

PROJECT

**PLANT LEAF DISEASE CLASSIFICATION
USING CONVOLUTIONAL NEURAL
NETWORKS**

AGENDA

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PROBLEM STATEMENT

Agriculture crops are threatened by wide variety of plant diseases. These can damage the crop, lower the vegetable and fruits quality and wipe out the harvest. About 42% of the world's total agricultural crop is destroyed yearly by diseases. If plant disease is not identified at early stage, it can affects other crops too. Disease affected plants constitute 10-30% of total crop loss.

INTRODUCTION

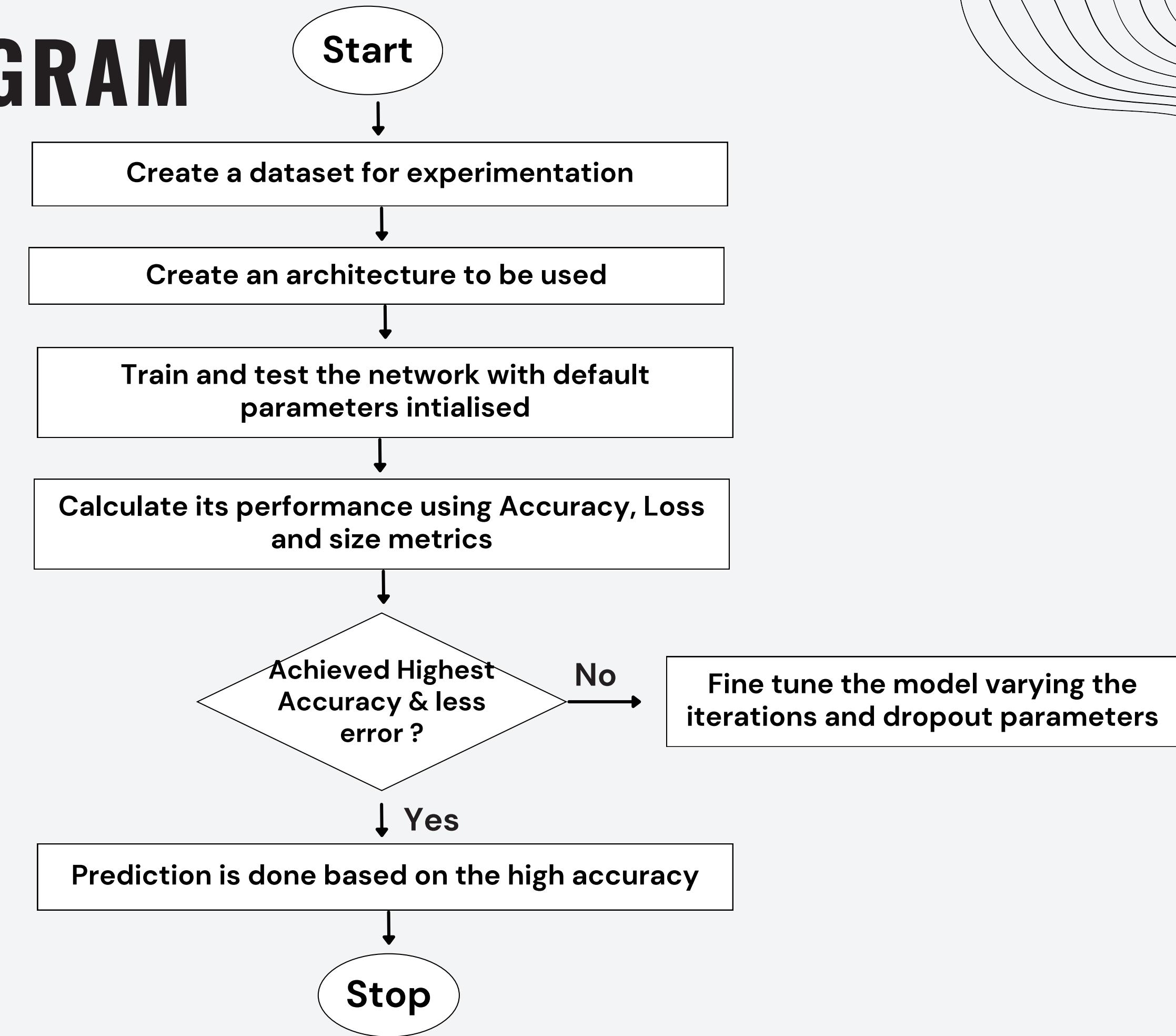
- Diseases found in agricultural crops is a major threat that cause production and economic losses as well as reduction in both quality and quantity of agricultural products.
- In India 70% of the population depend on agriculture and contributes 17% towards the GDP of country.
- Farmers experience great difficulties in switching from one disease control policy to another. The naked eye observation of experts is the traditional approach, this method can be time consuming, expensive and inaccurate.
- The crop losses can be minimized by applying pesticides or its equivalent to combat the effect of specific pathogens, if diseases are correctly diagnosed and identified early.

