

Data Set Classification of Plant Diseases and Nutrition Level Using Machine Learning Algorithm

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Abstract: Plant diseases are a major cause of decreased yield and lower farmer revenue. Currently, scientists are working hard to develop a system that can automatically identify plant illnesses and assess the nutritional status of plants. Accurate diagnosis of plant diseases may aid in identifying a cure as soon as possible to minimise damage. The goal of this study is to provide an unique method for predicting plant diseases and nutrient levels using machine learning methods.

Keywords—Plant Disease; Nutrition Level; Yield

1. INTRODUCTION

One of the most common jobs in India is farming. All nations' economies depend heavily on agriculture. The major goal of agricultural development is to satisfy the population's increasing need. Agriculture must be improved in order to survive in its current state.

Both bacterial and fungal infections may harm crops. The impact on farmers' output is significant. Crops need to be healthy in order to provide the best yield. The procedure of diagnosing illnesses with our unaided eyes will always be challenging. The farm must be continuously watched in order to achieve this. This procedure is laborious. When the farm is large, this is also highly expensive. Even agricultural professionals struggle to detect the ailments and come up with a fix because of this challenge. Farmers would benefit greatly from a machine that could detect plant illnesses. This technology may serve as a tool to alert farmers when it's appropriate so they can take the appropriate precautions. Plant components including leaves, fruits, seeds, etc. may be harmed by a number

of plant diseases. These illnesses only affect certain plant body sections. The most crucial component of a plant is its leaves. Disease that affects a plant's leaf directly disrupts the plant's life cycle.

Bacterial, fungal, and other diseases are those that often harm leaves. Therefore, it is essential to find plant diseases early. Images of the diseased leaf are shown in Figure 1.

The solution to this problem seems to be machine learning. To automatically recognise and categorise plant diseases from digital plant pictures, a variety of machine learning (ML) techniques are offered. Different diseases affect plants in different sections of their bodies, including the leaf, stem, seed, and fruit. Various portions of the plant body are affected by diseases in different ways. In general, leaves may be thought of as the heart of the plant, yet photosynthesis can only occur with the help of leaves. The plant's life cycle is immediately impacted if a leaf is susceptible to disease.

It is crucial to put up a system that automatically identifies and categorises the ailments in order to effectively combat these conditions. ML is likely to be an excellent solution to this problem. Recently, a number of machine learning (ML) algorithms have been suggested for the classification and detection of plant diseases using plant pictures. These automated technologies have provided solutions to the issues, but the consistency and reliability of the tests' findings still provide a significant hurdle. In order to identify plant diseases, ML approaches are used in this research.



Fig1. Diseased Plant

2. METHODOLOGY

Several diseases may affect a plant's leaves. Humidity or other environmental factors can be to blame. Virus, bacterial, and fungal infections are among the common illnesses. Changes in colour and form may result from this. Due of the similar patterns, it might be difficult to distinguish these variants. Therefore, loss may be avoided by early identification of these disorders. This research suggests a machine learning method for categorising plant diseases.

At the Massachusetts Institute of Technology, Bell Laboratories, University of Maryland, and Jet Propulsion Laboratory, several digital image processing methods were developed in the 1960s. The price of picture processing was quite expensive. However, this changed in the 1970s when the availability of less expensive computers and technology led to a fast growth in digital image processing. The processing of images could then be done instantly. Digital image processing has emerged as one of the most popular methods of image processing thanks to the development of fast computers that were accessible in the 200s. It is used because it is both the most adaptable and the least expensive way.

Digital image processing has a real-world impact on almost every industry and is constantly evolving in response to new technological advancements.

1. Image sharpening and restoration-

It is the process in which we can modify the image. We can convert the color image to grey image, sharpening, enhancement of the image, detecting edges, and recognition of images.

2. Medical field-

Now a days if we have brain tumor through the image processing the tumor is detect that where the tumor is. Also it is used to detect any kind of cancer.

Xray imaging, medical CTScan , UV imaging depends on the functioning of digital image processing.

