LITERATURE SURVEY

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*1)*Title: *Plant Leaf Disease Prediction*

Authors: Chohan, Murk & Khan, Adil & Chohan, Rozina & Hassan, Muhammad.

Publication year: 2020

Abstract:

The Indian economy relies heavily on agriculture productivity. A lot is at stake when a plant is struck with a disease that causes a significant loss in production, economic losses, and a reduction in the quality and quantity of agricultural products. It is crucial to identify plant diseases in order to prevent the loss of agricultural yield and quantity. Currently, more and more attention has been paid to plant diseases detection in monitoring the large acres of crops. Monitoring the health of the plants and detecting diseases is crucial for sustainable agriculture. Plant diseases are challenging to monitor manually as it requires a great deal of work, expertise on plant diseases, and excessive processing time. Hence, this can be achieved by utilizing image processing techniques for plant disease detection. These

techniques include image acquisition, image filtering, segmentation, feature extraction, and classification.

Introduction:

Agriculture production in the Indian economy is more than just food. Today's agricultural land mass has grown so large that it has become an important part of its economy. In India, 60-70% of population relies on agriculture sector. Plant diseases often cause severe loss of vegetables and crops. Plant diseases can also affect human health by secreting toxic metabolites. The study of plant disease involves detection of visual patterns in the plants. Diagnosis of plant diseases is an important part of cultivation as failure will affect the quantity and quality of product and human health . There are various types of plant diseases caused by organisms like virus, bacteria and fungus. An automated disease identification process can be helpful in identifying plant pathology at an early stage. The early detection of disease has a positive effect on plant health. In most of the cases, disease symptoms are seen on the leaves, stem and fruit. The indications on the plant leaves are used to diagnose the disease faster, more reliably and at lower costs. In general, the technique for diagnosing plant diseases is naked eye inspection by farmers, which allows for disease recognition and detection. A large number of specialists and constant plant monitoring is required for this, which incur a cost when dealing with large farms. However, in certain nations, farmers lack adequate facilities or even the knowledge of how to contact experts. This means that consulting professionals is both expensive and time consuming.

Techniques and algorithms used:

CNN algorithms analyze an image and extract its features. Convolutional neural networks are deep learning algorithms that can process large datasets containing millions of parameters, modeled on 2D images, and connect the resulting representations to the corresponding outputs. A CNN is a supervised multilayer network that can dynamically learn new features from datasets. In nearly all significant classification challenges, CNNs have achieved state-of-the-art results recently. In the same architecture, they are also able to systematically isolate features and categorize them

Results:

Even though there are various methods for detecting and classifying plant diseases using automatic or computer vision, research into this field has been lacking. In addition, there are few commercial options, with the exception of those focusing on the identification of plant species via photographs. Over the last few years, there has been tremendous progress in the performance of convolutional neural networks. The new generation of convolutional neural networks (CNNs) has shown promising results in the field of image recognition. A novel approach to automatically classifying and detecting plant diseases from leaf images was examined through this project utilizing deep learning techniques. With an accuracy of 90%, the developed model could distinguish healthy leaves from eight diseases that could be observed visually. On the basis of this high level of performance, it becomes apparent that convolutional neural networks are highly suitable for automatic diagnosis and detection of plants

*2)*Title: *Intelligent insecticide and fertilizer recommendation system based on TPF-CNN for smart farming*

Authors:

A. Sukhadia, K. Upadhyay, M. Gundeti, S. Shah, M. Shah

Publication year: 2020

Abstract:

Nowadays, artificial intelligence and sensor technology play a vital role in the agriculture field. The use of excess insecticides and fertilizers in farming poses a risk to human health. It is necessary to control them to ensure healthy crop production. Many techniques are used to identify the pest, suggest medications, and do soil nutrient analysis techniques separately. This paper applies the dual operator, Transition Probability Function (TPF), and Convolution Neural Network (CNN) to process the pest's image discretely and continuously for applying the recommended insecticide. The mathematical model with the objective function is derived in this paper. The

proposed system combines two major aspects in farming: pest identification and insecticide recommendation using machine vision and CNN. Secondly, the soil nutrient analysis uses a soil NPK sensor with the recommendation of fertilizers according to the obtained nutrient values. On-spot results are obtained, and the time required for insecticide recommendation is within 10 s, and for fertilizer recommendation, it is within 80 s. Successful identification of five pests, namely aphids, bollworms, leaf folder, leaf miner, and green stink bug, was done with more than 90% accuracy. The proposed approach is also compared with the other intelligent approaches, such as Artificial Neural Network (ANN), K-Nearest Neighbour (KNN), and Support Vector Machine (SVM), and it is observed that the proposed TPF-CNN approach gives higher accuracy in the shortest time.