OBJECTIVES

- Forecasting of plant leaf disease (Quantification) as soon it appears on plant leaves
- Automatic detection of plant leaf disease detection and classification
- Increase accuracies Using large dataset to train the algorithm and maximize epoch values
- Make use of deep learning model for plant leaf disease detection and will check their performance on the basis of various evaluation



DATAFLOW DIAGRAM



PROPOSED METHODOLOGY



This work proposes a training image generation technology based on image processing techniques, which can enhance the robustness and prevent overfitting of the CNN based model in the training process

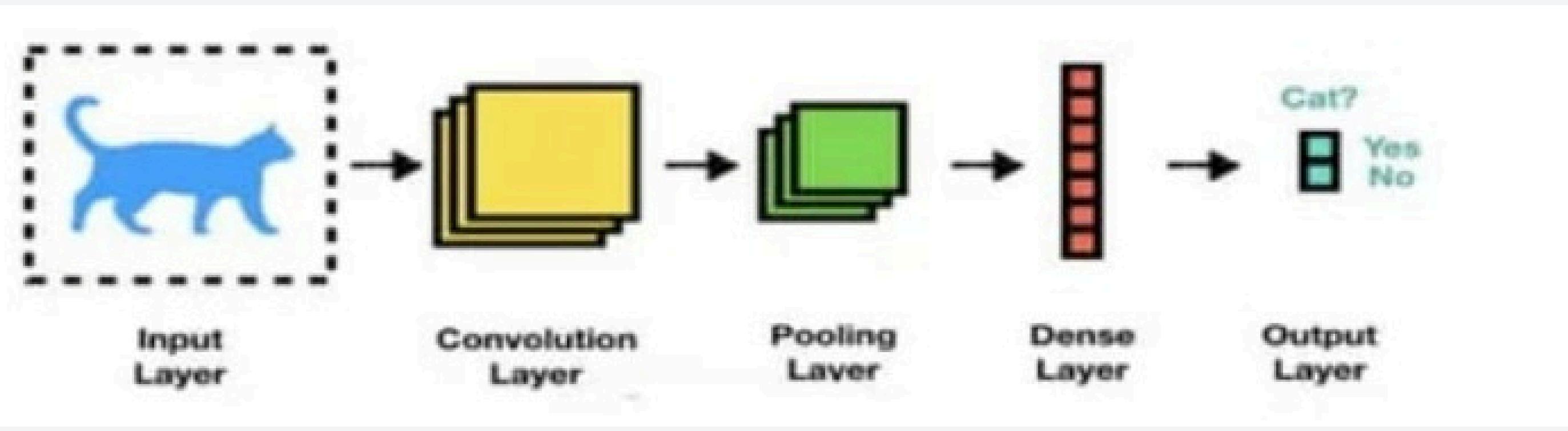


A convolutional neural network is first employed to diagnose leaf diseases; the end-to-end learning model can automatically discover the discriminative features of the leaf images and identify the common types of leaf diseases with high accuracy

PROPOSED METHODOLOGY

Convolutional Neural Network (CNN)

A Convolutional Neural Network is a deep learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.



