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Grape Disease Detection Using Image Processing

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ABSTRACT

In India, grape cultivation is both social and economic. Maharashtra is the leading grape producer in India. Grape quality has decreased in recent years due to a variety of factors. Grape infections are one of the major causes. Farmers spray massive amounts of pesticides to prevent illnesses, which raises production costs. Farmers are also unable to manually diagnose illnesses. The illnesses are only discovered after they have become infected, which takes a long time and has negative consequences for the vineyard. The goal of the proposed research is to create a monitoring system that would detect grape illnesses in their early stages using a CNN algorithm and provide notifications to the farmer and expert. The goal of this project is to provide early detection of Grape Leaf Disease.

Keywords : grape leaf, Diseases Predication, CNN, Neural Network

I. INTRODUCTION

India is an agricultural country, with agriculture employing more than 65 percent of the people. Ten to thirty percent of the crop is lost due to plant disease. Farmers observe diseases with their naked eyes and judge them based on their previous experience. However, this is not an accurate or proper method. Farmers occasionally consult professionals to diagnose diseases, but this is a time-consuming process. The majority of plant diseases are found on the leaves and stems. On plants, illnesses are classed as viral, bacterial, fungal, insect-borne, rust-borne, and nematode-borne. Early disease detection is an important issue in agricultural science. So, for farmers, the most important responsibility is to identify these diseases as soon as feasible. The production of grape plants is reduced by these diseases. Grapes are one of India's most important fruit crops. It is the third most extensively grown fruit in the world. It is a vital component of a thriving wine industry. Detection via a region of interest will aid in solving the problem.

Figure 1 : Grape Leaf Disease

II. LITERATURE SURVEY

B. Liu et.al [1] Authors generator model with digressive channels is first designed to generate grape leaf disease images; then, the dense connectivity technique and instance normalization are fused into an inexperienced discriminator to select out real and pretend disease images with the resource of the usage of utilizing their great function extraction capability on grape leaf lesions.

R. Dwivedi et.al [2] in this author's paper, a grape leaf illness detection network (GLDDN) is proposed that uses dual hobby mechanisms for feature assessment, detection, and classification. At assessment stage, the experimentation executed over benchmark dataset confirms that illness detection network may be pretty befitting than the winning strategies as it recognizes similarly to detect the infected/diseased regions. With the proposed disorder detection mechanism. S. Lauguico et.al [3] these authors examine proposes a way for detecting three first-rate ailments from grape leaves other than the wholesome leaves and considers the self-perception price of the device in efficaciously identifying the classes. The ailments are namely: Black Rot, Black Measles, and Isariopsis.

S. M. Jaisakthi et.al [4] Author have proposed an automatic device for detecting the ailments inside aspect the grape vines the usage of picture processing and tool mastering method. The device segments the leaf (Region of Interest) from the records picture the usage of take hold of reduce segmentation method. From the segmented leaf detail the diseased location is in addition segmented based mostly on precise strategies which include international thresholding and the usage of semi-supervised method.

Sanath Rao et.al [5] This authors paper targets to find out and classify Grapes and Mango leaf diseases, the usage of a dataset of 8,438 pics of diseased and wholesome leaves gathered from the Plant Village dataset and purchased locally.

S. Barburiceanu et.al [6] Authors novel strategies are operating inside aspect the RGB color location and are using a today's photo demising set of policies embedded right into a multi scale LBP function extraction process. The effects received inside aspect the experimental phase for grape leaf disorder magnificence on a public database, using Support Vector Machines, show that the proposed function extractors supply a extensive improvement in terms of accuracy, precision and do not forget even as in assessment to latest grayscale LBP-based absolutely strategies.

A. A. Bharate and M. S. Shirdhonkar [7] The authors proposed art work includes making use of techniques of picture graph processing to robotically classify grape leaves in to wholesome and non-wholesome. Features in conjunction with shadeation and texture are obtained from the leaf picture graph and classifiers in conjunction with KNN and SVM are used to classify the given grape leaf.

Liu, Bin et.al [8] This authors paper proposes a completely unique recognition method that is based mostly on advanced convolutional neural networks for the diagnoses of grape leaf diseases. First, based mostly on 4,023 pictures collected inside aspect the concern and 3,646 pictures collected from public records sets, a records set of 107,366 grape leaf pictures is generated via image graph enhancement techniques.