Introduction:

The agriculture sector in India is advancing due to globalization . As people become more health-conscious, producing quality crops is needed for today's world. Farmers spray pesticides and add fertilizers to the soil to obtain maximum production. Pesticides are toxic substances used to kill pests, weeds, fungus, etc., including herbicides, fungicides, insecticides, etc. Insecticides are substances that prevent pest attacks on crops and are more toxic than herbicides and fungicides . The production, sales, and import of pesticides are regulated under "The insecticide act, 1968´´, including rules for the safe and proper use of pesticides. These rules and regulations ensure pesticide industries operate within limits under supervision. The government of India has also banned the use of 30 pesticides, and 18 pesticides have declined registration . Some farmers are unaware of the ill effects of spraying an excess quantity of insecticides on plants and adding the excess quantity of fertilizers to the soil without testing the quality of the soil. Excess spraying of insecticides can lead to human as well as environmental damage. Direct or indirect consumption of these insecticides can cause respiratory issues, cancer, and genital syndrome and can even cause death. Environmental damages include soil pollution, water pollution, and toxic produce .

Technology and techniques used:

The flowchart of the system can be seen . The study includes five types of pests, namely aphids, bollworms, green stink bugs, leaf folder, and leaf miner, commonly found on various crops. The description of each pest. Crop pests

• Aphids: They are a damaging pest that consumes the sap of the plant and can cause viral plant diseases found on cabbage, mustard, pea, peach, tomato, soybean, cotton, and potato .

• Bollworms: They cause great harm to crops and are responsible for global economic loss. They can be found on cotton, tomato, soybean, and grain crops such as corn, sorghum, chickpea, and other pulses .

•Green Stinkbug: They are abundant in population and cause harm to crops reducing their production, and can be found on soybean, corn, and cotton.

Conclusion:

The TPF-CNN dual operator approach makes the insecticide recommendation operation efficient and compact. The proposed system consists of combined insecticide and fertilizer recommendation systems, which will help farmers gain maximum farm yield. Also, the soil nutrients would be managed efficiently, resulting in nutrient-rich soil. The cost incurred for laboratory testing of soil nutrients will reduce. The proposed approach gives the recommendation of insecticides in a short time of 10 s and fertilizer recommendation in 60 s only. Compared to other approaches such as KNN, SVM, and ANN, it gives nearly 20% higher performance. This system can be used anywhere as it is standalone and does not require an internet connection. In the future, the system can be integrated with more sensors such as pH, temperature, humidity, and moisture sensors for open and indoor farming. Also, this system can be used in online and offline modes. This system can be recommended for farmers, soil testing laboratories, and seed hybridizing companies. The limitations of this model

are it does not save any data on the system or cloud database.`

3)Title: ***Disease Prediction In Tree Leave.***

Authors: Ramesh, S., and D. Vydeki

Publication year: 2019

Abstract:

Agriculture is the main aspect of country development. Many people lead their life from agriculture field, which gives fully related to agricultural products. Plant disease, especially on leaves, is one of the major factors of reductions in both quality and quantity of the food crops. In agricultural aspects, if the plant is affected by leaf disease then it reduces the growth of the agricultural level. Finding the leaf disease is an important role of agriculture preservation. After pre-processing using a median filter, segmentation is done by Guided Active Contour method and finally, the leaf disease is identified by using Support Vector Machine. The disease-based similarity measure is used for fertilizer recommendation.

