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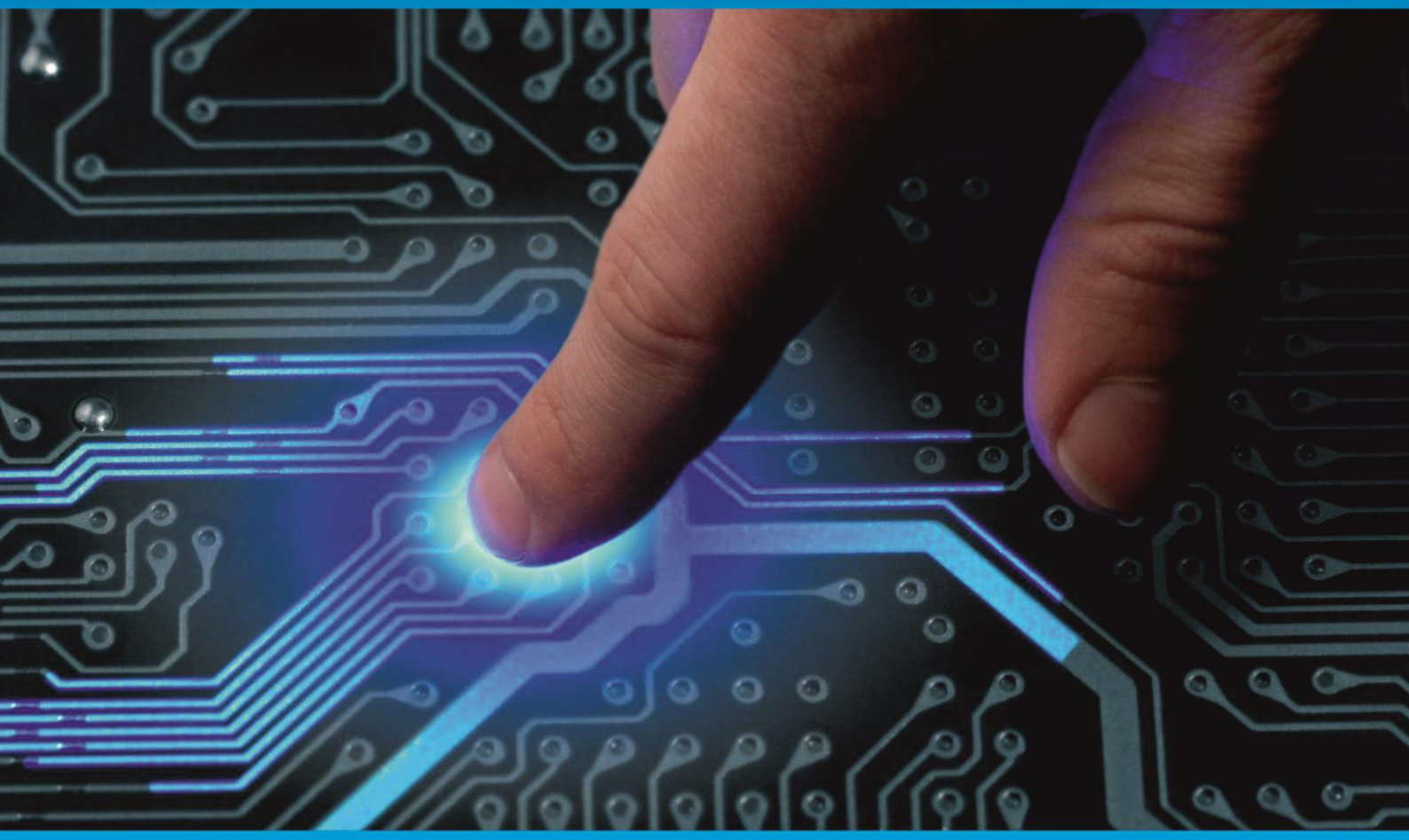

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Plant Leaf Disease Recognition Using Deep Learning Approach

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ABSTRACT: Smart farming system using necessary infrastructure is an innovative technology that helps improve the quality and quantity of agricultural production in the country. Plant leaf disease has long been one of the major threats to food security because it dramatically reduces the crop yield and compromises its quality. Accurate and precise diagnosis of diseases has been a significant challenge and he recent advances in computer vision made possible by deep learning has paved the way for camera-assisted disease diagnosis for plant leaf. It described the innovative solution that provides efficient disease detection and deep learning with convolutional neural networks (CNNs) has achieved great success in the classification of various plant leaf diseases. A variety of neuron-wise and layer-wise visualization methods were applied using a CNN, trained with a publicly available plant disease given image dataset. So, it observed that neural networks can capture the colors and textures of lesions specific to respective diseases upon diagnosis, which resembles human decision-making.