K. Z. Thet et.al [9] This authors tool proposes transfer mastering through fine-tuning of VGG16 network, virtually taken into consideration one of CNN Architecture, to classify ailments on grape leaf. The system used Global Average Pooling (GAP) layer as opposed to VGG16's absolutely related layers in advance than final kind Softmax layer to beautify accuracy quit end result of fine-tuning VGG16 for grape leaf ailments kind. The proposed tool mainly analyzed healthy leaves and five leaves ailments, named anthracnose, downy mildew, black measles, Isariopsis leaf spot, and nutrient insufficient, on 6000 photos dataset of Myanmar Grapevine Yard.

Y. Nagaraju et.al [10] In this authors work, a awesome-tuned VGG-16 Network is proposed to

classify eight one-of-a-type instructions of apple and grape leaf together. This version is capable of categorizing separate ailments of Apple and Grape leaves which reduces the training time and identifies the ailments accurately. Here awesome tuning of VGG-16 Network is finished through disposing of closing layer of gift network and appending a brand new output layer to it. The version's training time is reduced through adopting transfer learning, that is, first-class the closing layer is skilled and the last VGG-16 Network layers are not skilled with apple and grape leaves dataset.

III. PROPOSED SYSTEM

A) METHODOLOGY

Obtaining Dataset: Grape photos can be collected from a variety of sources, including vineyards, agricultural research centres, and online image libraries, to produce a dataset. The photographs should show a variety of grape disease signs, such as minor and severe infections, as well as healthy grape leaves.

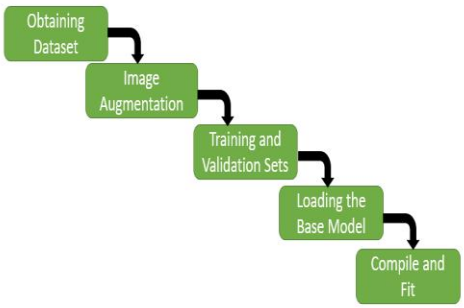

Figure 2: Proposed System

• Image Enhancement Data augmentation techniques like as image rotation, flipping, and cropping can be used to boost dataset variety and reduce over fitting.

• Validation and Training Set dividing the dataset: The dataset can be divided into two sections at random: training and validation sets. Typically, 80% of the time is spent on training and 20% on validation, but this might vary depending on the size of the dataset.

• Preventing data leakage: To avoid data leakage, the training and validation sets should be separated. This means that the samples in the two sets should have no overlap.

• Class balance: The training and validation sets should be balanced, which means they should have an equal number of samples from each class. This prevents bias towards a specific class and ensures that the machine learning model can learn to recognize all classes.

• Training set augmentation: Data augmentation techniques can be applied to the training set to boost the dataset's variety and prevent over fitting. Random rotations, scaling, and cropping are examples of augmentation techniques.

• Model training: Various techniques, such as convolutional neural networks (CNNs), are used to train the machine learning model on the training set. The goal is to minimize the loss function and improve the model's accuracy on the training set.

• Saving the model: Before the model can be loaded, it must first be stored in a format that the application can read. This can be accomplished using numerous frameworks such as Tensor Flow or PyTorch.

• Stored model format: The stored model format can be a binary file or a format such as HDF5. The format will be determined by the framework used to train the model.

• Loading the model: Once the model has been saved, it may be loaded into the application using the framework's appropriate method or API. This is usually accomplished with a few lines of code.

• Testing the loaded model: Once the model has been loaded, it may be tested on new data to ensure that it is functioning properly. This can be accomplished by employing a test dataset that was not utilised for training or validation.

• Optimising the loaded model: By lowering its size and complexity, the loaded model can be optimised

for deployment. Pruning and quantization techniques can be used to accomplish this.

• Deployment: After loading and optimising the model, it can be deployed to the target environment, such as a mobile device or web application.

• Compiling the model: Before fitting the model, it must be compiled. This is the next step. This includes defining the loss function, optimizer, and measurements to be used during training. The optimizer changes the model based on the loss function, which quantifies how well the model predicts the result. The model weights are based on the loss function, and the metrics are used to evaluate the model's performance.

• Model fitting: The model is then fitted to the training data. This entails iterating through the training set for a certain number of epochs, updating the weights based on the loss function and optimizer, and tracking performance on the validation set. The model learns to recognise patterns in the data and generate accurate predictions during this process.

B) Algorithm

This system Grape Leaf disease prediction is used CNN algorithm for better prediction. Artificial intelligence has made significant progress in closing the gap between human and computer capabilities. Researchers and hobbyists alike work on a variety of facets in the subject to achieve incredible results. The field of computer vision is one of several such disciplines. The goal of this field is to enable machines to see and perceive the world in the same way that humans do, and to use that knowledge for a variety of tasks such as Image Video Recognition, Image Analysis Classification, Media Recreation, Recommendation Systems, Natural Language Processing, and so on. Advancements in Computer Vision using Deep Learning have been built and developed over time, particularly through the use of one specific algorithm – the CNN.

