Detecting Leaf Diseases of Plants Using ML Algorithm

[1]Dr B.GOPI, [2]B. VENKATESH, [3]CH.BHAVYA SRI

[1]Associate Professor, Dept. of MCA, Krishna Chaitanya Institute of Science And Technology, Kakutur, Nellore, AP,India.

[2]PG Student, Dept. of MCA, Krishna Chaitanya Institute of Science And Technology, Kakutur, Nellore, AP,India.

[3]PG Student, Dept. of MCA, Krishna Chaitanya Institute of Science And Technology, Kakutur, Nellore, AP,India.

ABSTRACT_ The identification and detection of plant diseases are crucial in determining crop yield loss in agriculture. Studying plant diseases involves examining visible symptoms, such as spots or color changes, on any part of the plant. This differentiation is essential for agricultural sustainability and development. However, accurately identifying plant diseases is challenging, requiring extensive expertise and knowledge in plant pathology. To address this challenge, image processing techniques are employed for plant disease detection. The process involves several steps, including image acquisition, feature extraction, image segmentation, and pre-processing. Machine learning plays a pivotal role in this context by analyzing training data and developing models that can accurately identify plant diseases. Machine learning aids in decision-making and predicting outcomes from vast amounts of data. Key factors such as leaf color, extent of damage, and the affected area of the plant leaf are used for classification purposes. Various machine learning algorithms are evaluated to determine their effectiveness in identifying plant leaf diseases and achieving the best accuracy. In summary, integrating image processing with machine learning offers a powerful approach to detect plant diseases, ultimately contributing to better agricultural practices and crop management

KEYWORD: Image Registration, Image blending, Document image, video

1. INTRODUCTION

The issue of efficient plant disease protection is intimately connected to sustainable agriculture and climate change, particularly in India, where farmers cultivate a wide variety of crops. Numerous pathogens in the environment can severely impact both crops and the soil, leading to reduced agricultural production. Plant and crop diseases often manifest visibly on leaves, with various colored spots and patterns serving as key indicators for detection.

Traditionally, plant disease detection relied on direct visual inspection and the memorization of disease characteristics based on climate and season. These methods were not only inaccurate but also time-consuming. Current approaches to plant disease detection involve laboratory tests, skilled personnel, and well-equipped facilities. However, such resources are often unavailable in remote areas.

Implementing automatic detection techniques for plant diseases can significantly alleviate the burden of monitoring extensive crop fields. These techniques enable early detection of disease symptoms, often visible on plant leaves, thus facilitating timely intervention and reducing potential crop losses.

Incorporating image processing and machine learning into plant disease detection can revolutionize the process. Image acquisition, feature extraction, image segmentation, and pre-processing are key steps in this approach. Machine learning algorithms can analyze these images to identify disease patterns, offering a more accurate and efficient solution for farmers, particularly in remote and resource-limited areas.

Overall, leveraging technology for early and accurate plant disease detection can enhance agricultural sustainability, improve crop yields, and mitigate the impacts of climate change on farming practices

2. PROPOSED SYSTEM

Climate change and sustainable agriculture are strongly linked to the issue of effective plant disease prevention. India's farmers grow a wide variety of crops. There are numerous diseases in the environment that negatively impact crops and the soil in which they are planted, which has an impact on crop productivity. Numerous diseases have been reported to affect crops and plants.The leaves of the impacted plant or crop serve as the primary means of identification. The leaf's numerous coloured patterns and dots are highly helpful in identifying the illness.

.. In the past, diagnosing plant diseases required direct visual observation and memory of the specific disease in relation to the weather, season, etc. These were certainly labor-intensive and imprecise procedures. The current techniques for detecting plant diseases required a variety of laboratory tests, knowledgeable personnel, well-stocked labs, etc. These items are not always accessible, particularly in isolated places. When sickness is detected automatically, it saves a great deal of labour in large agricultural fields by identifying signs early on. This implies that once an illness manifests itself on plant leaves, it can be treated.