KEYWORDS: Disease Detection, deep learning, TensorFlow.

I. INTRODUCTION

Deep learning is a branch of machine learning which is completely based on artificial neural networks, as neural network is going to mimic the human brain so deep learning is also a kind of mimic of human brain. It's on hype nowadays because earlier we did not have that much processing power and a lot of data. A formal definition of deep learning is- neurons Deep learning is a particular kind of machine learning that achieves great power and flexibility by learning to represent the world as a nested hierarchy of concepts, with each concept defined in relation to simpler concepts, and more abstract representations computed in terms of less abstract ones. In human brain approximately 100 billion neurons all together this is a picture of an individual neuron and each neuron is connected through thousands of their neighbours.

It focused how image from given dataset in field and past data set used to predict the pattern of plant disease using CNN model. As maximum types of plant leaves will be converted under this system, former may get to know about the leaf which may never have been cultivated also, this system takes into consideration the past production of data which will help the farmer get inside into the demand and the cost of various plants in market.

II. LITERATURE SURVEY

Title:(Differential) Co-Expression Analysis of Gene Expression: A Survey of BestPractices
Author: Hussain A. Chowdhury, Dhruba K. Bhattacharyya, Jugal K. Kalita
Year:2019

It presented an overview of best practices in the analysis of (differential) co-expression, coexpression networks, differential networking, and differential connectivity that can be discovered in microarrays and RNA-seq data, and shed some light on the analysis of scRNA-seq data as well. It has discussed co-expression analysis for RNA-seq along with a comparison of analysis of co-expression networks in microarrays vs. RNAseq. We discussed differential co-expression and differential networking along with a comparison of differential expression, differential networking and differential connectivity. It included many tools used for analyzingmicroarry, RNA-seq, and scRNA-seq data. Reverse engineering to reconstruct transcriptional network is also discussed. Preprocessing and co-expression analysis of scRNA-seq data along with useful tools and applications are also included. It discussed biological interpretation and functional analysis to extract biological information from a set of given genes that are identified through analysis. It presented some recommendations and guidelines for the analyst. Analysis of gene expression data is widely used in transcriptomic studies to understand functions of molecules inside a cell and interactions among molecules. Differential co-expression analysis studies diseases and phenotypic variations by finding modules of genes whose co-expression patterns vary across conditions. It review the best practices in gene expression data analysis in terms of analysis of

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(differential) co-expression, co-expression network, differential networking, and differential connectivity considering both microarray and RNA-seq data along with comparisons. It highlights hurdles in RNA-seq data analysis using methods developed for microarrays. It includes discussion of necessary tools for gene expression analysis. In addition, it shed light on scRNA-seq data analysis by including preprocessing and scRNA-seq in co-expression analysis along with useful tools specific to scRNA-seq. To get insights, biological interpretation and functional profiling is included. Finally, it provides guidelines for the analyst, along with research issues and challenges which should be addressed.

Title: Image of pant disease segmentation model based on pulse coupled neural.Network with shuffle frog leap algorithm.
Author: XiaoyanGuo, MingZhang, Yongqiang Dai.
Year: 2018

A novel image segmentation model SFLA-PCNN for plant diseases based on hybrid frog-hopping algorithm is proposed. Using the weighted sum of cross entropy and image segmentation compactness as the fitness function of SFLA, the image of potato late blight disease is taken as a trial segmentation image to find the optimal configuration parameters of PCNN neural. Image segmentation is a key step in feature extraction and disease recognition of plant diseases images. To avoid the subjectivity of using traditional PCNN (pulse-coupled neural network) to segment plant disease image, a new image segmentation model (SFLA-PCNN) is proposed get the parameters configuration of PCNN. The weighted sum of cross entropy and compactness degree of image segmentation is chosen as fitness function of shuffled frog leap algorithm to optimize the parameters PCNN, which could improve the performance of PCNN. After 100 times local iteration and 1500 times global iteration, we get the best parameter configure. The extensive tests prove that SFLA-PCNN model could be used to extract the lesion from the background effectively, which could provide a foundation for following disease diagnose.

