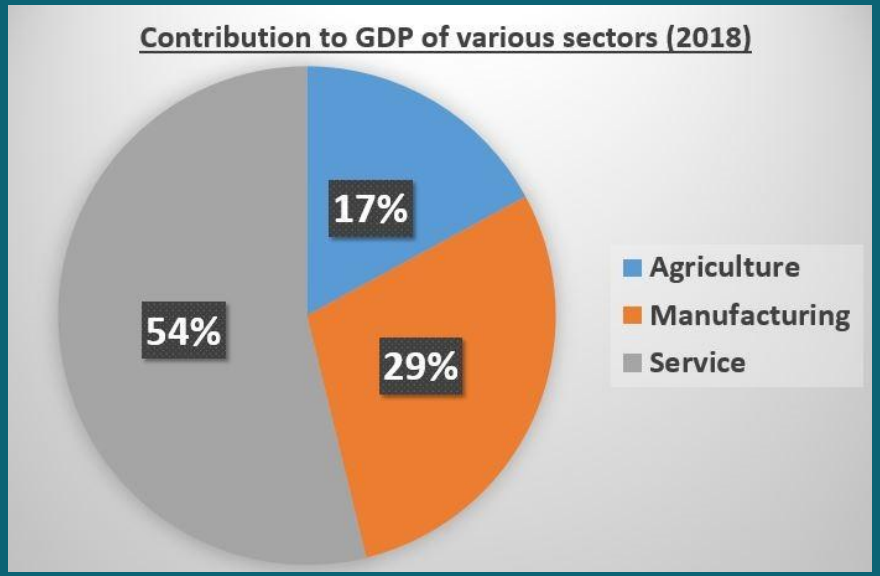
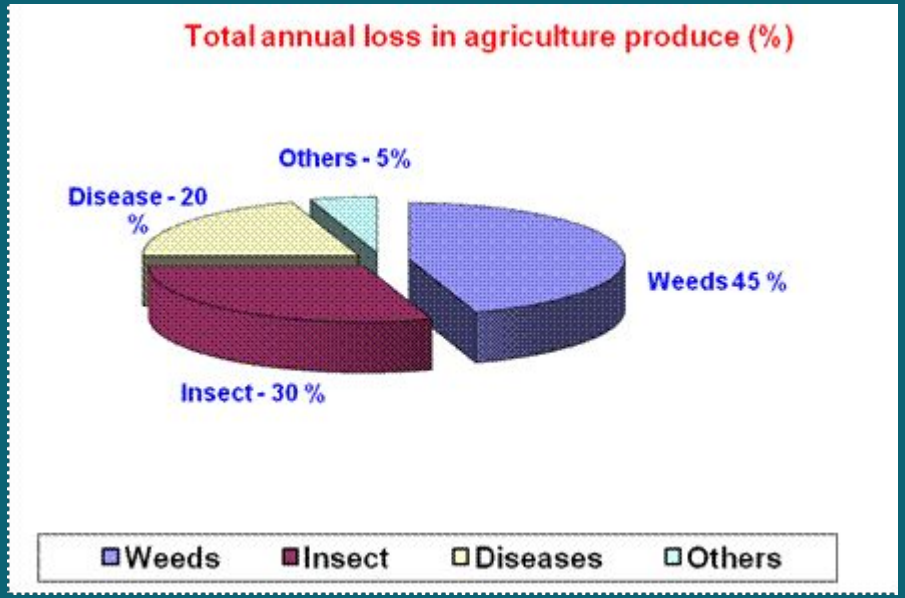
Introduction

- As we know that In India 70% of population depend on agriculture and contributes 17% towards the GDP of country, There for disease found in agricultural crops impacts quality and quantity of agricultural products which result in poor income to farmers.



