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Plant Disease Detection using Deep Learning and Convolutional Neural Network

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***Abstract*:**
Deep learning methods are greatly admired in the research field of agriculture. The fundamental basic key aspect of agriculture is soil for crop growing.The proposed system identifies the plant disease and provide remedies that can be used as a defence mechanism against the disease..The data is divided into training data and testing data. The data is trained with the classifier and then output is predicted with optimum accuracy. The Convolution Neural Network (CNN) which comprises of different layers which are used for prediction. And also prediction of the name of the crops that can be cultivatable to their corresponding soil types.
A system is designed which can be used for large agricultural fields images of the plants which will act as input for the software, based on which the software will tell us whether the plant is healthy or not. With the code and training model we have achieved an accuracy level of 78% .The system gives us the plant species disease with its confidence level and also the remedy that can be taken as a cure.
Keywords Disease, Predict, soil type,crops

INTRODUCTION

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.And it is necessary to provide with the sufficient amount of those nutrients to the plants through fertilizers or organic manures.An improper disease detection may lead to inexperienced pesticide usage that can cause development of long term resistance of thepathogens, reducing the ability of the crop to fight back. The plant disease detection can be done by observing the spot on the leaves of the affected plant. It can also be done by observing the colour change in the different parts of the plant body.The method we are adopting to detect plant diseases is image processing using Convolution neural network (CNN).Using the CNN algorithm it checks for the disease and if it is affected with the disease,then it provides suggestions in the form of guide to recognise the disease and cure it. The first implementation of the plant disease detection using image processing was done by Shen WeizhegWuyachun Chen Zhanliang and Wi Hangda in their paper [1].

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EXISTING SYSTEM

However there is an increasing researches related to the disease of plants,For example the system describes about the identification of the disease and if an plant is affected with an disease then the crop production is lowered also compromising the quality of crops,the most common disease are Anthracnose,applescab,bacterial canker,black knot, blossom end rot,brown rot,club root etc.A system follows an sensor based analyses to detect the disease by using the temperature,humidity and PH sensors monitoring the plant and soil.The sensors are fixed in different positions of the farm and also an ccamera is fixed in the farm which is connected to the raspberry pi module where the data is sent to the cloud for storage and accesed through an web application which is designed user friendly to the farmers.

Drawbacks:

- The existing works which the prediction accuracy has been not well while consider the prediction rate.
- And it has not good enough remedies also.
- It uses an number of sensors and the is an high risk of disconnection of the sensors in the farm

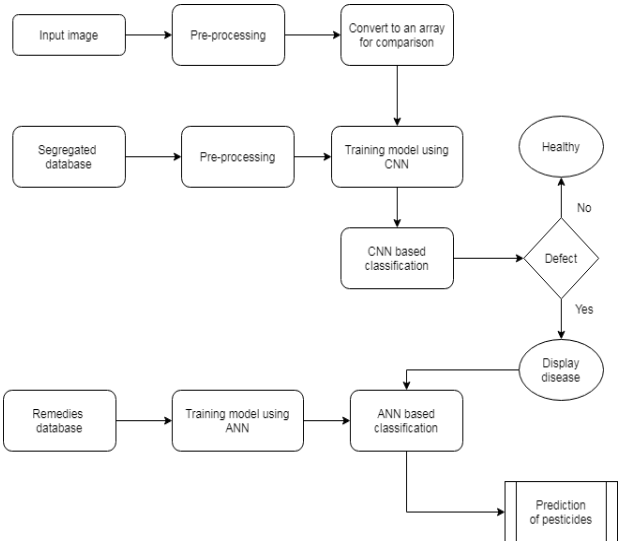
PROPOSED SYSTEM

The soil image is captured and then it is preprocessed , in which the quality of the image data is improved and the unwanted distortions are removed.Pre-processing of the image which involves gray conversion and noise removal.Then we use the CNN algorithm to detect the disease present in the plant and ANN to provide with the means to cure it. The CNN algorithm predicts the disease using classification.A reliable approach is used by employing additive merging for both image recognition and object detection based on residual connection.Convolutional neural network are used to find patterns in an image. This algorithm focuses only on the soil area and gets deeper into the layers and finds out the pixels. ANN algorithm is the simple mathematical model for analysis of the data.It also enables the process to proceed in an sequential order. Then using training data we will train our classifier and then output will be predicted with optimum accuracy. We use Convolution Neural Network (CNN) which comprises of different layers which are used for prediction. A prototype drone model is also designed which can be used for live coverage of large agricultural fields to which a high resolution camera is attached and will capture images of the plants which will act as input for the software, based of which the software will tell us whether the plant is healthy or not. With our code and training model we have achieved an accuracy level of 78% .

Advantages:

- The proposed work, we are using convolutional neural network (CNN) which gives us the better prediction rate based and also gives us the disease pesticides.
- This system working time consumption are less and also gives us better results.
- It also provides us with the remedies to treat the disease.