Title: A Smart Phone Image Processing Application for Plant Disease Diagnosis networkwith shuffle frog leap algorithm.
Author: Nikos Petrellis.
Year: 2017

A smart phone application for plant disease recognition was presented. It is based on image processing that analyzes the color features of the spots in plant parts. It was evaluated on grape diseases with an accuracy that exceeds 90% using a small training set. Although professional agriculture engineers are responsible for the recognition of plant diseases, intelligent systems can be used for their diagnosis in early stages. The expert systems that have been proposed in the literature for this purpose are often based on facts described by the user or image processing of plant photos in visible, infrared, light etc. The recognition of a disease can often be based on symptoms like lesions or spots in various parts of a plant. The color, area and the number of these spots can determine to a great extent the disease that has mortified a plant. Higher cost molecular analyses and tests can follow if necessary. A Windows Phone application is described here capable of recognizing vineyard diseases through photos of the leaves with accuracy higher than 90%. This application can easily be extended for different plant diseases and different smart phone platforms.

Title: Plant Diseases Recognition for Smart Farming Using bModel-based Statistical Features.
Author: Chit Su Hlaing, SaiMaungMaungZaw.
Year: 2017

It has shown the advantages of GP distribution model for SIFT descriptor and successfully applied in plant disease classification. Furthermore, it proposed feature achieves a good tradeoff between performance and classification accuracy. Although it proposed feature can successfully model the SIFT feature and applied in plant diseases recognition, it need to try to improve our proposed feature by considering and cooperation with other image processing methods. It research is to detect and classify the plant disease in agricultural domain, by implementing image processing techniques. It aims to propose an innovative set of statistical texture features for classification of plant diseases images of leaves. The input images are taken by various mobile cameras. The Scale-invariant feature transform (SIFT) features used as texture feature and it is invariant to scaling, rotation, noise and illumination. But the exact mathematical model of SIFT texture descriptor is too complex and take high computing time in training and classification. The model-based statistical features are calculated from SIFT descriptor to represent the features of an image in a small number of dimensions. It derive texture information probability density function called Generalized Pareto Distributions from SIFT texture feature. It proposed feature is to reduce computational cost of mobile devices. In our experiment, 10-Fold cross validation with SVM classifiers are applied to show that our experiment has no data bias and exclude theoretically derived values.

Title: Pepper Cutting UGV and Disease Detection using Image Processing.

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Author: Rakshitha.N, Rekha.H.S, Sandhya.S, Sandhya.V and S.Sowndeswari.
Year: 2017

It proposed system a simple UGV is designed and implemented. Pepper cutting is a serious issue as it grows to greater heights and is most likely to get affected by the diseases. To overcome these limitations "pepper cutting UGV and disease detection using image processing" is implemented which in turn reduces the human efforts. The pepper plucking and disease detection can be done with the help of image processing technique. Agriculture is the backbone of India. Over 77% of the Indian population depends on agriculture. The crop yield is reduced when the plants are infected by diseases. It disturbs the economical conditions of the farmers which in turn reduces the productivity of the nation. The recognition of the disease in earlier time is a very important factor to prevent serious outbreaks, failing to do which may cause several losses. The proposed system focuses on designing an UGV (Unmanned Ground Vehicle) for the purpose of cutting pepper fruit, disease detection and also providing solution for the disease by sprinkling the required pesticides. The paper discusses the extraction of mainly the pepper plant based on the color recognition techniques and also the methods used for the detection of plant diseases using the images of leaves and providingsolution by opting sprinkling mechanism.

III. EXISTING SYSTEM

It reviews and summaries various techniques used for classifying and detecting various bacterial, fungal and viral plant leaf diseases. The classification techniques helps in automating the detection of plant leaf diseases and categorizing them centered on their morphological features. It focuses on identifying the mulberry plant leaf diseases with CNN as classifier. It is also intended to focus on increasing the recognition rate and classification accuracy of severity of leaf diseases by using hybrid algorithms.Plants are considered to be important as they are the source of energy supply to mankind. Plant diseases can affect the leaf any time between sowing and harvesting which leads to huge loss on the production of crop and economical value of market. Therefore, leaf disease detection plays a vital role in agricultural field. However, it requires huge manpower, more processing time and extensive knowledge about plant diseases. Hence, machine learning is applied to detect diseases in plant leaves as it analyzes the data from different aspects, and classifies it into one of the predefined set of classes. The morphological features and properties like color, intensity and dimensions of the plant leaves are taken into consideration for classification. It presents an overview on various types of plant diseases and different classification techniques in machine learning that are used for identifying diseases in different plant leaves.

ADVANTAGE:

- Increasing throughput & reducing subjectiveness arising from human experts in detecting the plant diseases.
- It is essential to detect a particular disease. In our country many farmers are not so educated to get correct information about all diseases.