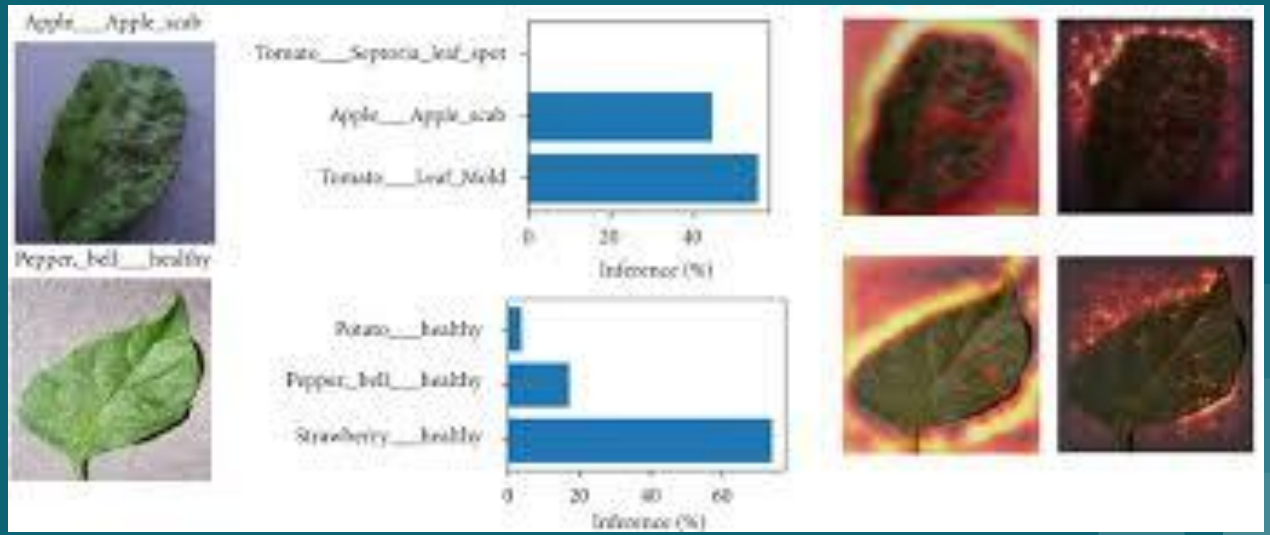
Introduction

- **Thus, recognizing diseases in plant becomes very crucial in order to avoid any massive losses in production, performance and in the amount of the agricultural outcome.**



Introduction

- **Since manual recognition is extremely time consuming and more prone to inaccuracy, it leads to wrong treatment. The recent development in technology has made it feasible for plant disease detection and identification that enables us to contribute in providing better treatment for plants in case of any disease.**



Motivation of work

- **Due to the cultivation of a large number of crop products, even an agriculturist and pathologist may often fail to identify the diseases in plants by visualizing disease-affected leaves.**

Tomato_Spider_mites_Two_spotted_spider_mite

Tomato__Tomato_YellowLeaf__Curl_Virus

Potato___Late_blight

Motivation of work

- **In remote areas, farmers may need to travel far to consult an expert, and naked eye observation of experts is the traditional approach, which is time consuming and expensive.**

Motivation of work

- **The attack of these numerous types of diseases on plants results in a huge loss in the yield performance in terms of quality as well as quantity. Plants affected by diseases add up to for about 20-30% of the entire crop deprivation.which is result in lesser income for farmers.**

State of the art techniques/work

Many researchers across the world explored different Machine Learning, Deep Learning, Image Processing and Soft Computing techniques to automate plant disease detection. Some them are described below.

1. **Liu Bin, Presented "Identification of apple leaf diseases based on deep convolutional neural networks". In this paper, Liu proposes a new model of deep convolution networks for prediction and identification of disease in apple leaves. Model Proposed in the Paper used a total of 13,689 images which were created with the help of image processing technologies like PCA oscillation.**

State of the art techniques/work

2. S.Zhang designed a neural-network-based system to detect plant diseases like bacterial speck, target spot, late blight, early blight, mosaic virus, and Septoria leaf spot. The proposed model employed a three-channel convolution neural network and achieved a total accuracy of 89.29%.

3. V. Singh and A.K.Misra presented a plant disease detection system. Shape and texture features were extracted before classification. The classification of diseases is done using the minimum distance criterion using K-mean clustering and SVM. The system achieved accuracy 86.54%.