PROPOSED METHODOLOGY

- By analyzing the characteristics of leaf diseases, a novel deep convolutional neural network model based on ResNet shall be proposed
- Residual network (ResNet) is Convolutional Neural Network (CNN) architecture that overcome the "Vanishing Gradient" problem.
- As it reduces the Vanishing gradient, though there are many layers error rate will be low
- The strength of ResNet to solve the degradation problem to give higher accuracies and the advantages of a pretrained model is the motivation of using it as the classification technique in our proposed work

TRANSFER LEARNING



- Transfer learning is the reuse of a pre-trained model on a new problem
- A pre-trained model is a saved network that was previously trained on a large dataset, typically on a large-scaling image-classification task
- Feature Extraction: Use the representations learned by a previous network to extract meaningful features from new samples
- Fine Tuning: Unfreeze a few of the top layers of a frozen model base and jointly train both the newly-added classifier layers and the last layers of the base model

DATASET

- The Dataset collected from open source website "Kaggle"
- The Dataset contains 87k image samples of 48 crops
- The dataset consists of 38 classes corresponding to 38 leaf dieases of 14 crops
- The 38 disease are listed below
 - 1.Apple___Apple_scab 2.Apple___Black_rot 3.Apple___Cedar_apple_rust
 - 4.Apple___healthy 5.Blueberry___healthy 6.Cherry_(including_sour)___Powdery_mildew
 - 7.Cherry_(including_sour)___healthy 8.Corn_(maize)___Cercospora_leaf_spot_Gray_leaf_spot
 - 9.Corn_(maize)___Common_rust_ 10.Corn_(maize)___Northern_Leaf_Blight
 - 11.Corn_(maize)___healthy 12.Grape___Black_rot 13.Grape___Esca_(Black_Measles)
 - 14.Grape___Leaf_blight_(Isariopsis_Leaf_Spot) 15.Grape___healthy
 - 16.Orange___Haunglongbing_(Citrus_greening) 17.Peach___Bacterial_spot 18.Peach___healthy
 - 19.Pepper,_bell___Bacterial_spot 20.Pepper,_bell___healthy 21.Potato___Early_blight
 - 22.Potato___Late_blight 23.Potato___healthy 24.Raspberry___healthy 25.Soybean___healthy
 - 26.Squash___Powdery_mildew 27.Strawberry___Leaf_scorch 28.Strawberry___healthy
 - 29.Tomato___Bacterial_spot 30.Tomato___Early_blight 31.Tomato___Late_blight
 - 32.Tomato___Leaf_Mold 33.Tomato___Septoria_leaf_spot 34.Tomato___Spider_mites_Two-spotted_spider_mite 35.Tomato___Target_Spot 36.Tomato___Tomato_Yellow_Leaf_Curl_Virus
 - 37.Tomato___Tomato_mosaic_virus 38.Tomato___healthy

Potato_ healthy



Tomato_ Leaf_Mold



Grape_ healthy



Potato_ Early_blight



Tomato_ Septoria_leaf_spot



Potato_ healthy



Grape_ Black_rot



Tomato_ Late_blight



Grape_ Leaf_blight_(Isariopsis_Leaf_Spot)



Peach_ healthy



Grape_ Esca_(Black_Measles)



Tomato_ healthy



Tomato_ Leaf_Mold



Grape_ Black_rot



Tomato_ Early_blight



OVERVIEW OF EXISTING SYSTEM



Leaf Blast



False Smut



Bacterial Blight



Leaf Strake



Brown Spot

- The most wanted crop, Paddy
- Diseases - Brown Spot, Paddy Blast, Bacterial blight affected leaf
- Methods - Histograms, k-means clustering, Image Processing
- Drawbacks- Accuracy

Fungal disease poses threat to apple crop in Uttarkashi: Agri experts

TNN | Aug 5, 2023, 07:45 AM IST



UTTARKASHI: Agri experts have warned of a fungal epidemic triggered by the *Marssonina Coronaria* fungus due to climatic patterns in hilly regions. If not controlled at an early stage, it can severely impact apple production, the experts said.

Uttarkashi district, known for its significant apple production with an annual production of 45,000 metric tons, has already witnessed a decline in productivity attributed to the infection. Early symptoms include small spots leading to mid-season leaf fall.

Patiala: Seedborne fungal disease affects renowned paddy crop

Pesticides, fertilisers of little use

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Updated At: Aug 07, 2023 08:17 AM (IST)

3738



Fungal rot disease hits ginger crop

15 per cent of the crop has been affected, says official

August 20, 2014 10:34 pm | Updated 10:34 pm IST - Shimoga

VEERENDRA P. M.

