Grape Leaf Disease Detection and Classification Using Machine Learning

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ABSTRACT

Grapevine diseases and pets could cause significant financial losses to grape production and farmers if not detected and treated early. With the recent advance of artificial intelligence techniques and machine learning technologies, people start to use computer vision and deep learning algorithms to detect and classify grapevine diseases with high efficiency. In this paper, four modified deep learning models are developed for grape leaf disease detection and classification based on a developed grape leaf dataset.
Transfer learning technique has been used in this research project based on three pretrained machine learning models (VGG16, Mobile Net, and Alex Net). The targeted diseases include: black rot, black measles, leaf blight and phylloxera. The reported comparative evaluation results show better accuracy and performance improvement compared with pretrained models. In addition, an ensemble model based on these four developed models improves final detection and classification accuracy. The reported evaluation results show a great potential usage in grapevine production.

Keyword: - *Smart Agriculture1, Plant Disease Detection2 and Classification, Machine3 Learning, and Transfer Learning etc…..*

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1. Grape Leaf Disease Detection and Classification Using Machine Learning -1

The idea is to reduce the diseases and improve the farmer's profit. work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work.

India is well known for its agriculture production. Farmers have variety of options to cultivate crops in the field. Still, the cultivating these crops for best harvest and top quality of production is done in a technical way. So, the yield can be increased and quality can be improved by the use of technology. Generally, whenever there is disease to a plant, we can say that leaves are the main indicator of the disease caused to the plant.

1.1 Problem Definition and scope -1

Reduce the damage of diseases, many researchers have made tremendous efforts to identify plant diseases. With the continuous development of machine learning algorithms, they have been widely utilized to identify diseases.

1.2 Motivation of the project-2

India is well known for its agriculture production. Farmers have variety of options to cultivate crops in the field. Still, the cultivating these crops for best harvest and top quality of production is done in a technical way. So the yield can be increased and quality can be improved by the use of technology. Generally, whenever there is disease to a plant, we can say that leaves are the main indicator of the disease caused to the plant.

2. Methodology of Problem Solving and Efficiency Issues -2

a) training dataset,

b) validation dataset, and

c) test dataset.

2.1) Data Augmentation:

For the raw data, we have collected 1075 images for leaf blight, 1383 images for black measles, 1180 images for black rot, 423 for healthy leaves and250 for phylloxera. To balance the dataset and reduce overfitting problems during the training stage, we augmented healthy and phylloxera disease data by cropping, and did data augmentation with image data generator.

2.2) Renaming:

Renaming is used to ease the data management for further evaluation. Image renaming in each category is done after cropping and augmentation, but before data shuffled randomly.

After renaming, the images in each category fold are named as "class name*sequencenumber*".*Itcanbeeasilych* 4.6.3)*RandamlyDataShuffling* : *oavoidimageaugmentationbasedonthesameimagesinthegivendataset*(*trainin*

2.3) Data Splitting:

a) training dataset,

b) validation dataset, and

c) test dataset

2.1 Reconciled Estimates -1

The project cost can be found using any one of the model. COCOMO-1 Model COCOMO-2 Model Model The basic COCOMO model computes software development efforts as a function of program size expressed in estimated lines of code. Model-2: The intermediate COCOMO model computes software development efforts as a function of program size and a set of cost drivers that include subjective assessment of the product, hardware, personnel, project attributes Model-3: The advanced COCOMO model incorporates all characteristics of the intermediate version with an assessment of the cost drivers impact on each step of the software engineering process. Following is the basic COCOMO -2 model.

Table -1: cocomo model

Software Project	A(b)	B(b)	C(b)	D(b)
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.22	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

The risks for the Project can be analyzed within the constraints of time and quality

Table -2: Risk Table

ID	Risk Description	Probability	Impact
Schedule	Quality	Overall	
1	Deadline	Low	Low	High	High
2	Cost	Low	Low	High	High

4. CONCLUSIONS

Based on four developed models with high accuracy and performance, the proposed ensembled model generates 100This model can be easily extended to be used widely in grapevine industry. In the future, we plan to develop a real time smart farming system based on camera and drone data as well as remote sensing to support real-time multiple dimension
disease detection and classification based on our developed models and ensemble model to support future smart agriculture and faming.

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6. REFERENCES

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