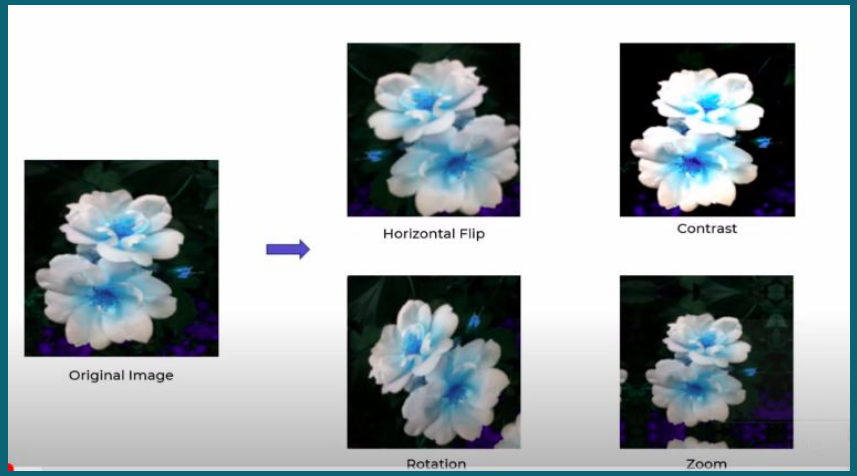
State of the art techniques/work

4. In his paper X.Wu proposed an automatic system to detect diseases in cucumber leaves. The system uses K-Means clustering based segmentation and obtained 85.70% accuracy.

5. K.Singh,S.Kumar, and P.Kaur, presented a plant disease detection system to detect fungal rust in pea plants The images were segmented using the binary threshold and SVM for classification. The system obtained an overall accuracy of 89.60%.

Problem Observed on the State-of-The-Art Techniques/Works

- **In model training and accurate prediction of diseases the size of the dataset matters the most but in Liu's and other papers they use a small number of images. Therefor present models are less accurate as they don't take a lot of sample images.**



Problem Observed on the State-of-The-Art Techniques/Works

- **The various models proposed were good in predicting diseases but too difficult for a non technical user to understand ,implement and use for their benefit. Farmers can not understand Deep Learning Terminologies.Some level of abstraction is necessary so that layman farmers can use them.**

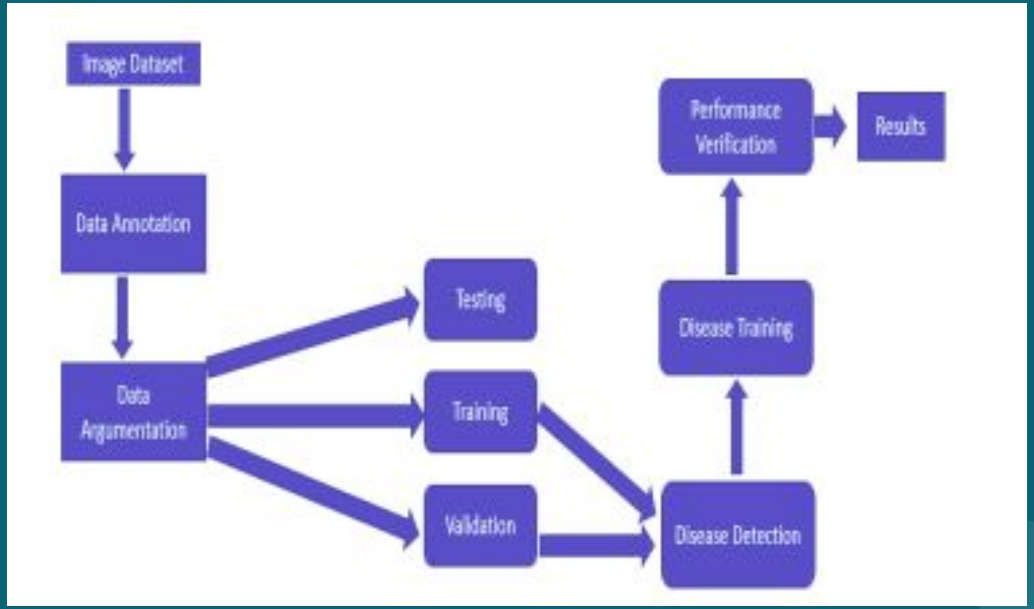
Exact Problem I’m going to solve

- When different size, rotation and zoom levels images are given to model for prediction its accuracy decreases to address this problem I’m going to solve this problem using Data Augmentation.

- End goal is to create an end user accessible application with high accuracy.