3. ALGORITHM

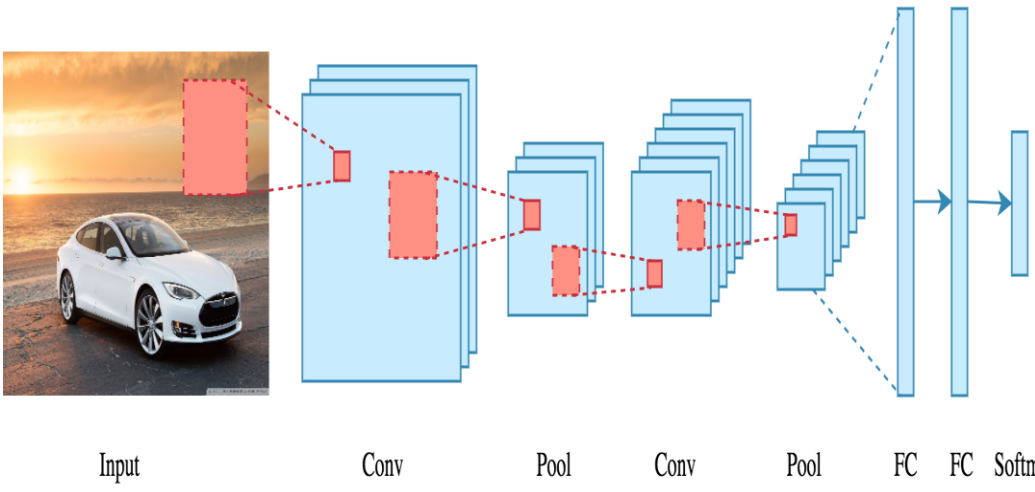
Proposed Method: CNN model with increased accuracy

CNN are everywhere. It is arguably the most famous deep mastering architecture. The latest surge of pastime in deep gaining knowledge of is due to the monstrous reputation and effectiveness of convnets. The pastime in CNN started out with AlexNet in 2012 and it has grown exponentially ever since. In simply three years, researchers improved from eight layer AlexNet to 152 layer ResNet.

CNN is now the go-to mannequin on each and every picture associated problem. In phrases of accuracy they blow opposition out of the water. It is additionally efficiently utilized to recommender systems, herbal language processing and more. The important benefit of CNN in contrast to its predecessors is that it mechanically detects the essential elements barring any human supervision. For example, given many photographs of cats and puppies it learns exclusive points for every category with the aid of itself.

CNN is additionally computationally efficient. It makes use of unique convolution and pooling operations and performs parameter sharing. This permits CNN fashions to run on any device, making them universally attractive.

All in all this sounds like pure magic. We are dealing with a very effective and environment friendly mannequin which performs automated characteristic extraction to gain superhuman accuracy (yes CNN fashions now do photograph classification higher than humans). Hopefully this article will assist us discover the secrets and techniques of this super technique.



4. PROPOSED SYSTEM ARCHITECTURE

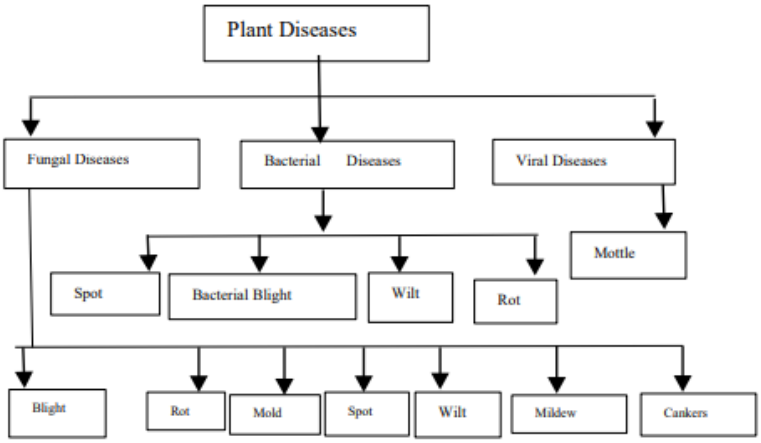


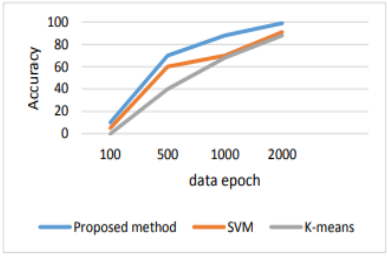
Fig. 1. Classification of Plant Diseases

5. EXPERIMENTAL RESULTS

In this section performance of plant leave diseases detection is calculated. The overall performance is calculated as how many time the system is detected the diseases as correct. In this way performance is calculated. For evaluating the system, we determined that leaves (mainly tomato leaves) are affected from Bacterial, Fungal, Viral, and Fungus diseases . The proposed methodology evaluated the leaves base on their diseases. The proposed system ask for the particular leave image. Base on the image it will show that the

leave is affected any kind of disease

6.Comparitive Study



S.no	Algorithm	Accuracy
1	k-means	88.6
2	SVM	91%
3	CNN	99%

we derived that individual algorithm like k-means process give efficiency 88.6% and SVM give efficiency 91%. But in the proposed methodology it give better result. The performance analysis is 99%. The accuracy is better than individual algorithm performance.

7.CONCLUSION

The proposed method of approaching is a precious approach, which can be give better performance. K mean algorithm didn't work well in global cluster and it does not work well with cluster of different data size and different data density. So that after clustering if we give the clusters in the multiple SVM class then it is give better classification. In the performance analysis this hybrid algorithm is better than individual algorithms performance. In this method it is found that big amount of dataset can be easily trained and tested to predict the different diseases

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