Agriculture General Applications: A Study of Digital Imaging Processing

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Abstract

Agriculture accounts for a significant portion of the Indian economy. According to reports, any crop grown by farmers is susceptible to one or more diseases, including bananas, tomatoes, and cauliflower. It is difficult to manually track plant health and detect disease in plants. As a result, image processing can be a valuable and time-saving method for plant disease detection. Color characteristics and edge details are used to classify diseases. The framework includes an infection percentage as well as precautionary steps. Images taken with a smartphone camera are pre-processed, then segmented, features extracted, and diseases classified. On MATLAB image processing, algorithms to detect diseases will be developed. The methods used in the detection of multidisciplinary diseases were discussed in this paper, which included coconut, tomato, vegetables, and horticulture. Building an effective recognition device in the field of computer vision is a difficult job. The recognition system's main goal is to reach a human-like degree of object recognition. Shape, colour, texture, and other characteristics of the vegetables can vary. For efficient performance, vegetables and fruits are recognised using a combination of features. There are several difficulties to resolve in order to identify the vegetable, for example, the vegetable may be the same colour and form, and vegetables may exhibit notable variation in colouring and surface depending on how they are ripe, e.g., tomatoes vary from green to yellow to red,
I. INTRODUCTION

Synthetic-aperture radars (SARs) are a type of radar that is broadly used to make two-dimensional pictures or three-dimensional reproductions of objects, for example, scenes. SARs utilizing the movement of the radar receiving wired communication assure better spatial goals instead of customary pillar examining radars. SARs are typically mounted on a moving stage, for example, a shuttle or an airplane, and have their beginnings in a propelled type of side-looking airborne radars. The length that a SAR gadget goes over the objective in the time taken for the radar heartbeats to come back to the reception apparatus creates a huge receiving wire gaps (size of a radio wire). Commonly, the more drawn out the gaps, the higher the picture goals will be, irrespective of whether the openings are physical (an enormous receiving wire) or manufactured (a moving reception apparatus) this permits SARs to make high-goals of a picture with nearly little physical radio wires.

Additionally, SARs have the property of having large aperture for distant objects and allowing consistent spatial resolution over a range of viewing distances. The Synthetic Aperture Radars (SARs) include the photographic and other numerous optical imaging abilities. Since it can't when of a day or a climatic condition and the one of a kind reaction of territory and social focuses to the radar frequencies. Manufactured Aperture Radars (SARs) innovation has given territory auxiliary data to geologists for mineral investigations, oil slick limit on the water to earthy people, ocean states an dice dangers guide to the pilots, and in addition the observation and focusing on the data to military tasks. There are numerous different applications for this modernization. Some of them, particularly regular people, since they have not yet been sufficiently investigated on the grounds that minimal effort gadgets are the starting to make Synthetic Aperture Radars (SARs) innovation efficient for littler scope employments[1]

II. LITERATURE SURVEY

Image Processing in Agricultural Field
The important source of Information is image in the field of agriculture. For reducing farmer’s manual monitoring image processing techniques are used to enhance accuracy and consistency of processes[2]. Following are some image processing techniques.

1. Image Processing -Terminologies Used in Agriculture
2. Image Acquisition -Digital camera is used to capture the Digital images.
3. Image pre-processing -For improving the Image quality cropping, conversion stage are performed in this stage.
4. Gray scale conversion- To obtain the single intensity values from multiple channel colour image is converted to grey scale image
5. Image Background extraction-By applying image enhancement techniques and filters the background Object is separated form foreground image.
6. Image restoration-The process of getting the original and pure image from noisy and corrupt image
7. Image segmentation-Image is segmented into no of regions which leads to show different objects
8. Feature Extraction-Image characteristics are identified by applying this process on image dataset.
9. Object recognition-Finding and identifying objects in an image or video sequence.

Characteristics of Agriculture Image

According to the characteristics of agriculture image, new image recognition scheme and image authentication scheme were designed, which based on perceptual hash algorithm. Some tomato leaf diseases pictures were used to achieve image perceptual hash feature extraction. And the experimental results show that the same diseases images have closer perceptual hash characteristics[3]. An early detection of rice plant disease especially rice plant leaves disease detection can assist farmers to take necessary precaution at the early stage and can achieve better quality of crops. Rice plant can be affected by various types of fungal infectious diseases and among them rice blast is a common one. There are a numerous image processing approaches available today which can analyze rice plant leaves disease. Existing most approaches considered binary threshold based segmentation approach although input images are always RGB color images. To develop an automated system to identify and classify rice blast diseases it is always beneficial to use RGB color images as input and to provide analysis results in RGB color images as well. This study proposed a suitable frame work where enhancement, filter, color segmentation and color feature for classification steps were incorporated for identification. CNN classifier was applied to increase the identified accuracy rate[4]. In order to overcome the inherent challenges in the recognition of weeds in wheat fields, we accomplished the following in this study: 1) A fast recognition method for weeds in wheat fields combining RGB images and depth images was proposed. For the first time, RGB-D fusion information was applied to the classification of weeds in wheat fields. 2) Focusing on the issue of holes in depth images, a depth information repair method based on RGB image information guidance was proposed that utilizes the object consistency of RGB and depth image acquisition. 3) A more robust classification algorithm of the various weed species in wheat fields was proposed. The different features of weeds in wheat fields at the peak of weed emergence were analyzed. Color, position, texture, and depth information was extracted. The Ada Boost algorithm was employed for integrated learning in order to achieve accurate recognition of weeds in wheat fields[5].