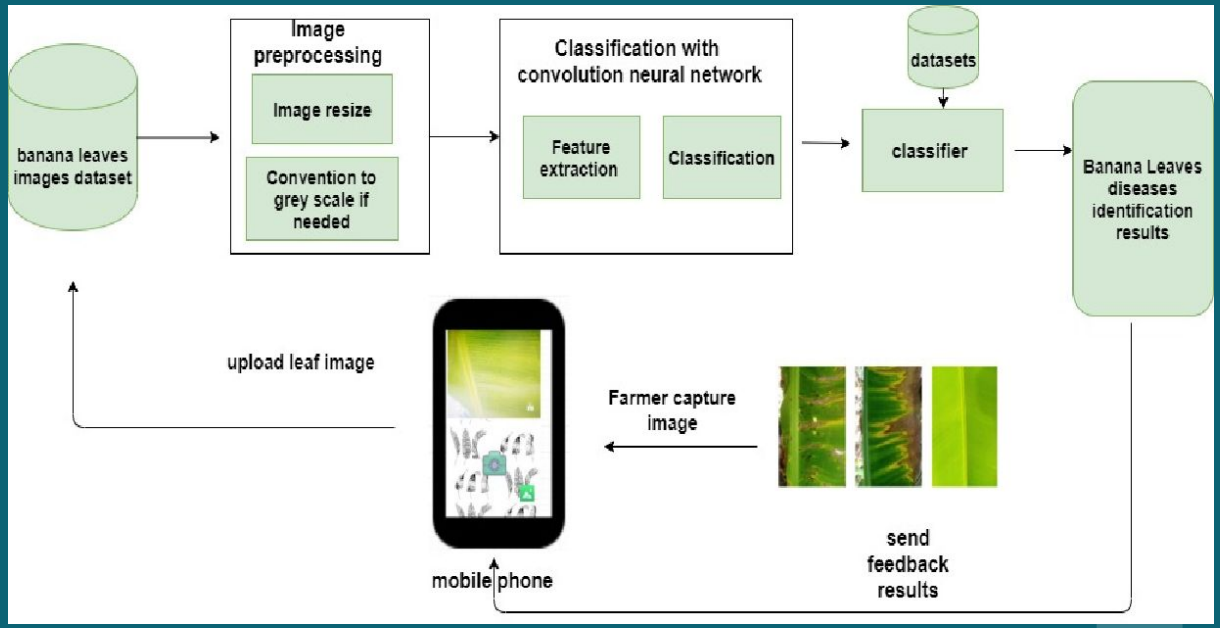
Novelty of the Work

- I’m going to use Image processing and Data augmentation techniques on images before using them to train model.



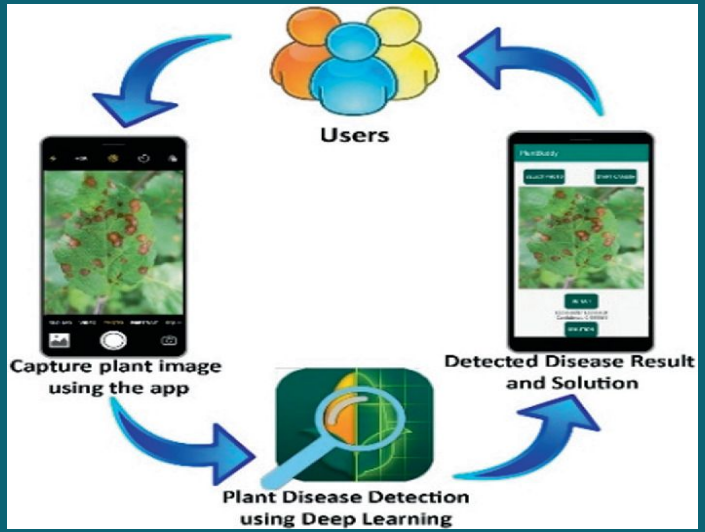
Novelty of the Work

- **I will be creating an user application which will have an interface easily understandable by non technical users/farmers**



Potential Solution

- I’m going to implement an easily accessible end-user application for predicting plant disease with high accuracy with help of Data augmentation, image processing and Convolutional neural network.



Future Work Plan for completion of the Project

- I’m planing work on increasing current accuracy by taking large epoch and batch size.

- Creating user friendly application and integrate model in form of api to predict plant disease.

References

1. Liu, Bin, "Identification of apple leaf diseases based on deep convolutional neural networks".

2. S.Zhang,W.Huang, andC.Zhang, "Three-channel convolutional neural networks for vegetable leaf disease recognition," Cognitive Systems Research, vol.53, pp. 31-41,2019

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4. S.Zhang,X.Wu, Z. You, andL.Zhang, "Leaf image based cucumber disease recognition using sparse representation classification," Computers and electronics in agriculture, vol. 134, pp. 135-141,2017

5. K.Singh,S.Kumar, andP.Kaur, "Support vector machine classifier based detection of fungal rust disease in Pea Plant (Pisamsativam)," International Journal of Information Technology, vol. 11, pp. 485-492, 2019.

6. Plant Village DataSet, David. P. Hughes, Marcel Salathe An open access repository of images on plant health to enable the development of mobile disease diagnostics, eprint 2015.

Thank You