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WEED DETECTION USING IMAGE PROCESSING

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Abstract - *Agriculture is one of the origins of human sustenance in this world. Nowadays due to growing population we need the greater productive capability of the agriculture to meet the demands. In olden days, people used natural methods to increase the productivity, such as using the cow dung as a fertilizer in the fields. That resulted in an increase in the productivity enough to meet the requirements of the population. But later people thought of earning more profits by getting more outcome. So, there came a revolution called "Green Revolution". After this period usage of deadly poisons as herbicides has increased to a drastic level. By doing so we got success in increasing the productivity but we have forgotten the damage done to the environment, which will raise a doubt in our sustenance on this beautiful earth. So, in this project, 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 MATLAB to detect the weed areas in an image we took from the fields.*

Key Words: **Image-Processing, Interplant weed detection, Agriculture, Color segmentation.**

1. INTRODUCTION

In olden days weed detection was done by employing some men, especially for that purpose. They will detect the weed by checking each and every place of the field. Then they will pluck them out manually using their hands.

Later with the advancement in the technology they started using the herbicides to remove the weeds. But to detect the weeds they are still using manual power in many parts of the world. Later there came few methods to detect the weeds automatically but due to lack of their accuracy, they are unable to reach to the people. Then they started using image processing for this purpose.

In this proposed project our main aim is to detect the weed in the crop by using image processing. Then we will give the inputs of the weed areas to an automatic spray pesticide only in those areas. For this, we need to take a photograph of the field with good clarity to detect 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 to that image using MATLAB to detect the weed.

2. WEED

A weed is a plant considered undesirable. Weeds have no botanical classification since a plant that is a weed in one reference is not a weed when growing where it is wanted.

It is applied to any plant that grows or reproduces aggressively or is outside its native habitat. The term is occasionally used to broadly describe species outside the plant kingdom that can live in diverse environments and reproduce quickly. 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, and (to a lesser extent) space for growth. Weed classification is a serious issue in the agricultural research. Weed classification is a necessity in identifying weed species for control.

There are two types of weed based on the frequency of the edges present in them.

2.1 Weed with narrow leaves

Fig-1: Weed with narrow leaves.

2.2 Weed with wide leaves

Fig-2: Weed with wide leaves.

3. ALGORITHM AND RESULTS

This Algorithm prepares an image for further advanced processing and is consists of Loading the image from source, color segmentation, and edge detection.

Fig-3: Input image for weed detection

Color segmentation is the method used to separate the crop (which also include weed) from the background. The method helps in separating all the visually distinguishable colors from one another. The desired image after color segmentation consists of green color (the crop and the weed) and the remaining part of image black, making the image feasible to the step in the process, edge detection.

Fig-4: Output image after color clustering

In an image, an edge is a curve that follows a path of rapid change in image intensity. Edges are often associated with the boundaries of objects in a scene. Edge detection is used to identify the edges in an image.

To detect edges properly we have to convert the color segmented image into the gray scale image.

The image after both color segmentation and edge detection is left with the edges and veins of both the crop and the weed in white and the remaining part completely Black.

Fig-5: Output image after Edge detection.

The operations like color segmentation, edge detection make the image ready for the next operation called filtering.

The filter here is used for recognizing regions in which edges appear with a frequency in a specific range (weed frequency range). Here the image after the edge detection in above step as input. To apply filtering the image has to be divided into blocks of a certain size.

There is a trade-off between the block size and gained accuracy. If the block size is too large, frequency estimation can be faulty due to the existence of both crop and weed in the same block. If it is too small, the frequency cannot be calculated correctly because of an inadequate number of edges in a block. A small block may detect the inner part of the weed leaf as the crop because of less number of edges in it.