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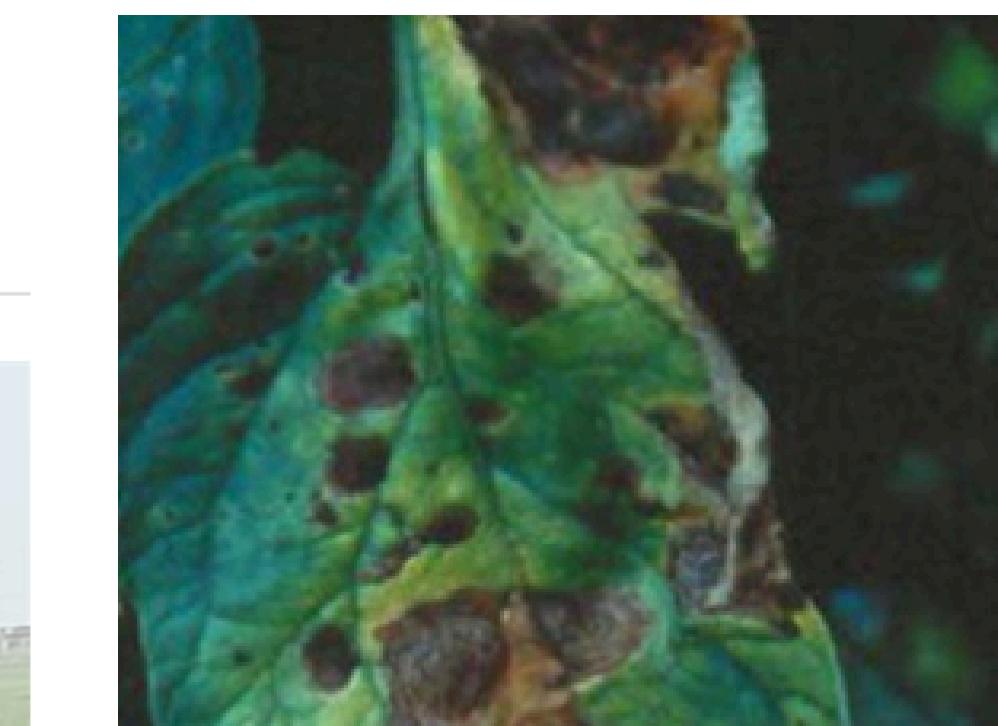
Fungal attacks threaten crops