Proposed Methodology

AI is a part of Computer Science that is utilized to extend Algorithms which show the property of Self Learning. AI is somewhat similar to Artificial Intelligence. Human mind learns from the previous data available and does it work accordingly.
Similarly the algorithm is trained with lot of previously available data. These algorithms can build the model of the system based on the information and yield information. The whole framework can be prepared to foresee future qualities additionally.

![Fig 3 Fruit detection](image1)

**Fig 3 Fruit detection**

Fig 3The physical characteristics like shape, colour, margin, and texture are the effective measures used by humans to pick the fruits and vegetables.

![Fig3.1 Crop detection using machine learning](image2)

**Fig3.1 Crop detection using machine learning**

The customary Algorithms accessible can't be utilized to anticipate the right information in Agriculture Fields. There are three sorts of learning calculations specifically managed learning, solo learning and Reinforcement Learning. The application of machine learning and machine vision by using descriptors of textures and contours, and the usage of algorithms for deep learning would allow plant species recognition from RGB images especially in the problem of weed detection in agricultural fields. Due to the nature of problem at hand, the weed detection has ultimately been defined as the segmentation of the image to weed, plant and land pixels and state of the art deep learning algorithms have been used for segmentation. Advanced Image Processing is the use of Computer Algorithms to Perform Image Processing on Digital Images and “medicinal plant” include various types of plant life used in herbal medicine[12] its support digital image processing for quality purpose.
Fig 3.2 Key phases of Digital Image Processing

Fig 3.2 Computerized Image Processing has got parcel of focal points when contrasted with Analog Image Processing. Picture Processing includes principally four phases to be specific Image Acquisition, Pre-Processing, Feature Abstraction and Organization Color Segmentation is the method used to separate crop from the background. Generally weed is a plant considered undesirable. The ideology is incidentally used to comprehensively portray species outside the plant realm that can live in different situations and imitate rapidly. Plants may be generally described in terms of their geometrical, optical and mechanical properties. Weed classification is a serious issue in Agricultural research. In the olden days weeds in the agricultural fields were removed with the help of Pesticides. But due to usage of pesticides the normal plant also gets affected. But in the recent advances weeds can be removed with the autonomous developed systems. Variations of the plant are captured as images under different Light conditions, moisture, wind. The captured images are trained with the different algorithms using artificial intelligence and Machine Learning. Since the field condition is mind boggling, the common plant isn't developed in static and relative positional structure, the pictures gathered from the field would be influenced by these questionable elements. Then weeds can be easily detected and removed without manual intervention.[6] The below listed are the images of complete manual weed
detection by humans, weed detection by Human operated machine and Image Processing Flowchart. In agriculture, determining the total number of chilli fruits to estimate the amount of crop yield plays an important role. Determining manually the total number of chilli fruits in an orchard is a tedious job, also it requires huge human resource, cost and has low accuracy. In this research work, a novel approach is proposed, for detecting and counting gripped chilli fruit from the plant images. It helps farmers to plan the manual labor to harvest the crop, shipment, sales and operations related to the post harvest. Computer vision techniques can help to precisely count the chilli fruits of the orchard. Therefore, an automated determination and counting the number of chilli fruits is introduced in the agricultural farms. The proposed technique achieves fine accuracy when compared towards ground truth chilli fruit images. For example, rice isa primary source of food and the most characteristics of agriculture image, crop in Asia especially in India, However, due to attack of insect pests, the quality and quantity of rice reduce or even lose. Therefore, it becomes imperative to develop effective approach to lessen the infestation level in the paddy fields. Farmers have the most challenging task of pest control in agriculture. Most of the farmers adapt regular spray programs (as traditional pest management methods) for paddy fields in place of the presence of insect pests. Another available method is the use of chemical on crops that eliminate the pests by killing them. Pest forecasting decisions require the density assessment for the pest population of rice in paddy fields. Furthermore, insect pests can be widely trapped by using sticky traps mechanism. Such insects now identify and count manually in the laboratories for knowing their type of species. Typically, crop technicians manually count the major pests followed by their segregation and identification according to their species. In paddy fields, such a process provides the pest density estimation from the resulting counts. However, rice fields require frequent counting and multiple sites of pests. However, this process is quite tedious and time consuming for crop researchers. Poor decisions on rice pest management due to accurate count delays or low count accuracy.

