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EXPOSURE OF LEAF DISEASE CLASSIFIER USING CNN

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Abstract : Agriculture is one field which has an excess impact on life an deconomic status of human beings. Improper management leads to loss in agricultural products. As the Convolutional Neural Network(CNN)is achieving the state-of-the-art in the field of image classification, this project focuses on the discovery of the high accuracy of leaf image diseases using a deep learning approach. In this system, we detect the leaf disease using convolutional neural network. The main purpose of this project is to acquire better per formance in the identification of leaf diseases. Among the different types of leaf diseases Late blight, bacterial and Yellow Mosaic have been chosen to recognize diseased leaves from healthy leaves. This work utilizes an open dataset of 4000 pictures of unhealthy and healthy plants, where deep convolution system and semi supervised techniques are used characterize crop species. Agriculture impacts life and economic status of the people. It employs many people and accounts for major part of Gross Domestic Product .Diseases are quite natural and area major factor for crop losses .Improper management of diseases results in annual loss of agricultural yield which will have serious effects on the quality. quantity and productivity if no proper care is taken. By using some automatic to healthy or unhealthy.

Keywords – *Convolutional Neural Network, Image Processing, Deep Learning, Leaf Disease, Recognized Leaf Disease*

1. INTRODUCTION:

There are a large number of farmers in India that grow a wide variety of crops. Agriculture is the key industry and the primary source of employment for most people. In terms of agricultural output, India is second only to the United States. A large number of individuals are either directly or indirectly reliant on the agriculture sector's output. To ensure the long term viability of the country, it is essential to produce high- quality agricultural products. There are a number of variables that can affect crop productivity. As the world's population grows, political unrest persists, and the weather changes, the agricultural business is scrambling to find new and improved ways to produce more food. Many farmers are leaving agriculture in favour of other employment because of a lack of productivity and industrialization . With today's advanced farming technology, we can significantly boost crop yields while lowering the cost of production and enhancing the quality of food. Temperature, humidity, and light conditions must be monitored and controlled in order to produce crops that are more productive and of higher quality. The primary occupation in India is agriculture. India ranks second in the agricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. Various factors such as climatic conditions, soil conditions, various disease, etc affect the production of the crops.

1. EXISTINGSYSTEM:

Theeffectivenessofthesystemisbasedonthewayinwhichthedataisorganized.Intheexisting system, much of the data is entered manually and it can be very time consuming and managing such data becomes difficult. Even though advanced Machine Learning (ML) techniques have been adopted for leaf detection, the disease remains a major role in the leaf. Most of the existing ML-based leaf disease detection approaches are under two categories: supervised and unsupervised. Only the disease can be predicted not the remedies can be predicted. The Disadvantages of Existing System are: Disease cannot be predicted efficiently, loss of information while entering the data manually, there is no remedy to clear the disease. Identification of leaf diseases traditionally relies on human annotation and visual inspection.

The existing system for leaf disease detection is manually observing the affected leaf simply through naked human eye which requires intense research, expensive devices, more man labor, properly equipped laboratories and continuous and constant monitoring of the farm which is time-consuming .As many diseased leaves have similar features, this traditional approach may or

may not be accurate. Also applying the wrong remedy leads to the loss of the entire plant. Call centers are there for kisan but they do not provide 24*7 service and also communication fails sometimes. Farmers are not able to explain the disease correctly on call as they do not have enough knowledge about it. Though, videos and images of leaves provide better understanding and scientists give a better solution to resolve the problem, it has not yet been informed to farmers accurately. K-means clustering method for disease identification gives very less accuracy.

1. PROPOSEDSYSTEM:

In this proposed system, we had interacted the end user with graphical interface that helps him to experience with automated disease detection of leaf. Our model is proposed for the classification of plants affected by certain forms of disease. This model will only concentrate on photos of leaf diseases. While training, the model would learn certain properties that are present in the subject image and would most likely consider the property to be a different class. Thus, in order to focus only on plants and their types of diseases, we have trained our model from scratch by presenting only the most valued images in a segmented manner. This model provides high accuracy of detecting leaf diseases multi dimensional produces outputs. The external world is not connected with the middle layers called hidden layers.

