IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

A STUDY OF WEED DETECTION AND REMOVAL USING IMAGE PROCESSING TECHNOLOGY

Prachi Choudhari
Department of EXTC
Shree L.R. Tiwari College of Engineering

Abstract: - Agriculture is one of the most important origins of human support in whole world. The detection and classification of weeds are of most important technical and economic aspects in the agricultural industry. Automated weed control has received an increased interest from the scientific community in recent years. Though there are plenty approaches and even commercially available systems for weed control, several challenges need to be assessed.

1. INTRODUCTION

Weed plant detection is a new research problem in agricultural field which want to take help from computational science to detect unwanted growth of weed along with other crops/plants. Usually in farming when we farmers grew something due to soil property and pre available micro seeds additional growth of weeds is there which spoil the actual outcome of farming as they affect the growth of planted plants. So weed detection is problem of accurately identifying the area of weeds so that specific areas can be targeted for spraying with minimum spraying on the other plants of interest. In recent years, as the world population growth, existing land and natural resources decreased, the precision agriculture is increasingly capturing more attention of the researchers. Image processing approaches could be applied to solve this problem.

2. WEEDS

Weed, general termed as any plant growing where it is unwanted. Since the times when humans started to cultivate crops, they had to fight with the invasion by weeds. Weeds interfere with a variety of human activities, and many methods have been developed to suppress or eliminate them. These methods vary with the nature of the weed itself. In agriculture, weed control is essential for maintaining high levels of crop production and get quality of output. The many reasons for controlling weeds become more complex with the increasing development of technology. Weed classification is serious issue in research. Weed classification is a necessity in identifying weed species for control.

3. RELATED WORK

Image processing and computer vision technology have been used for classification of plant and distinguishing between crop and weed.

In [1] the author has proposed an approach to identify weeds in vegetable plantation using deep learning and image processing. The algorithm here was depicted in two steps. A CenterNet model was trained to detect vegetables. The trained CenterNet achieved a precision of 95.6%, a recall of 95.0% and a F1 score of 0.953. Then the remaining green objects in the color image were considered as weeds. To extract weeds from the background, a color index was used to determine and evaluate

through Genetic algorithms (GAs) according to Bayesian classification error. In this way, the model focuses on identifying only the vegetables and thus avoid handling various weed species.

In [2] the author has proposed a crop and weed detection method which can be used in presence of large amounts of weeds by combining crop row detection using depth data and crop/weed classification by k-means clustering. The experiment showed the effectiveness of the method by using images taken in unweeded cabbage field.

In [3] author has proposed a weed detection system that works in real time without need for segmenting plants or leaves. Feature extraction and edge detection are done using Convolutional Neural Networks. The output image of the weed detection system can be used for selective weed treatment. To evaluate the system, a standard dataset of images is provided and images captured in carrot crop field at different conditions are used. The performance is analysed by training the proposed system with manually annotated input images and comparing the output images with expert labelled ground truth images. The analysis result indicates that the proposed system achieves a precision of 91.1%.

In [4] author has detected weed using the threshold value of images, which is determined in the following 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. In this paper, they have taken 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, they took an image which contains pure weed and calculated the number of edges in it by using "for" loops and then they have calculated the number of edges per block for pure weed. That turned out to be approximately 350. Then they did the same by taking pure plant image and its edge frequency is approximately 210.

In [5] Design and Development of Automatic Weed Detection and Smart Herbicide Sprayer Robot, the colour image is converted to binary by extracting the green parts of the image. The amount of white pixels present in the region of interest is determined and regions with higher white pixel count than the predefined threshold are considered as weeds. The herbicide is stored in a container fitted with water pump motors attached to spray nozzles. Once the weeds are identified, a signal is sent from Raspberry-Pi to the motor driver IC controlling the water pump motors to spray the chemicals over the weeds.

In precision agriculture, weed control and detection has become one of the most interesting areas. Preventing damaging consequences of chemical herbicides as well as saving money are some reasons of this trend. In this paper [6] the author introduces a new weed control robot which is capable of identifying weeds in corn fields. With the proposed image processing algorithm 95.89% classification accuracy can be reached. The other feature of this system is being robustness against different light conditions, which is the problem of many weed detection systems, as well as being capable of operating under real-time conditions with the aid of LabVIEW software.

4. PROPOSED SYSTEM

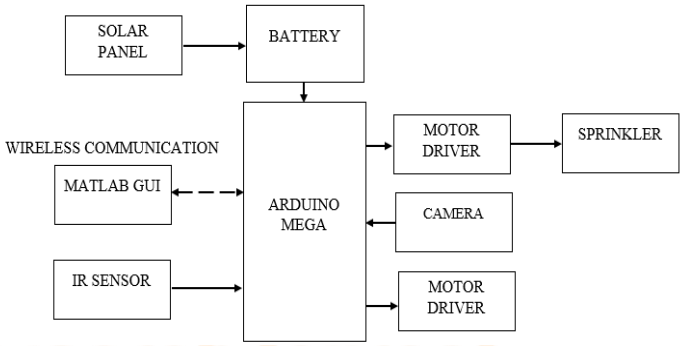

Fig 7.1 shows the block diagram of the proposed system, the model consist of Arduino Mega which is the heart of the system. The system is controlled with the help of MATLAB GUI which has wireless communication with the system. The wireless communication is performed via ZigBee. In this project the robot will be moving in the field for weed detection. A camera is attached to the robot takes continuous photos of the field to detect weed. The system will send these images to the matlab which will use the algorithm for weed detection. If weed is present in the image the matlab will communicate with the system and in turn the system will activate the sprinkler. The job of the sprinkler will be to sprinkle the pesticides precisely only that position where weed is being detected. The robot will also have IR sensor which will be helpful in obstacle detection. The whole system which will be moving in the field will be battery powered. The battery in turn will be powered with the help of the solar panel.

5. 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. Using an image processing algorithm, weeds are identified from the images by shape, color, texture and size features. Prior work has documented the high accuracy considering various other parameters such as texture, genes, etc. Weed detection is an important factor for their removal and regulation. Appropriate weed detection algorithm must be used to avoid damaging the crop plants. The proposed system considers the simple edge detection algorithms.

6. REFERENCE

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