ARCHITECTURE DIAGRAM



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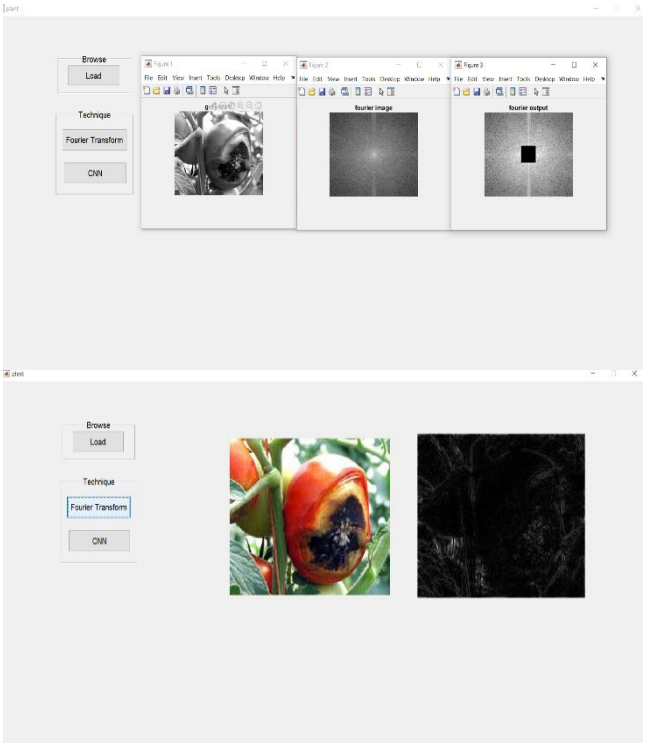
WORK FLOW

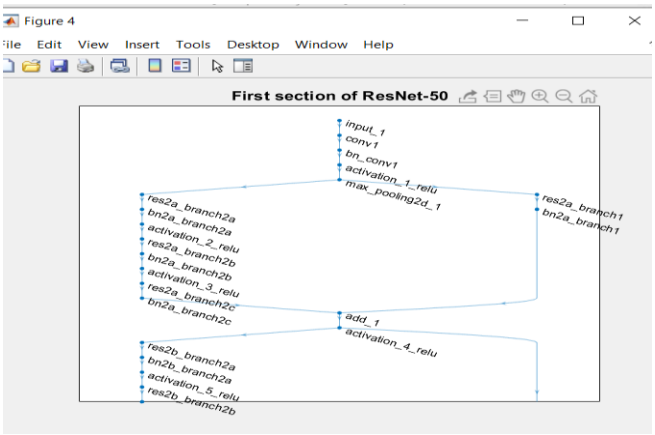
The user is asked to input the image of the plant which is affected by a disease.A digital image is composed of pixels which can be thought of as small dots on the screen. The designed system compares the given image with the data set which is feeded to the system. If the plant is found to be healthy, it shows an message that the plant is healthy, if not when the plant is detected with any disease, thenit compares with the data set and detects the plant is affected by which disease and also the system suggests with the remedies such as the fertilizers and the pesticides that need to be added to the plants to cure the disease.

INPUT:

PREPROCESSING:

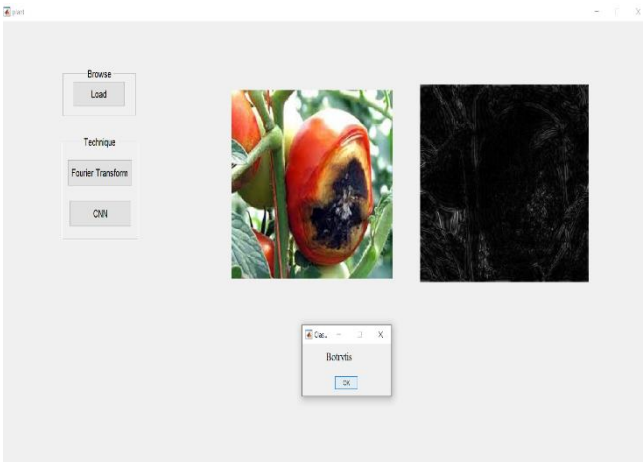


CLASSIFICATION:



INPUT SCREEN:

OUTPUT:



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FUTURE PROSPECTS

Incomparison with techniques used and presented, comparable or even better results were achieved, especially when taking into account the wider number of classes in the presented study.But this paper detects for ten common diseases of plants ,it may be improvised by making the system more generalised.Though the distinctive algorithm used in the proposed system is effective and cost efficient,it may be further improved in the upcoming proposals.

CONCLUSION

To satisfy the need of growing population it is high time to focus maximum yield. This is only possible if plants get enough nutrients for growth. Plant nutrient content is neglected many times, though it should be given the importance. The examination of the plant disease is predicted and the measures to be taken in order to get rid of the disease are suggested.The use of the distinctive algorithms improves the accuracy and the execution time of the system.

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