**Agriculture Applications**

Agriculture is the primary source of livelihood for large percentage of India’s population, but contribution of agriculture to the national economy is less. It is due to lack of agriculture productivity. The productivity decreases because of plant diseases. So, it is necessary to identify the disease and getting solution for the same is very important. The solution mainly includes pesticides, weedicides and fertilizers to overcome the infection in scientific manner. Fruits are very much prone to acquire the diseases very easily. Among the fruits, pomegranate is one of the fruit acquires the disease very easily and frequently. Pomegranate has high economic values and diseases in productivity affect the farmers adversely, so identification of diseases in pomegranate is very much necessary. It is used for medicinal purpose because of its high nutritional value. Pomegranate grows mainly in the area having annual rainfall around 40-50 cm. So, pomegranate is grown in arid and semi-arid regions. Pomegranates are used in medical field in curing diabetes, diarrhea and to overcome male and female infertility. Nowadays farmers are facing many problems in cultivation of pomegranate mainly in the early stages. In early stages, the immunity of the pomegranate towards the infection is very less. Hence these fruits acquire the diseases very easily through infection causing pathogens. Pomegranate diseases are many, but
only few are going to affect the farmers adversely[9-10]. Such diseases are Alternaria, pomegranate cercospora, pomegranate thrips, bacterial blight and pomegranate borers. All these diseases lead to a huge loss to the farmers and thereby reducing the productivity and hence overall economic status of a farmer will be affected.

Future work

Crop type mapping was for decades an important issue to monitor agriculture. Remote sensing has shown its contribution through several studies in the characterization and monitoring of vegetation, thanks to the synoptic nature of data, and the availability of the image archive. Earth remote sensing data thus offers several advantages in crop mapping and monitoring of vegetation. It is in the first place the efficiency of that method from the point of cost and time consuming compared to the traditional methods, besides the extended coverage of the images. There are several diseases which affect tomatoes and decrease produce. Early Blight is one of the most common diseases, occurring nearly every season. It is characterized by dark and concentric lesions on the leaf or fruit surface. Severe attacks often result in defoliation of the plant. The disease affects the quality, quantity and productivity of tomato produce.

Vegetable Quality Digital Image Processing Technique

Agriculture is backbone of our country. As a farming country we need produce and transfer the vegetables. Manual sorting requires labors and it is time consuming. We need to identify the vegetables (or) agriculture products without damaging it. So we propose a vegetable recognition algorithm to recognize the vegetables with the help of digital image processing technique. Digital images are profoundly successful in passing on specific feature that assistance in specific assessments. In food science the way toward distinguishing the defect in a vegetable acts an essential job. Vegetables production faces important losses in India due to bacterial infection. Vegetable quality is usually mentioned size of vegetable, its shape, its color and bruises from which it are often classified. The detection of diseases at time is that the basis for management of a ranch. Many research papers have proposed many machine vision strategies for recognizing vegetable deformities, as distinguishing defects in vegetables at an early time can help decrease extra disease spreading to different parts of the vegetables which will support the farming business. Bacterial illnesses of vegetables are most extreme and unhelpful infections impacting in field crops. Under most conditions they can cause confined pandemics impacting young rising vegetable. The exact detection of vegetable illness is request undertaking task to specialists. This work presents vegetable disease detection using image processing techniques to monitor diseases dependent on colour space division. The datasets utilized for this analysis was gathered dependent on real sample images for vegetable at various diseases, which were gathered from a market. The proposed approach comprises of three unique stages; like pre-processing, segmentation, and classification. In the pre-processing stage the pictures are resized to 250x250 pixels for decrease their shading index. Contrast enhancement is utilized to improve the shading edges. In the segmentation stage clustering algorithm is utilized to segment unnatural part of the vegetable images from the original image. Extract the features of the image. The vegetables contain the features such as color, shape, size, texture. By extracting these
features, we can classify the vegetables. At classification phase, Support Vector Machine is used to perform supervised Learning. Finally, the name of the infected disease image is determined.

III. CONCLUSION

Agricultural productivity is very dependent on the economy. Plant diseases play an important role in agriculture because plant diseases are very natural and failure to care will have serious consequences for plants and therefore affect the quality, quantity, or productivity of the product. Timely and accurate diagnosis of leaf diseases plays a major part in preventing loss in productivity and loss or reduction of agricultural products. Detection of plant diseases by automated techniques is beneficial because it reduces monitoring efforts on large plants and detects an indication of disease.

IV. REFERENCE

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