A perceptron of one layer is connected to every perceptron of the next layer but not the same layer. From one layer to a data. In feed forward neural networks, perceptron form layers. The first layer takes inputs and the last layer.

ConvolutionalNeuralNetworksareaclassoffeedforwardneuralnetworksthathavetheability to process nother, information is fed forward constantly. CNN reduces images into an easy-to- process form, without compromising the quality of features that are required to get good prediction .Images are provided as in put in order to classify the leaf diseases in be precise manner. From those images, the convolution layer (image filter) extracts the features. From the extracted features, the pooling layer calculates the feature values

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2. PROBLEMSTATEMENT:

In India, many people are farmers and they cultivate a variety of crops. Agriculture is the major source of livelihood and primary occupation. India stands second in the world in agricultural output. Many people depend on the production of agricultural sector directly or indirectly. Factors like climatic conditions, soil conditions and diseases affect the crop production. Due to rise in population, political in stability and changing climatic conditions, agricultural industry is looking for new and better methods to increase food production. Due to lack of productivity and industrialization, many farmers are migrating from agriculture to other jobs. We have to increase the usage of agriculture by using the current technology, which helps farmers to increase the crop yield, enhance the productivity and improve the quality at very less cost. To produce crops with better productivity and quality, we have to monitor and control the requirements such as temperature, humidity and light. Another major threat to food security is leaf disease. It compromises the quality and reduces the crop yield. Pathogens like insects, pests, fungi, bacteria and viruses cause diseases in leaves.

3. METHODOLOGY:

CNNALGORITHM:

The reader is expected to be familiar with neural networks. Artificial Neural Networks are excellent in Machine Learning. Image, audio, and word classification are all examples of tasks where artificial neural networks are applied. LSTM and Convolution Neural Network are both used for picture classification, whereas Recurrent Neural Networks and Convolution Neural Networks are used to predict word sequences. Let's go over the basics of a neural network again before getting in to the Convolution Neural Network. Normal Neural Networks have three layers: the input, the output, and a hidden layer. Layers of data to be entered: Essentially, this is the layer where we feed our model with data. There are exactly as many neurons in this layer as there are

In our data (number of pixels in the case of an image). An online are network's output is generated by multiplying the previous layer's output by the layer's learnable weights and biases, then applying an activation function to the resulting matrix. A logistic function such as sigmoid or soft maxis used to translate the output of each class into a probability score for each class in the output layer. Using the model's output, we can next calculate the error using an error function, such as cross entropy or square loss error, among others. This phase is referred to as "feed forward."After that, we use the derivatives to retrace our steps back to the model.

