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IMAGE BASED PLANT DISEASE DETECTION A COMPARISON OF DEEP LEARNING

Prof. A.B. Bagwan[1], Suraj Chougule[2], Abhishek Chinchkar[3], Priti khaire[4], Mayuri Dhumal[5]

Professor, Computer Engineering, Siddhant College, Pune, India[1]

Student, Computer Engineering, Siddhant College, Pune, India[2,3,4,5]

Abstract: Plant disease identification by visual way is increasingly difficult and simultaneously less accurate. However, in the event that disease detection technique is used, it will take less time and processing power and proves to be progressively exact. Some broad maladies in plants appears dark coloured, yellow spots, and some are infectious, viral and bacterial diseases. Image processing is being used for estimation of infected area. Image segmentation is the process of collecting images into different parts. Now a day there are various strategies used for preforming image segmentation, stretching out from the fundamental thresh holding procedure to forefront concealing picture division systems. Computers does not any special technique for intelligent objects recognition, so a great number of techniques have been developed. The segmentation procedure relies upon various features found in the image. This might be shading data, limits or fragment of an image Plant disease identification by visual way is increasingly difficult and simultaneously less accurate. However in the event that disease detection technique is used, it will take less time and processing power and proves to be progressively exact. Some broad maladies in plants appears dark coloured, yellow spots, and some are infectious, viral and bacterial diseases. Image processing is being used for estimation of infected area. Image segmentation is the process of collecting images into different parts. Now a day there are various strategies used for preforming image segmentation, stretching out from the fundamental thresh holding procedure to forefront concealing picture division systems. Computers does not any special technique for intelligent objects recognition, so a great number of techniques have been developed. The segmentation procedure relies upon various features found in the image. This might be shading data, limits or fragment of an image.

Keywords: Multi disease detection, pre-processing, classifier algorithm, feature extraction, Convolutional neural network (CNN) etc.

INTRODUCTION:

Agriculture is an important source of livelihood and agricultural production depends on the Indian economy. In order to increase crop yield and benefit, the identification of plant leaf diseases at an early stage is critical. This paper offers an overview of different types of plant diseases and various machine learning algorithms used for disease detection in agricultural fields. India ranks second in total farm yields. As indicated by 2018, more than 50 c/o Indian manpower was used by the agribusiness section and contributed 18 percent to total national production. For farmers, continuous monitoring of the plant according to human standards can be expensive. By using distinctive AI algorithms for plant disease detection, automatic image recognition is performed. Agriculture is a major source of income in India, and the country's economy is heavily reliant on it. To maximise agricultural productivity and profit, it is critical to diagnose plant leaf diseases early on. Because naked eye observation of diseases does not always yield reliable results, especially during the early stages, an image processing technique is utilised to detect leaf diseases accurately. It consisted of five steps: image acquisition, pre-processing of the acquired image, feature extraction, disease classification, and display of the results. This work offers a thorough examination of the categorization of agricultural illnesses using the Support Vector Machine classifier.

OBJECTIVE:

The major goal of this study is to determine which parts of the body are impacted by many diseases and which parts are healthy. To detect an unhealthy body part region. Texture features are used to classify the dataset. The multidisease infection is analysed using coding.

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GENERAL PLANT DISEASE DETECTION SYSTEM:

n a proposed system, we are proposing experiment on chronic diseases like lung cancer, brain tumour, heart disease and breast cancer with limited set of supervised data.

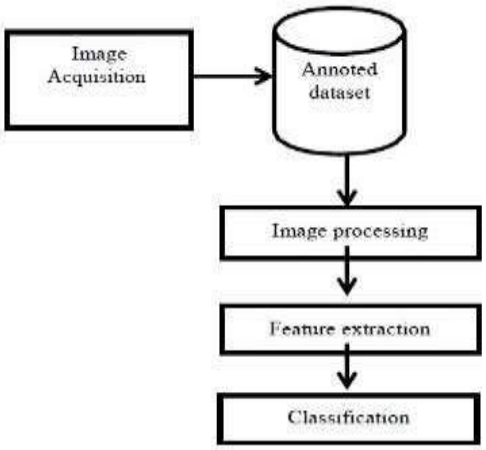

Figure 1: GENERAL PLANT DISEASE DETECTION SYSTEM

MULTI DISEASE DETECTION SYSTEM:

We propose a new multimodal illness risk prediction model based on Convolutional neural networks that is more accurate for limiting chronic diseases. With accurate stage forecasts, we will be able to tackle the issue of accuracy in lung cancer diagnosis. We also concentrate on detecting brain malignancies using machine evaluations based on tumour sizes in millimetres. The detection of heart illness is based on a diagnosed dataset, such as heart symptoms reports. Lung cancer detection, heart disease detection, and brain tumour detection are the three key modules of the proposed system. Our system has two modules: admin and users. Admin begins by gathering information about various ailments in the form of text and photographs.

DATA ANALYSES:

The content of this paper deals with a systematic review, not in a meta-analysis of the state of the art related to the intelligent data analysis in the medical field. Nevertheless, it does not deepen into the details regarded to the results obtained in each case of study. Hence, data analysis techniques are not applicable in this case.

