Tribhuvan University
Institute of Science and Technology

A Final Year Project Proposal

On

PLANT DISEASE DETECTION USING CNN WITH PYTORCH

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1.Introduction

As we know Nepal is an Agricultural country. In countries like Nepal, it is of utmost importance to bring technological advancement in the fields related to crop productivity. Modern technologies have given human society the ability to produce enough food to meet the demand of more than 3 crore people. However, food security remains threatened by several factors including climate change, the decline in pollinators, plant diseases, and others. Identifying diseases from images of plant leaves is one of the most important research areas in precision agriculture. Advances in artificial intelligence, image processing, and graphical processing units (GPUs) can expand and improve the practice of precise plant protection and growth.

2.Problem Statement

Many people and technological groups are involved in the field of agriculture to increase the yield and throughput. There have been various techniques used in the past to solve problems related to disease spread in a variety of plants. With the advancement in technology, plant disease detection has become easier and more precise. In our system, a different approach, i.e., CNN algorithm is used for the same. Various kinds of methods have been used recently to determine the type of plant disease. Some of these involve analysis and study of the chemical analysis method to determine plant diseases, and ways which are indirect by implementing physical techniques, like spectroscopy of the leaf and imaging, to get information related to properties of a plant. Following this, the merits of the project contrasted with the existing technologies are related to the underlying points: The system avoids the process involved in gathering inputs for studying them in the laboratory, because of pre-existing images taken in place of the plant diseases. It examines the chances where a particular plant is concurrently simulated with higher than one pest or disease in the unchanged recorded input. The outlook deploys inputting of various images apprehended by various cameras with diverse resolutions, like mobile phones and the other available cameras devices. The project is systematically packed

with different conditions related to illuminations, the size of actors in an image, surrounding distinction, etc., holding across the neighboring part of that particular plant. It imparts a feasible functioning approach that can maneuver in the domain by not using costly and complex and compound technologies.

3.Objective

To enhance the given input image by Image acquisition and Image preprocessing.

- Identify the affected part through texture analysis and Segmentation.
- Classify the healthy and affected leaf part by feature extraction and classification.
- Train the model by using testing data for accurate results.

4.Proposed Statement

Plants are susceptible to various disease-related disorders and seizures. There are various causes which can be characterized by their effect on plants, disturbances due to environmental conditions such as temperature, humidity, excessive or insufficient food diseases. In the proposed system, we use the CNN algorithm to detect disease in plant leaves because with the light and the most common diseases such as bacterial, viral and fungal help of CNN the maximum accuracy can be achieved if the data is good.

5.Methodology

5.1 Literature Review

Liu, Bin, et al. "Identification of apple leaf diseases based on deep convolutional neural networks. In this paper, Liu proposes a new model of deep convolution networks for accurate prediction and identification in apple leaves.Model Proposed in the Paper can automatically recognize the different character traits with a very high level of accuracy. A total of more than 70,000 images were created with the help of image processing technologies like PCA oscillation.

Apart from this new AlexNet based neural network was also proposed by implementing the NAG Algorithm to optimize the network. In future work to predict the apple leaf disease, other Models of Deep Learning Like F-CNN, R-CNN, and SSD can be implemented. This article suggests a new way to classify leave using the CNN model and builds two models by adjusting network depth using Google Net. We assessed the effectiveness of each model based on discoloration or leaf damage. The recognition rate achieved is more than 98%, even if 30% of the leaves are damaged. In future research, we will seek to identify leaves attached to branches to develop a visual system that can mimic the methods humans use to identify plant species.