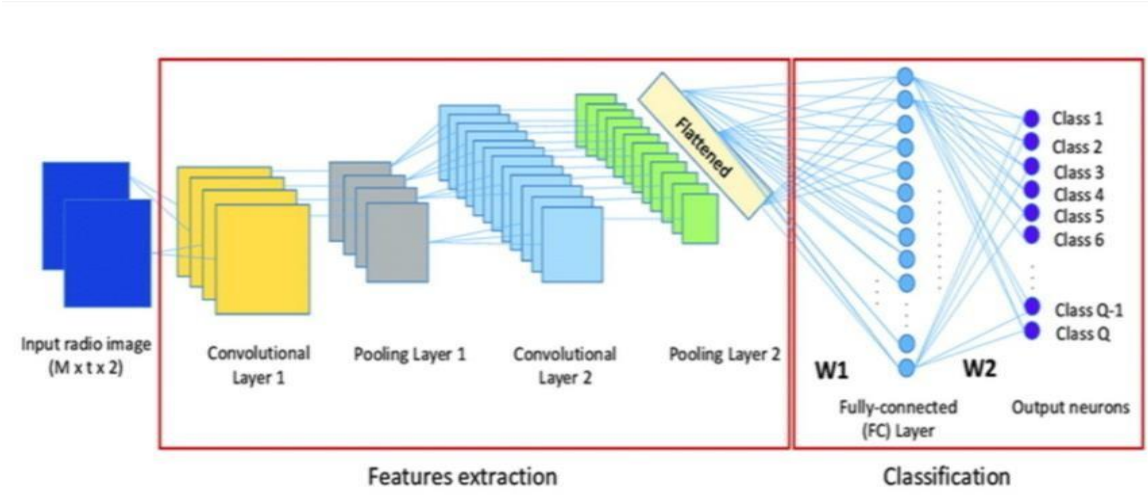

Fig5.1 CNN architecture

2. *SYSTEMARCHITECTURE*

System architecture refers to the structure and organization of a system, including the hardware, software, and the inter relationships between them. It is the overall design of a system, which includes the hardware, software, and the protocols that govern the interactions between them. The system architecture serves as the blueprint for the system, defining how the different components work together to achieve the desired goals and objectives of the system.

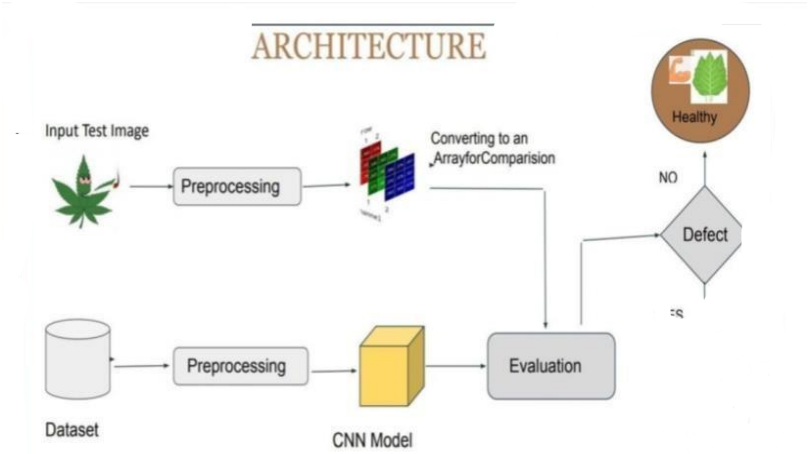

Fig4.6:SystemArchitecture

3. *IMPLEMENTATION*

ENVIRONMENTALSETUP

Functions are used for placing or storing the code which is to be repeated several times. For example, if we need same code, then we must have to write that code again and again. So in order to remove this we use functions. Implementation is the stage where the theoretical design is turned into a working system. The most crucial stage in achieving new successful system is giving confidence on the new system for the users that it will work efficiently and effectively. The system can be implemented only after

thorough testing is done and if it is found to work according to the specification. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve the change over an evaluation of change over methods apart from planning. Two major tasks for preparing the implementation are education and training of the users and testing of the system.

MODULEDESCRIPTION

Dataset

The following figure shows the snapshot of the images used as the dataset for this project. All these images are in PNG format.