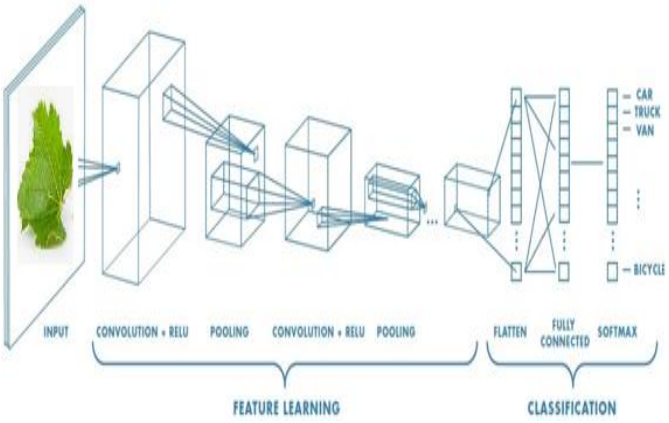

Figure 3: CNN algorithm

IV. RESULT AND DISCUSSION

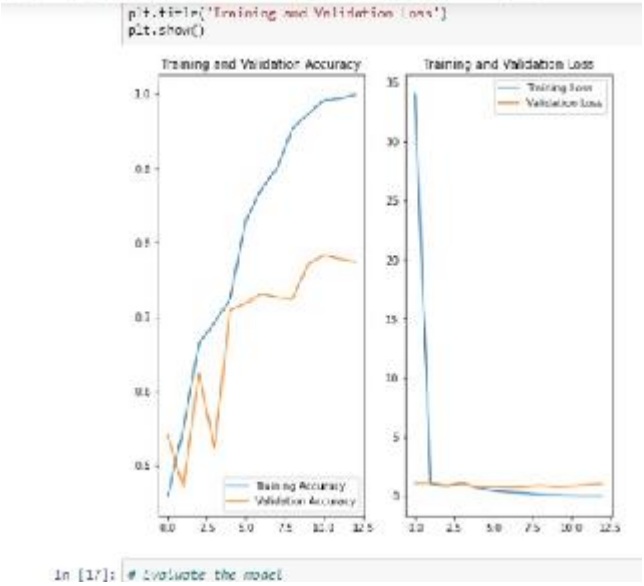

Figure 3: Loss and accuracy

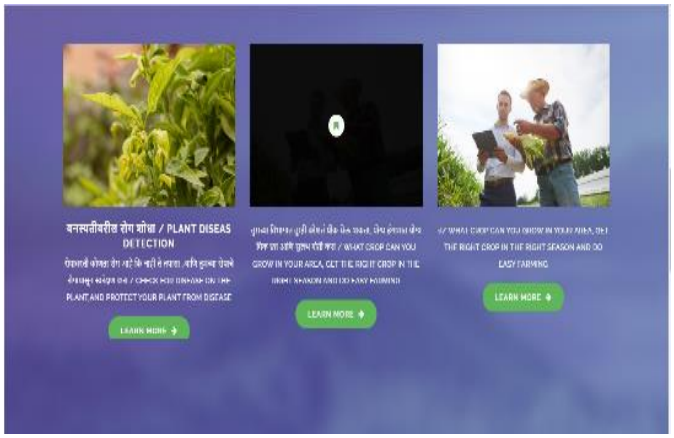

Figure 3: Home Page

Figure 3: Prediction Page

Figure 3: Result

V. CONCLUSION

This system is on illness prevention. Pesticides are sprayed in large quantities by farmers, raising production costs. Farmers are also unable to manually diagnose illnesses. The goal of the planned research is to create a monitoring system that can detect grape disease early on. By using CNN method we can implement our grape leaf detection system. This system gives better accuracy as soon as it execute fast and gives the results fast.

VI. FUTURE SCOPE

Increasing the size of the dataset used to train machine learning models can help increase disease detection accuracy and allow for the detection of additional grape illnesses. Integrating image processing with other technologies such as remote sensing, drones, or IoT can increase disease detection and monitoring efficiency. Real-time disease monitoring can reduce crop losses and the need for chemical treatments. Farmers can use a mobile app to capture photographs of their grape vines and receive fast feedback on the health of their plants. Image processing technology adoption in the grape farming industry can help optimize resource use and improve crop yields while minimizing environmental impact.

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