5.2 System Model

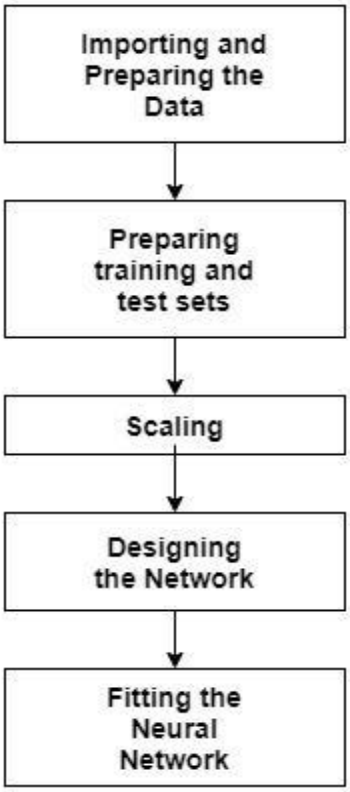

Fig: System Model

1) Data Collection And Preparation:

Data is collected from the datasets which we downloaded from here : https://data.mendeley.com/datasets/tywbtsjrjv/1

2) Preparing training and test data :

After we model our data and estimate the skill of our model on the training dataset, we need to get an idea of the skill of the model on new unseen data. For a normal classification or regression problem, we would do this using cross validation. With time series data, the sequence of values is important. A simple method that we can use is to split the ordered dataset into train and test datasets.

3) Data Training :

Data training is done with the CNN based on the given learning rates and also the datasets that we provided and it uses ADAM optimizers for optimization. The Training of the model takes a lot of time. We supposed to train the model with in 6-7 hours.

4) Designing the network architecture:

After having defined the placeholders, variables, initializers, cost functions and optimizers of the network, the model needs to be trained.There, TensorFlow compares the model's predictions against the actual observed targets Y in the current batch. Afterwards, Keras Conducts an optimization step and updates the network's parameters, corresponding to the selected learning scheme. After having updated the weights and biases, the next batch is sampled and the process repeats itself. The procedure continues until all batches have been presented to the network. One full sweep over all batches is called an epoch. The training of the network stops once the maximum number of epochs is reached or another stopping criterion defined by the user applies. The model quickly learns the shape and location of the time series in the test data and is able to produce an accurate prediction after some epochs.

6. Working Schedule

Activities	1w	2w	3w	4w	5w	6w	7w	8w	9w	10w	11w	12w
Planning												
Analysis												
Design												
Implementation												
Testing												
Documentation												
Review												
Presentation												*

Fig: Gantt Chart

7.Tests and Results

The model will detect the infected and healthy plant and based on that it will be able to identify the disease's name and also suggest the way to cure it with necessary supplements required to enhance the production.

Prediction is far better if there is white background with no other object in the frame of the camera apart from the hand. Accuracy increases with the condition applied. When we try to load the healthy and infected leaves of the plants, we are successful to detect the healthy and infected leaves with the name of the diseases and the various ways to eliminate the infections with the necessary supplements provided and also the types of diseases are classified.

We are supposed to gain an accuracy of more than **98percent.**

8.Conclusion

This project was undertaken to solve the underlying issue faced by farmers who can now identify the types of diseases and the curing method. They don't have to worry about which types of supplements they have to use, now they get the information on the webapp and can look up the supplements.

This project helps in eradicating the problems of crop dead due to which they were unknown about the types of diseases but now they are well aware about the diseases and the curing methods.

The application provides the necessary platform to solve with much ease and gives them the ability to interpret without any external help.

9.References

- Using Deep Learning for Image-Based Plant Disease Detection

  [[https://www.frontiersin.org/articles/10.3389/fpls.2016.01419/full]]

- https://www.ijrte.org/wp-content/uploads/papers/v10i3/C64580910321.pdf?fbclid=IwAR3ajNfbuqAU_mbjvDC_xpy-Ve5tyCtrc3RZMhFeXQCMMvuFirs9nTDAfRo

- Plant Leaf Disease Classification and Detection System Using Machine Learning

  [[https://www.researchgate.net/publication/347972088_Plant_Leaf_Disease_Classification_and_Detection_System_Using_Machine_Learning]]

- Articles [[https://plantmethods.biomedcentral.com/articles]]

- Plant Disease Diagnosis [[https://www.apsnet.org/edcenter/disimpactmngmnt/casestudies/Pages/PlantDiseaseDiagnosis.aspx]]

- Convolutional Neural Network Tutorial [Update] [[https://www.simplilearn.com/tutorials/deep-learning-tutorial/convolutional-neural-network]]