fig7.2.1:TrainDataset

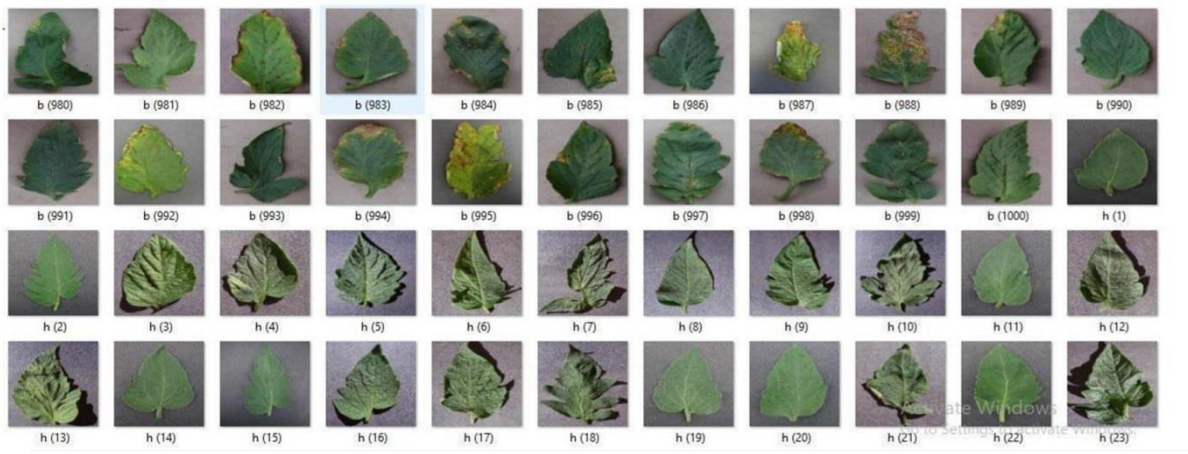

Fig7.2.2:TestDataset

Human – level accuracy has been achieved using generic object recognition in the last few years. Leaf diseases may now be detected early and accurately using a camera and image processing integrated with machine learning, an automated expert system.

4. RESULT AND SCREENSHOT

Fig7.1:TrainedAccuracy

After training our model using CNN, we got around 95% and above accuracy. Higher the data for training and higher pochrate more the accuracy we get. For example, it can identify between 12 different types of damaged leaves and their healthy outer parts in the image using the model that was designed for this task alone. The pesticide to be employed as a cure is displayed after the treatment, i.e., the pesticide, is successfully detected with a high level of confidence. As a preventative measure, this treatment helps to keep the disease at bay. Flask was used to integrate the pickle model into the remedy suggestion system. Leaf illnesses can be diagnosed more accurately and quickly using the proposed CNN methodology, compared to current methods.

