Weed Detection through Image Processing in Agriculture

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Abstract
Agriculture is the backbone of human sustenance on this world. Due to increasing population day by day peoples require more productive capacity of the agriculture to fulfill their demands at present. In former days they used natural methods to increase the productivity, such as using the dung, urine as a fertilizer in the fields that resulted increase in the productivity enough to meet the requirements of the population. But later people started thinking of earning more profits by getting more output. So, there came a revolution called "Green Revolution". In this paper we execute image processing using means to detect the weed areas in an image we took from the fields. Image processing has been proved to be effective tool for analysis in various fields and applications of an agriculture sector. So we got success in increasing the productivity but we have forgotten the damage done to the environment, which will affect this beautiful earth. So, in this paper, we have implemented some methods to reduce the usage of herbicides by spraying them only in the areas where weed is present. In this paper, we have implemented image processing using to detect the weed areas in an image we took from the fields.
Keywords: Image-Processing, Interplant weed detection, Agriculture

Introduction
Image analysis is an efficacious tool for non destructive analysis of agricultural objects, and has been widely used in agriculture. Improvement in digital image taking devices and software to operate on images has contributed in this. The main advantage of image analysis is its potential for non disastrous and objective analysis. In previous days weed detection was done by men especially for that purpose. They used to detect the weed by moving and checking each and every area of the field. Then they plucked them out manually using their own hands it was comparably time consuming process and also could be possible to disturb the crop due to lack of knowledge. Later with the modernization in the technology people started using the herbicides to remove the weeds. But to detect the weeds peoples are still using extra man power in many parts of the earth. Later there introduced some methods to identify the weeds with computerized technique but due to lack of their accuracy methods are unable to reach to the population. For this purpose we need to capture a photograph of the infected field with best clarity to identify the weeds with more accuracy. Taking a photograph can be done by attaching a camera to a tractor or taking them manually. Then we will apply image processing so that image using to detect the weed.

Weed

A weed is a plant considered undesirable**.** It is applied to any plant that grows or reproduces aggressively or is outside its native habitat. These have seeds that persist in the soil seed bank for many years. They compete with the desired plants for the resources that a plant typically needs, namely, direct sunlight, soil nutrients, water.

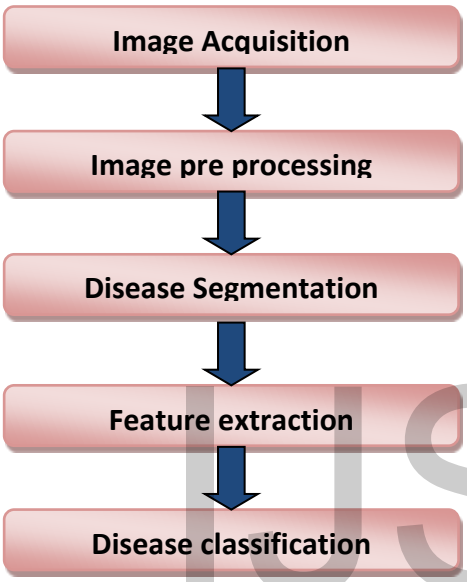

Fig- Steps of Image Processing

Image Acquisition

The real time images are fed directly from the camera. For further analysis, proper visibility and easy analysis of images, white background is created because most of leaves colour varies from red to green for exact segmentation. Acquisition is used for processing the analog images of physical scenes or the interior structure of an object, and converting it into digital.

Image Pre-processing

Image pre-processing is required to resize captured image from high resolution to low resolution. Captured input image is being converted into a gray scale image using colour conversion by the equation

$$\text{Image} = 0.3R + 0.59G + 0.11B$$

Disease Segmentation

Disease Segmentation is an important step to make something that is more meaningful and easier to analyze. finds an image segmentation method using support vector machine and Otsu's method for apple sorting and grading. Results derive by this application of above mentioned technique, shows segmentation error of 3% to 25% for rigid SVM and 2% for flexible SVM.

