Weed Detection In Plant Images : A Review

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Abstract - The image processing is widely used area now days in various fields such as Radiology, pattern modeling, education, research etc. The basic approach is to process the pixels containing information in an image. The information stored in the form of pixels can be manipulated to generate the required result. It can be used to detect and diagnose various kinds of diseases in medical imaging. This paper focuses on the weed detection in plant images. There are many approaches to weed detection. In this paper, we will discuss the various detection methods with their pros and cons.

Keywords - Weed Detection, Pattern detection, Classification

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1. INTRODUCTION

Image processing is the method to convert a image into digital form to get an enhanced image. A two dimensional function f(x, y) is characterized as an image in which the spatial coordinates are defined by x and y. A digital image is accomplished when x, y as well as the intensity values of f are all finite and discrete. The creation, processing, communication and displaying of digital image in which algorithms are used are known as Digital Image Processing. The 70% of total population of India depends upon agriculture thus it known as agricultural country. The desirable fruits and vegetables crops can be selected by the farmers from huge range of varieties available. For improving these approaches we need technological support. In this paper we are used baseline method for developing a real time weed detection system through binary classification. In this ,first green plant algorithm is implemented to remove soil part from image to reduce the image information .The second step of algorithm is to focus on vegetation ,median filtering to remove noise from image and preserving their edges. Third step of algorithm is to convert gray scale image into binary form. Then pixels are labeled and objects in the image are identified .Finally area calculations are done for each object.

2. LITERATURE SURVEY

Camilo Andrés Pulido-Rojas, et.al (2016) represented a machine vision system for weed detection in vegetable crops using outdoor images, avoiding lighting and sharpness problems during acquisition step [6]. This development will be a module for a weed removal mobile robot with camera obscura (Latin for "dark room") for lighting controlled conditions. The purpose of this paper is to develop a useful algorithm to discriminate weed, using image filtering to extract color and area features, then, a process to label each object in the scene is implemented, finally, a classification based on area is proposed, including sensitivity, specificity, positive and negative predicted values in order to evaluate algorithm performance.

Hossein Aghighi et.al (2018) employed [7] advanced ML techniques including boosted regression tree (BRT), random forest regression (RFR), support vector regression, and Gaussian process regression (GPR) approaches. The performances are compared by using some conventional regression methods. In order to compare them all, NDVI values of all silage maize fields were averaged and integrated to produce a two-dimensional dataset for each year. The proposed approach was employed hundreds of times and the metrics are calculated which is used to evaluate their performance and stability. The comparisons between the results of these methods indicate that the BRT technique, with the average R value higher than 0.87, outperforms other ones for all years. It was followed by RFR with almost same performance as GPR technique. The researcher concluded that the proposed ML approach predicts the silage maize yield and they are less sensitive to inconsistence NDVI time series. The results proves that the RFR was the most stable approach used to predict the maize yield in 2015 and whereas it was trained using 2013-14 dataset.

Anshul Garg et.al (2017) resultant [8] of the previous published research work in which the researcher delineate a regression based fuzzy time series and deals with qualm, obfuscation veracity, and spuriousness the various facets of the fuzzy contexture and furnishes a better and a more veracious result than the methods that are de facto and indubitable. Frequency based partitioning technique had been employed as the partition of discourse and actual production as the major discourse. Fuzzy Logical Relationships of varying degrees have been used to evaluate the fuzzification mechanism. Moreover, Regression Analysis Model had been employed to accomplish the defuzzification operation. it had been proposed that the new methodology was perfect and provides high exactitude tiny mean square error and average statement error rate.

Yolanda. M. Fernandez-Ordoñez et.al (2017) objectifies [9] the estimation of the yield and total volume of maize production by employing the Spot-5 satellite images and empirical models. This model analyzed that a) yield (Y) as a function of LAI, and b) yield as a function of NDVI. In order to determine the efficiency degree of the evaluated predictions at the flowering step of the crop, sampling of yield takes place at the psychological maturity step. Regarding yield prediction in the flowering stage, the models Y = f (LAI) reported a value of 5.96 ton.ha-1 and the model Y = f (NDVI) a value of 5.04 ton.ha-1 was obtained. These data represent 114% and 97% respectively of the true yield recorded on the field. The provided data denotes the 114% and 97% true yield records of the field. The models are used to specify the maize and cultivate the crop location and also forecast the provided sown areas. The researcher concluded that the LAI derived prediction model overestimated yield by 14%, whereas the

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NDVI attained 97% of accuracy. The LAI derived model behavior is due to variation in field data collection, which occurred at different hours during the day.

Table 1: Table of Comparison

Author	Year	Description	Outcome	Advantages	Disadvantages
Camilo Andrés Pulido	2016	A machine vision system for weed detection in vegetable crops using outdoor images, avoiding lighting and sharpness problems during acquisition step. This development will be a module for a weed removal mobile robot with camera obscura (Latin for "dark room") for lighting controlled conditions	The purpose of this paper is to develop a useful algorithm to discriminate weed, using image filtering to extract color and area features, then, a process to label each object in the scene is implemented, finally, a classification based on area is proposed, including sensitivity, specificity, positive and negative predicted values in order to evaluate algorithm performance.	The algorithm which is proposed in this research work for the weed detection give good accuracy	The algorithm for the weed detection has high accuracy but give low execution time
Hossein Aghighi	2018	Advanced ML techniques including boosted regression tree (BRT), random forest regression (RFR), support vector regression, and Gaussian process regression (GPR) approaches. The performances are compared by using some conventional regression methods. In order to compare them all, NDVI values of all silage maize fields were averaged and integrated to produce a two-dimensional dataset for each year.	The researcher concluded that the proposed ML approach predicts the silage maize yield and they are less sensitive to inconsistence NDVI time series. The results proves that the RFR was the most stable approach used to predict the maize yield in 2015 and whereas it was trained using 2013-14 dataset.	In this research work, the concept of parallel processing is applied which execute the algorithm at high rate	The fault detection rate and accuracy is very low which affect performance of the algorithm
Anshul Garg	2017	Frequency based partitioning technique had been employed as the partition of discourse and actual production as the major discourse. Fuzzy Logical Relationships of varying degrees have been used to evaluate the fuzzification mechanism. Moreover, Regression Analysis Model	It had been proposed that the new methodology was perfect and provides high exactitude tiny mean square error and average statement error rate.	The fuzzy system is applied for the weed detection which give good performance for the weed detection	The complexity of the system is very high which also increase execution time of the algorithm
Yolanda. M. Fernandez	2017	In order to determine the efficiency degree of the evaluated predictions at the flowering step of the crop, sampling of yield takes place at the psychological maturity step. Regarding yield prediction in the flowering stage, the models $Y = f(LAI)$ reported a value of 5.96 ton.ha-1 and the model $Y = f(NDVI)$ a value of 5.04 ton.ha-1 was obtained.	The researcher concluded that the LAI derived prediction model overestimated yield by 14%, whereas the NDVI attained 97% of accuracy. The LAI derived model behavior is due to variation in field data collection, which occurred at different hours during the day	The weed detection system uses the GPU system for the execution. Due to use the GPU system, the weed part will be clearly visible from the image	The accuracy of the system is low and execution time is also high

Conclusion

In this paper, it is concluded that weed detection is the major issue of the pattern detection techniques. The features of the weed and plants are very similar. The weed can be detected from the field in the two steps which are feature extraction and

classification. It is analyzed that machine learning techniques are the most efficient technique for the weed detection. In future proposed approach will be implemented for the weed detection.

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