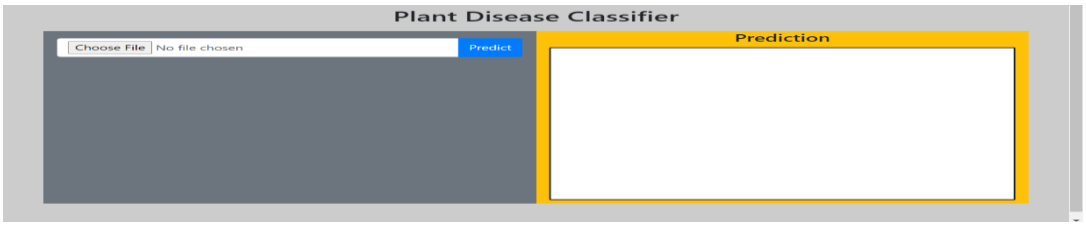

Fig7.2: Main Window

This is our main window which helps user to upload a leaf image

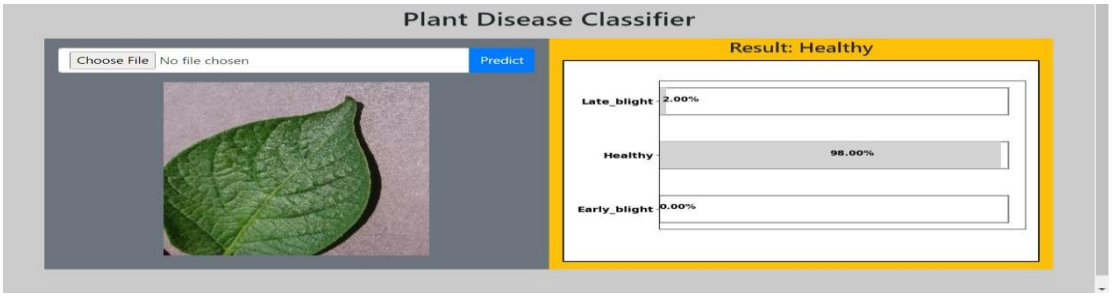

Fig7.3:Healthy Leaf Image

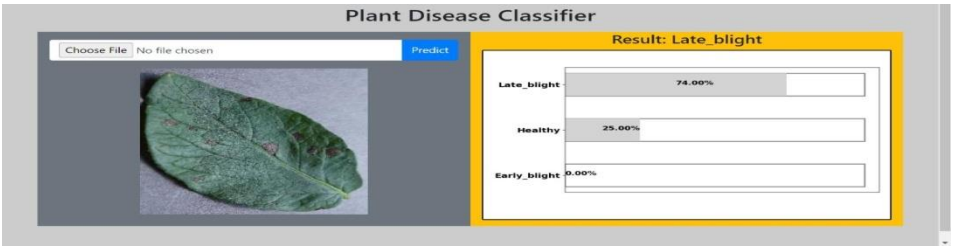

Fig7.4:Late Blight Image

In this window, we are analyzing the image and predicting the status of the leaf. If the leaf has some disease, then we are displaying the disease name. The pesticide to be employed as a cure is displayed after the treatment, i.e., the pesticide, is successfully detected with a high level of confidence .As a preventative measure, this treatment helps to keep the disease at bay. Flask was used to integrate the pickle model into the remedy suggestion system.

Leaf illnesses can be diagnosed more accurately and quickly using the proposed CNN methodology, compared to current methods. This window gives us the description of the remedies recommended for a leaf.

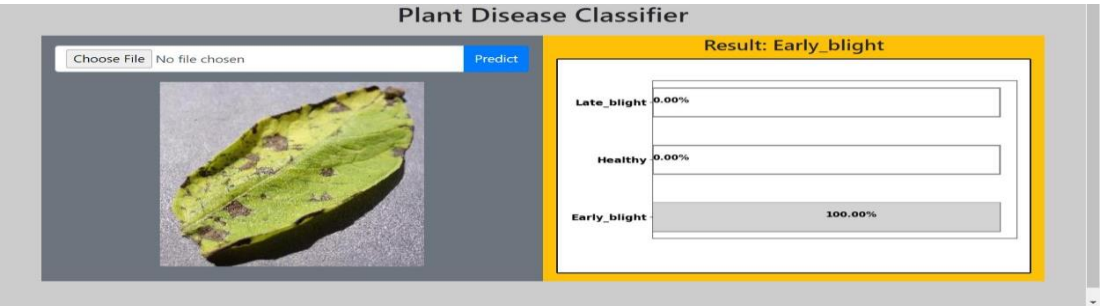

Fig7.5:Early Blight image

On further processing the same steps as discussed, we also come across some healthy leaf as shown above.

5. *CONCLUSION*

In this project we proposed disease detection of leaves using deep learning techniques and Convolutional Neural Network (CNN). We identify the disease of leaves with a mixture of texture and color extraction. The CNN and DNN algorithms are won`t to identify leaf diseases at an early stage. Machine learning methods are accustomed to train the model, which aids in making appropriate disease decisions. To contain infected diseases, it's suggested with the remedies for that disease. A combination of several features are accustomed to evaluate the distinctive features for identification of plant disease. When one is employed, shape feature has lowest accuracy and texture feature has highest accuracy. A combination of texture and color feature extraction out-turns a highest classification accuracy. Another advantage of this approach is that leaf diseases is detected at an early stage, or may beat the start. Convolution neural network and Deep neural network algorithms could also be accustomed to increase recognition rates within the classification process .Neural Networks help in generating a model which mimics human brain. Before neural networks, very few models were there that were actually trained in this way. A CNN model of automatic leaf disease detection using python gives an optimum accuracy of 96%.

FUTURESCOPE

In this project we demonstrated only some sorts of diseases which were commonly known and it will be extended for more diseases in future and also with remedies suggestion. Here we suggested only few diseases and remedies suggestion but in future this could be done automatically by machines without human interaction. A mobile app which operates with voice based instructions can be developed so that illiterate farmers can use with ease. Extension to the model can be made by further including the diagnosis for more number of leaf diseases which will be beneficial. Extensions like showing the part of the leaf affected in percentage can also be made.

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