Feature Extraction

Feature Extraction is one of the most interesting steps of image processing to reduce the efficient part of an image or dimensionally reduction of interesting parts of an image as a compact feature vector.

Other common feature extraction techniques include:

* Histogram of oriented gradients (HOG)
* Speeded-up robust features (SURF)
* Local binary patterns (LBP)
* Haar wavelets
* Colour histograms

Classification of Image - Classification of image consists of database that contains pre-defined patterns that are compared with detected objects to classify them in a proper category. Classification will be executed on the basis of spectral defined feature such as density, texture etc.

Following are basically techniques used to detect the crop and weed in the agriculture field.

A. Biological Morphology Based Technique

In biological morphological from and size options area unit extracted. Form options like, major axis, areas, minor axis, ratio, breadth area unit used for detection of plant. Hidden options are found with the assistance of biological morphological technique. Within the technique

the excessive inexperienced colour rule for segmentation of soil and vegetation used, subsequently median filtering for removing the noise, morphological options and calculation of applied math threshold price. Using this, they got 72.6% of exactness. Seven form options for detection of crop and weed is employed however this can be restricted to just for corn crop and that they got the accuracy 98.9%.

B. Plant Reflectance Based Technique

Spectral coefficient technique is employed for plant species identification. Spectroscope is important to record spectral coefficient parameter however price is beyond the common former will offered. numerous forms of spectral coefficient parameter is employed like for vegetation indices, to live crop properties within the spectrum generally ratios of broadband coefficient values are used. The options like, variance of the close to spectrum, skewness, average provides the high level of success in color segmentation.

C. Visual Texture Based technique

In this technique texture features of the image such as, energy, entropy, contrast, homogeneity, and inertia are used for detection of plant. By using the support vector algorithm and extracting the texture features energy, entropy, inertia, homogeneity, contrast and relegated got the 93% of precision. Kiani S, verified that different ANN gives different accuracies with five texture features energy, contrast, homogeneity, inertia, entropy as a input to the ANN. Gabor wavelet combined with PCA algorithm got 90.5% of precision. In this paper wavelet transform Db4 is used for extracting the texture features of crop and weed images.

D. Inter Row Weed Detection

In this technique we are able to find the weed that's gift in between the rows of the crop. Here it'll method the photographs taken in real time to urge the weed areas. We are going to take photos at twenty five frames per second. Every frame has to be operated for 0.04 sec. Here we are going to take the primary eight frames generated in 0.3 sec time and that we can perform the logical and operation between them to urge a reference image known as crop row image.

WORK ON WEED DETECTION

Following are few approaches exist that, may be used for our solution, try to solve the problem of weed detection. These approaches protect the crop while plants grow up in the farm. Weed detection is now a big challenge for every farmer; it causes maximum loss of crop and decrease the productivity of farming. Many techniques which are implemented by the authors some are as follows:-

Ajinkya Paikekari and co worker (2016) found that affect the threshold value in this way: if authors have narrow crop leaves and wide weed leaves then they can say that weed has more edge frequency than the crop, so here the threshold value will be more. Otherwise, the threshold value will be less.

Janwale Asaram Pandurng co worker (2015) found that In the Methodology 2 experiments involving winter wheat yield estimations were conducted at a field plot and on a regional scale to check the feasibleness of the PF-based information assimilation strategy and to research the results of the PF parameters and spatiotemporal scales of assimilative observations on the performance of the crop model information assimilation.

C O N C L U S I O N

Existence of weeds on earth since men started cultivating. Unwanted crop in agricultural field is named as weed. Weeds compete with crop for daylight, Space, Water and Nutrients within the soil. Weeds are responsible for infestation of

crop pests in tropical agriculture though they cause most reduction/loss within the yields of crops than alternative pests and diseases.

Image analysis is a good tool for non-destructive analysis of agricultural objects, and has been wide employed in agriculture. Improvement in digital image taking devices and code to work on pictures has contributed during this. The most advantage of image analysis is its potential for non-destructive and objective analysis. Image process technique has been tested as effective machine vision system for agriculture sector.

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