DISADVANTAGE:

- It has not focused on identifying the mulberry plant leaf diseases with CNN as classifier.
- It has not focused on increasing the recognition rate and classification accuracy of severity of leaf diseases.

IV. PROPOSED SYSTEM

To detect the plant leaf diseases. We planned to design deep learning technique so that a person with lesser expertise in software should also be able to use it easily. It proposed system to predicting leaf diseases. It explains about the experimental analysis of our methodology. Samples of 19 images are collected that comprised of different plant diseases like AlternariaAlternata, Anthracnose, Bacterial Blight, Cercospora leaf spot and Healthy Leaves. Different number of images is collected for each disease that was classified into database images and input images. The primary attributes of the image are relied upon the shape and texture oriented features. The sample screenshots displays the plant disease detection using color based segmentation model.

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V. SYSTEM ARCHITECTURE

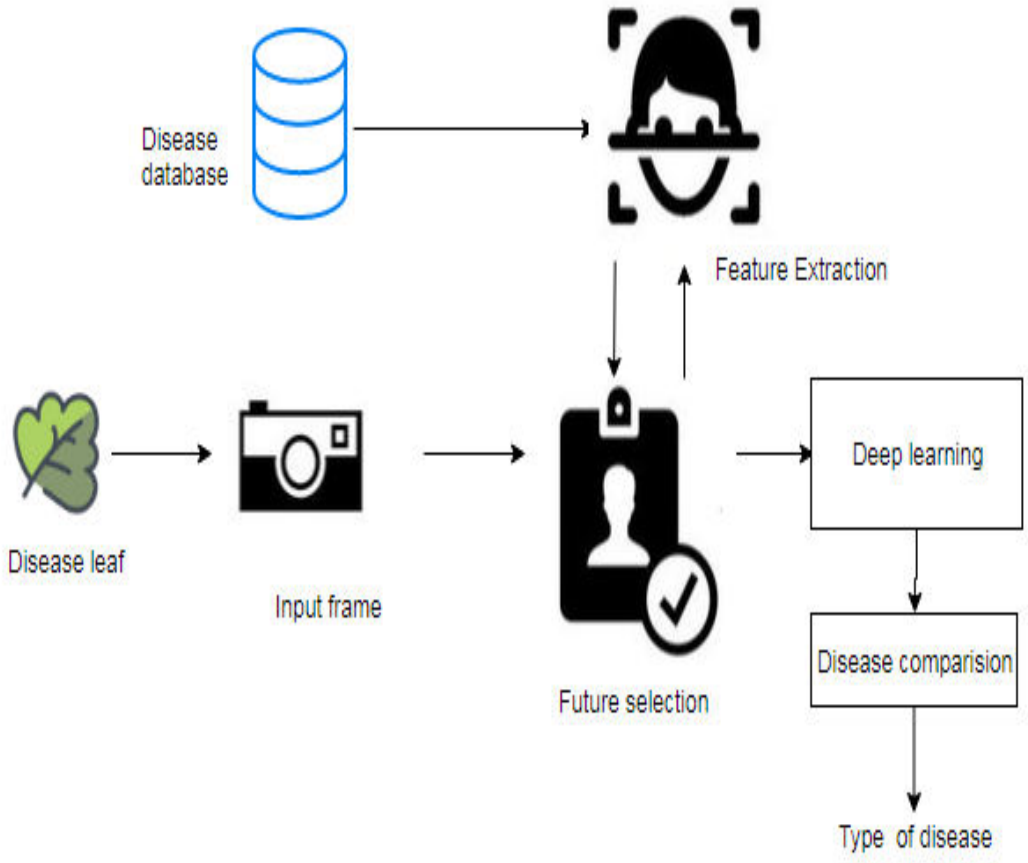

Fig1 : Design Architecture Diagram

VI. MODULES

- Import the given image from dataset (module01)
- To train the module by given image dataset (module02)
- Working process of Layers in CNN model (module03)
- Plant disease identification(module04)

VII. CONCLUSION

It focused how image from given dataset (trained dataset) in field and past data set used predict the pattern of plant diseases using CNN model. This brings some of the following insights about plant leaf disease prediction. As maximum types of plant leaves will be covered under this system, farmer may get to know about the leaf which may never have been cultivated and lists out all possible plant leaves, it helps the farmer in decision making of which crop to cultivate. Also, this system takes into consideration the past production of data which will help the farmer get insight into the demand and the cost of various plants in market.

VIII. FUTURE WORK

- Agricultural department wants to automate the detecting the yield crops from eligibility process (real time).
- To automate this process by show the prediction result in web application or desktop application.
- To optimize the work to implement in Artificial Intelligence environment.

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