Plant Disease Detection and Solution for Rural Farmers Using Computer Vision, Cloud Computing and Android Platform

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Overview

- Bangladesh is a densely populated country with considerably low per capita arable land. This makes a daunting task to grow sufficient food grains for about 160 million people.
- Also, diseases prevalence and the lack of proper monitoring causes significant crop loss as high as 30% in some cases.
- For instance, Potato, Tomato, and Rice production decrease by 37%, 43%, and 10% respectively, because of various leaf infection.
- To assist farmers, we have developed a voice-assisted app, namely the কৃসহায়ক (Kri-Sho-hayok), for instant detection of plant diseases using low-resolution images of affected leaves.

Significance

- Early and accurate detection of plant diseases can prevent a large-scale yield loss.
- Farmers can check their crops regularly through this voice-assisted app and take measures accordingly.
- Also, the proposed framework is extendable to diseases detection for other crops.

Method

- We have collected labeled-dataset of 5 different crops containing 25 classes of diseases.
- The dataset is pre-processed and visualized for experimentation and feature extraction.
- Supervised machine learning is used to train the classifier.

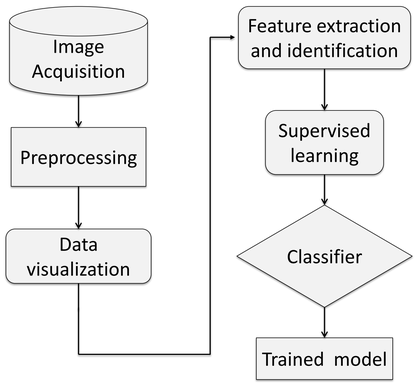


Fig. 1: Model Learning Process

System Architecture

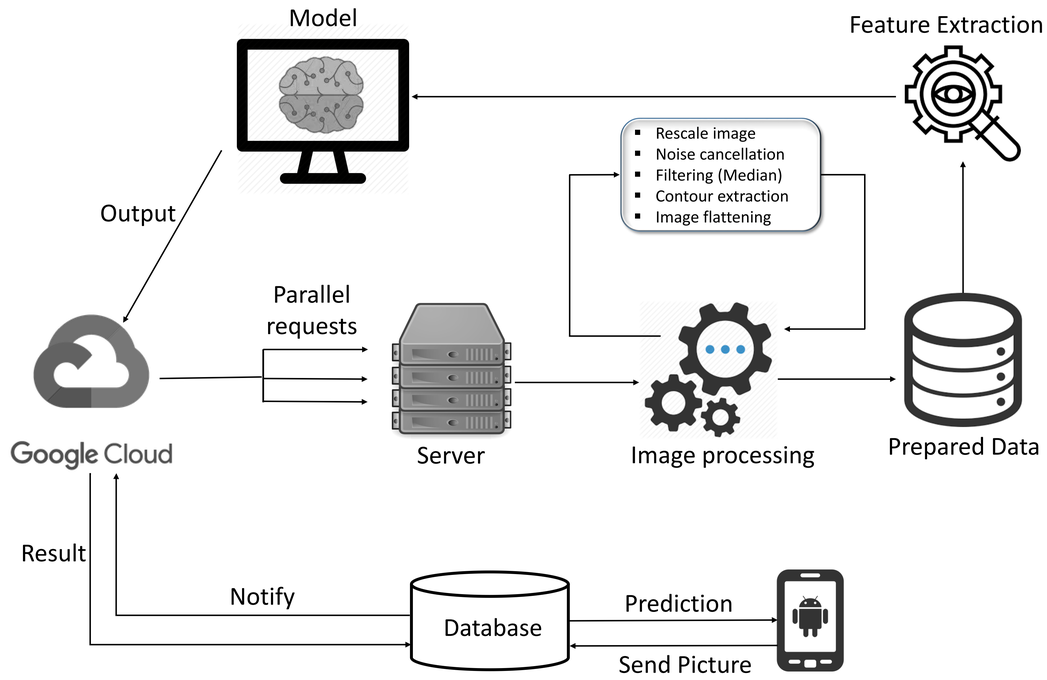
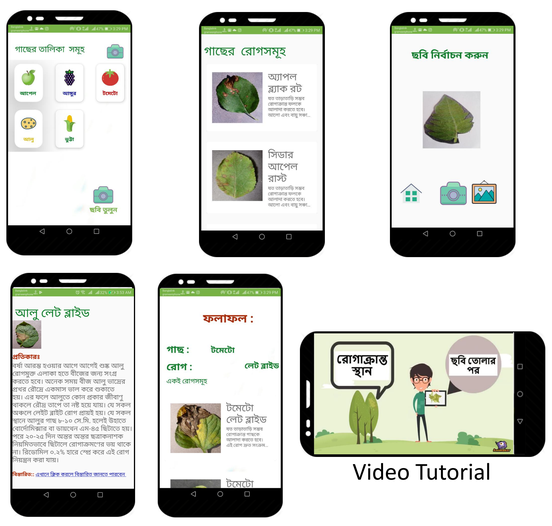


Fig. 2: Overall system architecture

- Captured images are sent to the cloud and the server pre-processes those images and sends the predictions back to the device via database.

Android App



Video Tutorial

Fig. 3: Activity Screenshots

Results

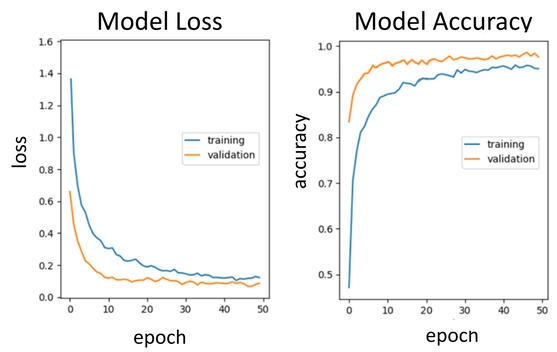


Fig. 4: Model accuracy and loss vs epoch

Model Comparison

Classifier	Accuracy
MobileNet	96.08%
AlexNet	86.08%
Custom CNN	90.05%

Model Description

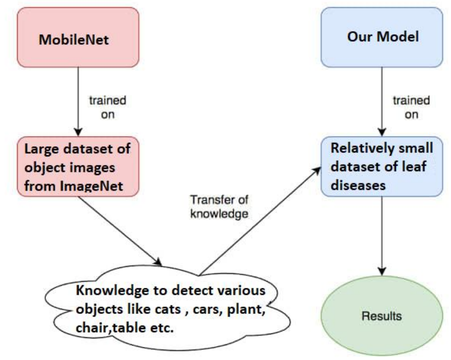


Fig. 5: Model Architecture

- We have chosen MobileNet as our base architecture.
- A comparison among alternative candidate models reveals MobileNet as the best fit for this problem.

Conclusion

- Farmers will be able to detect diseases of potatoes, tomatoes, apples, etc. by using this app.
- This allows the farmers to take necessary steps before it is too late.
- The architecture of the project is also adaptable for other kinds of crops and poultry diseases.

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References

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