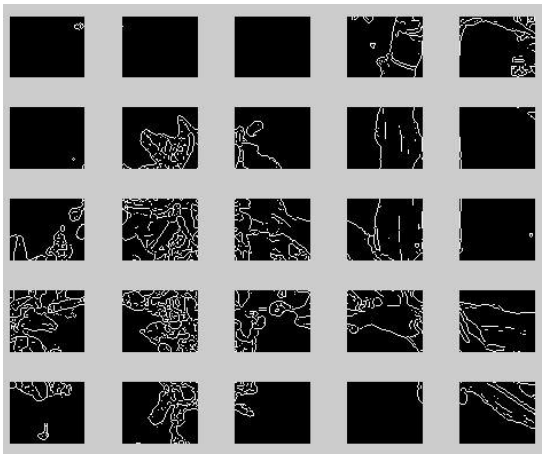

Fig.6: Image divided into 25 blocks

Also in choosing the threshold value we need to take care because its value depends on two factors.

They are:

1. Type of weed present

2. Type of crop

The above factors affect the threshold value in this way: if we have narrow crop leaves and wide weed leaves then we 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. In this paper, we take the case of corn crop where the edge frequency of weed is more than that of the crop. For knowing the value of the edge frequency here, first, we took an image which contains pure weed and calculated the number of edges in it by using "for" loops and then we have calculated the number of edges per block for pure weed. That turned out to be approximately 350. Then we did the same by taking pure plant image and its edge frequency is approximately 210.

So in this proposed paper we took 343 as threshold value so that all weed can be detected. Coming to our case in this project we have taken an image of the size approximately 320x240 pixels. And we have divided it into 25 blocks each of size 64x48 pixels. In the program which we wrote, we have used for loops for counting the number of pixels and if loop for keeping the threshold value. If the edge frequency is greater than the threshold value then we detect that block as weed block and again by using for loops we convert all the pixels in that block into white pixels. As a result, we will be getting an image which contains weed blocks as total white blocks and other blocks remains unchanged.

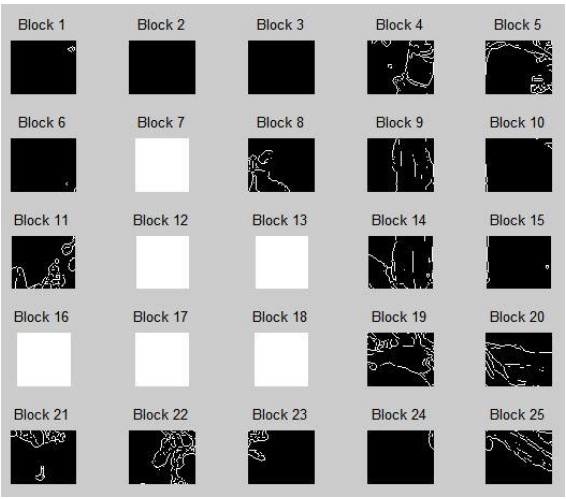

Fig-7: Final output after filtering showing the weed affected blocks.

4. CONCLUSION

In this system, we have developed a method by which we can detect weed using Image processing. Due to the use of our system, we can detect and separate out weed affected area from the crop plants. The reason for developing such system is to identify and reuse weed affected area for more seeding. This specific area can be considered for further weed control operations, resulting in more production.

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REFERENCE

[1] Mrs. Latha, A Poojith, B V Amarnath Reddy, G Vittal Kumar; "Image Processing In Agriculture"; IJIREEICE; 2014.

[2] Xavier P. Burgos-Artizzu, Angela Ribeiro, Maria Guijarro, Gonzalo Pajares; "Real- time image processing for crop/weed discrimination in maize fields"; Elsevier; 2010.

[3] Hossein Nejati, ZohrehAzimifar, Mohsen Zamani;"Using Fast Fourier Transform for weed detection in corn fields"; IEEE; 2008

[4] GrianggaiSamseemoung, PeeyushSoni, Hemantha P. W. Jayasuriya, Vilas M. Salokhe; "Application of low altitude remote sensing (LARS) platform for monitoring crop growth and weed infestation in a soybean plantation"; Springer; 2012.

[5] AnupVibhute, S K Bodhe; "Applications of Image Processing in Agriculture: A survey; International Journal of Computer Applications"; 2012.

[6] Alasdair McAndrew; "Introduction to digital image processing with MATLAB"; Course Technology; 2004.