EXISTING SYSTEM APPROACH:

For accurate identification and classification of chronic diseases, pathological procedures such as needle biopsy specimens and examination by skilled pathologists are required. A decision support system is desirable in this scenario since it includes human judgement of numerous criteria and a mix of experiences. Manual judgments have a low success rate in preserving patients' lives after diagnosis. Previous research approaches are insufficiently accurate and unable to deliver Nobel remedies for chronic diseases. Algorithm based on both structured and unstructured hospital data. No existing study in the field of medical big data analytics has focused on both data types, to our knowledge. Providing accurate diagnoses to reduce the number of individuals who die as a result of a misdiagnosis We've already gone through the process of merging CT and MRI scans. This method raises the quality of the data. As a result, we may choose the best course of action.

TRAINING AND TESTING:

Predicting future performance on new data is one of the most difficult areas of machine learning. To find the anticipated associations from data, a training set is usually utilised. The training set is a set of randomly selected data points that represent the model's inputs and outputs. To verify the model's quality, a piece of the original, unlabelled data set, referred to as the testing set, is usually used. During the training process, we are obviously vulnerable to some measurement

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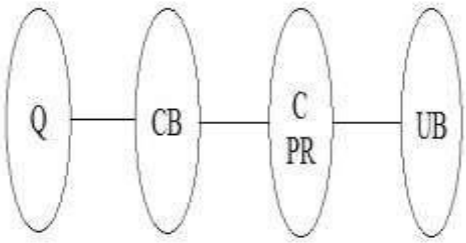
mistakes. As a result, the capacity to reduce the training error and the difference between the training and testing errors is linked to assessing how effective a learning algorithm is. Overfitting and underfitting are two essential ML notions that these two parameters belong to.

MATHEMATICAL MODELING:



Where,
Q = User entered input
CB = pre-process
C = feature selection PR = apply CNN Algorithm UB = predict outcome.

Set Theory:
1) Let S be as system which input image
S = {In, P, Op, Φ}
2) Identify Input In as In = {Q}
Where,
Q = User entered input image(dataset)
3) Identify Process P as P = {CB, C, PR}
Where,
CB = Pre-process
C = feature selection
PR = apply CNN Algorithm
4) Identify Output Op as
Op = {UB}
Where,

UB = Predict outcome
Φ=Failures and Success conditions.

CNN:

A Convolutional Neural Network (CNN) is a Deep Learning algorithm that can take an input image, assign importance (learnable weights and biases) to various aspects/objects in the image, and distinguish between them. As compared to other classification algorithms, the amount of preprocessing needed by a CNN is significantly less.

How CNN works:
- Convolution
- Relu layer
- Pooling
- Fully connected

The integral of the product of the two functions after one is reversed and shifted is known as the convolution of f and g, written fg:

$$s(t) = \int x(a)w(t-a)da \qquad s(t) = (x * w)(t)$$

Convolution is a commutative operation. At any time, it can be interpreted as a weighted average procedure (for this w need to be a valid probability density function). Discrete Convolution (one-axis):

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$$s[t] = (x * w)(t) = \sum_{a=-\infty}^{\infty} x[a]w[t-a]$$

Convolution and Cross-Correlation in Images Convolution operator: G=H*F

$$G[i,j] = \sum_{u=-k}^{k} \sum_{v=-k}^{k} H[u,v]F[i-u,j-v]$$

DISEASES ANALYSIS:

- **Viral Disease Symptoms:**

Infection-borne plant diseases are the most difficult to diagnose of all the plant diseases. There are no prior signs or symptoms that can be regularly monitored, and they are often misdiagnosed as nutrient deficits or damage. This disease is spread by aphids, leafhoppers, whiteflies, and cucumber creepy crawlies bugs.

- **Bacterial Disease Symptoms:**

Pathogenic microorganisms infect crops and cause serious infections. They cannot simply infiltrate plant tissue; instead, they must enter through wounds or plant holes. Bugs, different infections, and farming instruments can cause wounds on plants during various chores, such as pruning and picking.

- **Fungal Disease Symptoms:**

Plant leaf diseases, such as Late blight, are caused by fungus. It first appears on older, lower leaves that are water-soaked or have grey green patches. When parasitic disease progresses, these spots darken and fungus grows on them.

CONCLUSION AND FUTURE WORK:

The supremacy of the DL (deep learning) method over traditional ML (machine learning) algorithms is presented in this work. The DL is the way to go for picture classification problems with somewhat large datasets, based on both the simplicity of the approach and the acquired accuracy. Trying to improve the DL method's results on the same dataset would be pointless because the method's accuracy is already very good. Expanding the dataset with more diverse photos collected from other sources, in order to allow the DL model to generalise better, could be done in the future. The supremacy of the DL (deep learning) method over traditional ML (machine learning) algorithms is presented in this work. The DL is the way to go for picture classification problems with somewhat large datasets, based on both the simplicity of

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the approach and the acquired accuracy. Trying to improve the DL method's results on the same dataset would be pointless because the method's accuracy is already very good. Expanding the dataset with more diverse photos collected from other sources, in order to allow the DL model to generalise better, could be done in the future. This review compares and contrasts five distinct machine learning classification algorithms for detecting plant diseases. When compared to other classifiers, the SVM classifier is used by many authors to categorise diseases. The CNN classifier correctly detects a bigger number of diseases, according to the findings. Other machine learning classification algorithms, such as decision trees and the Nave Bayes classifier, could be used for disease detection in plants in the future, with the goal of supporting farmers in the automatic detection of all types of diseases in crops.

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