3. Robot -Vision-

There are several robotic machines which work on this technique. Through this technique robots find their ways. Like they can detect the hurdle and line follower robot.

4. Pattern- recognition-

It involves study of image- processing. It is also combined with the artificial intelligence such that computer-aided diagnosis, handwriting- recognition and images- recognition can be easily implemented.

5. Video processing-

The collection of frames and pictures are arranged in such a way that movement of pictures become faster. It involves frame rate , motion detection, reduction of noise and color space conversion etc.

ADVANTAGES

Advantage

1. Processing of images are faster. It require less time to process the image. There is no need of films and other photographic equipment.

2. Interactive method for detecting face, recognizing fingerprints, detecting cancer.

3. It is eco friendly process since it does not require chemicals while processing images.

4. We can change the quality of image. We can compress , enhance , quality of image produced are good.

5. Image can be made in any required format.

6. Now a days each and every book is available on the digital stage. The demand and needs of people are changing so having optimized digital book is need of todays generation so the digital image processing plays vital role in publishing world.

7. Errors in images can easily be rectified.

8. It analyse blood cells and their composition in our body.

9. Through this technique robots can detect their visions.

10. Its also helps in pattern recognition.

Overview of project idea

Agriculture is just not helpful for human feeding or earning it is much more like energy and global warming. Leaf disease has been affecting many aspects in the field of agriculture mainly they are production, quality and quantity. India is a country it

is reliant on farming. Farmers may benefit from the diagnosis of leaf disease. Utilizing images of leaves, research is being done in the smart computing environment to diagnose the condition. The photos would come from cameras, mobile phones, etc. The support vector machine and data sets are trained using the photos. Both the supervised learning method known as support vector machine and image processing are employed to make the aforementioned operation go smoothly. Image processing is used in agricultural applications for the following reasons.

When it comes to a sick leaf, it can be mentioned that its physiology isn't typical as it is for a leaf that is completely healthy. So that we can inspect before the whole leaf becomes diseased and the production declines. The affected region may be searched for. When the farmer discovers there is a problem with the leaf. The risk of infection exists for all plants as a result of that leaf. Identification of the illness is necessary before this may happen. Farmers may then attempt a variety of treatments if they are aware of the condition. The most important factor is symptom, which is the evidence of something's existence. It may be useful for effective cultivation to determine which section of the leaf is ill by assessing the responses to that question. Farmers may go on to the following phase, which is treating the illness with which the leaf is affected, once the sickness has been identified. The signs of illness and its fight are crucial to productive farming. Research has shown that illness results in significant losses. Financial losses vary, harvests are lost, and each of them is reliant upon the other. Crop destruction might result in a significant financial loss. Identifying diseased areas and beginning treatment of such areas are the major goals. Image processing steps in to the rescue at this point. As it relates to image processing, background separation and picture capture are carried out. In this application, image processing and support vector are both employed. Image processing is used for all feature extraction, for example, while support vector machines are used to train data sets and compare infected and unaffected leaves. This essay presents research on the identification of illness on various pomegranate leaves.

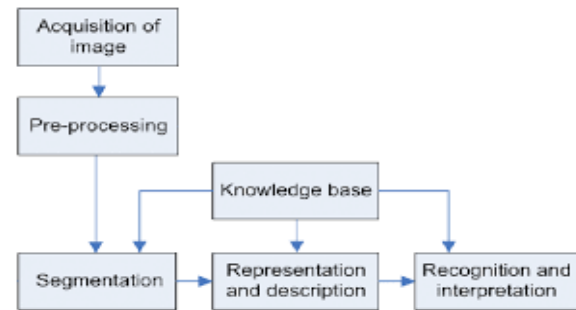


Fig2. Block Diagram of Proposed Model

3. CONCLUSION

Technology is being employed in many facets of life. Farmers have a tough time physically detecting plant illnesses and nutritional levels. Additionally, farmers do not have easy access to professional counsel. Having an automated system to recognise plant illnesses and nutrition is advantageous. Thus, machine learning will be used in our project to address these two issues.

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