Introduction:

Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyze the digital images using digital image processing for diagnosis of plant diseases. Application of computer vision and image processing strategies simply assist farmers in all of the regions of agriculture. Generally, the plant diseases are caused by the abnormal physiological functionalities of plants. Therefore, the characteristic symptoms are generated based on the differentiation between normal physiological functionalities and abnormal physiological functionalities of the plants. Mostly, the plant leaf diseases are caused by Pathogens which are positioned on the stems of the plants. These different symptoms and diseases of leaves are predicted by different methods in image processing. These different methods include different fundamental processes like segmentation, feature extraction and classification and so on. Mostly, the prediction and diagnosis

of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves

Technology and techniques used:

A digital camera or similar devices are used to take images of different types, and then those are used to identify the affected area in leaves. Then different types of image-processing techniques are applied to them, the process those images, to get different and useful features needed for the purpose of analyzing later-Plant leaf disease identification is especially needed to predict both the quality and quantity of the First segmentation step primarily based on a mild polygonal leaf model is first achieved and later used to guide the evolution of an energetic contour. Combining global shape descriptors given by the polygonal model with local curvature based features, the leaves are then classified overleaf datasets. In this research work introduce a method designed to deal with the obstacles raised by such complex images, for simple and plant leaves. A first segmentation step based on graph-cut approach is first performed and later used to guide the evolution of leaf boundaries, and implement classification algorithm to classify the diseases and recommend the fertilizers to affected leaves

Conclusion:

The proposed method uses SVM to classify tree leaves, identify the disease and suggest the fertilizer. The proposed method is compared with the existing CNN based leaf disease prediction. The proposed SVM technique gives a better result when compared to existing CNN. For the same set of images, F-Measure for CNN is 0.7and 0.8 for SVM, the accuracy of identification of leaf disease of CNN is 0.6 and SVM is 0.8.

4) Title: *Plant Disease Detection and Fertilizer Suggestion*

Authors: R. Indumathi, N. Saagari, V. Thejuswini and R. Swarnareka.

Publication year : 2019

Abstract:

Plant disease diagnosis is the foundation for efficient and precise plant disease prevention in today's complicated environment. Plant disease identification has become digitised and data-driven as smart farming has grown, allowing for advanced decision support, smart analysis, and planning. This work provides a deep learning-based mathematical model for detecting and recognising plant diseases, which improves accuracy, generality, and training efficiency. The prevention and control of plant disease have consistently been broadly talked about in light of the fact that plants are presented to the external climate and are profoundly inclined to diseases.

Introduction:

Plant infection can easily stifle growth and have a negative influence on output. Every year, a financial hardship of up to $20 billion is assessed all across the world. The most difficult issue for analysts is dealing with a variety of situations. In addition, traditional tactics rely on pros, encounters, and guides, but the majority of them are pricey, time-consuming, and labor-intensive, with difficulty in accurately recognising them. Hence, a fast and exact approach to identify plant infections appears so critical for the good thing about trade and biology to agriculture. Disease control procedures can be a waste of money and time if the disease isn't properly identified, and it can lead to more plant loss. Our project proposes a deep learning-based model that will be trained with photos of healthy and diseased crop leaves from a dataset. The model will achieve its goal by categorising photos of leaves into unhealthy categories based on defect patterns.

Technology and algorithms used:

From the dataset which is being used in this project we have

segregated the images into two sets: Training set and Testing set. For every architecture model we have used firstly, we train the architecture model using the images in our training set and after gaining impressionable results, we test the model using images in our testing set. We continue to test the model till we get the desired result. The results are observed and recorded for comparison with other architectures.

For all the other architectures the same process takes place and the results are recorded. In addition to this we have trained our own model with 3 convolution, 3 Pooling and 2 Dense Layers. For all pretrained models as well as our model we have done data augmentation using Image data generator. All other parameters like number of epochs , optimizer , activation function are kept the same to correctly analyse all the models.

Conclusion:

Different approaches and models of Deep Learning methods were explored and used in this project so that it can detect and classify plant diseases correctly through image processing of leaves of the plants. The procedure starts from collecting the images used for training, testing and validation to image preprocessing and augmentation and finally comparison of different pretrained models over their accuracy. Finally, at the end , our model detects and distinguishes between a healthy plant and different diseases and provides suitable remedies so as to cure the disease.This paper proposed and developed a system which uses plant leaf images to detect different types of disease in tomato crops, and also provides appropriate fertilizer suggestions.