December 31, 2010 12:37 pm | Updated October 17, 2016 11:06 pm IST - BANGALORE

STAFF REPORTER

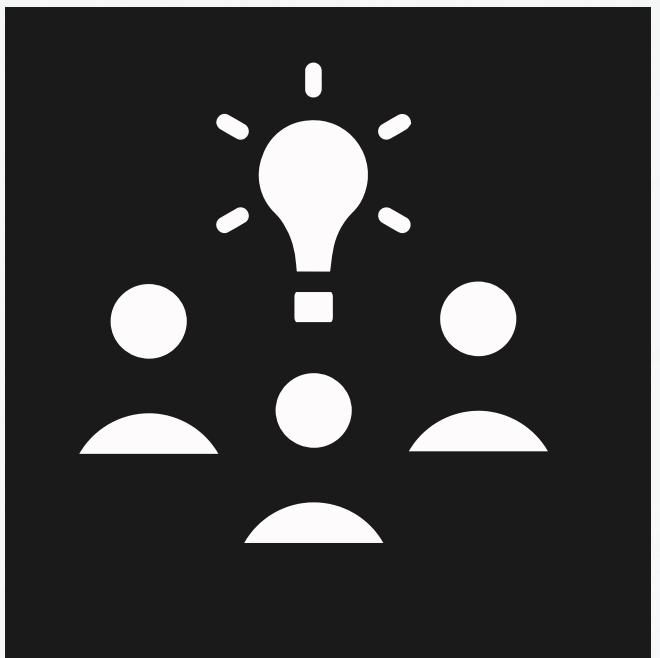
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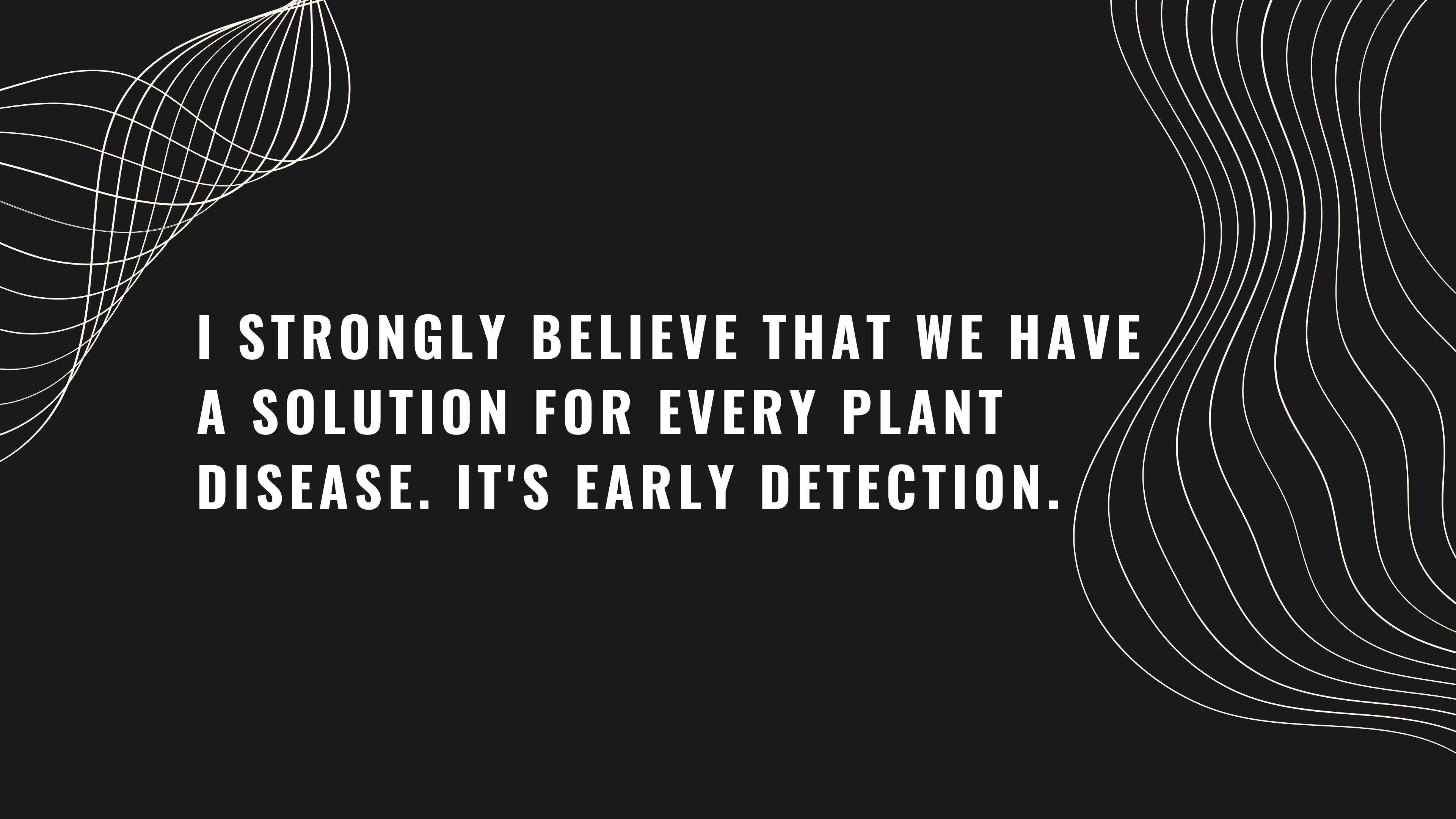
READ LATER



OVERVIEW OF PROPOSED SYSTEM

- **Innovation:** Convolutional Neural Networks
- **Benefit:** Increase in accuracy rate
- **Classification:** of various plant diseases
- **Advancement:** Pesticide suggestion





I STRONGLY BELIEVE THAT WE HAVE
A SOLUTION FOR EVERY PLANT
DISEASE. IT'S EARLY DETECTION.

FUTURE ENHANCEMENT

01

02

03

04

The future work can also be dedicated to the automatic estimation of the severity of these diseases

Usage of real-time images to identify the diseases which would increase time efficiency of the project

The instant solutions can be made available to the farmers by designing mobile based applications

Online solutions related to plant diseases can be provided by using web portals

CONCLUSION

This project shall propose a novel deep convolutional neural network model to accurately identify and classify leaf diseases, which can automatically discover the discriminative features of leaf diseases and enable an end-to-end learning pipeline with accuracy.

The transfer learning method used by Efficientnetb5 improves model accuracy while decreasing the loss. This technique can be used globally to track the spread of plant diseases.





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**THANK
YOU**