Chapter 6
Computer Vision for Weed Identification in Corn Plants Using Modified Support Vector Machine

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ABSTRACT

Weed plants are unwanted plants growing in between host plants. There are more than 8000 weed species in the agriculture field. This is the global issue that leads to loss in both the quality and quantity of the product. So, attention has to be taken to avoid these losses and save manpower. In this chapter, the three procedures, segmentation, feature extraction, and classification, for weed plant identification are presented in detail. To separate the region of interest, threshold segmentation method was applied. Then the important features, shape, and textures were analysed with the help of GLCM method, which are discussed in this review. Finally, in the image classification method, modified support vector machine was used to separate the weed and host plants. Finally, this modified SVM was compared with CNN using performance analyses and produced high accuracy of 98.56% compared to existing systems. Hence, the farmers are expected to adopt these technologies to overcome the agricultural problems.

INTRODUCTION

Agriculture is very important in Indian economy(Jones et al., 2017). In recent years, due to climate change effects, diseases, pests, human error the agriculture faces many problems. So, the most challenging task of agriculture is increasing both quality and quantity of the product from these critical issues (Sanjeevi et al., 2020).Agriculture is the backbone of the Indian economy. For more than half of India's population, it is a source of income(Shuping & Eloff, 2017). The cultivation from agriculture is important to offer the source of livelihood for any employees in farming, international trading, national revenue, raw material, saving source, foreign exchange resources, economic development and significance of transport. So there is a need to develop the agriculture because of less production in food products and reduction of cultivation and also to develop new techniques (Fritz et al., 2018). However, people from different places in India die due to food scarcity because farmers from different places highly depend on Indian. Agriculture controlling weeds that grow among plantation crops is one of the most important difficulties in agribusiness.

Accurate identification and precision treatment are needed for both types of plants such as weeds and crops(Thornton et al., 2017). But both these treatment and identifications are subjected to predict the error in affect crops field. Hence, research in agriculture is focused to increase quality and quantity of the of the product. Manual diagnosis is challenging task for agriculture area. So automatic detection is needed for human error and man power saving. In recent years, the agriculture and farming systems has become a worldwide development with well-growing technology (Jones et al., 2017)(Ragul Krishna et al., 2020). With the help of image processing techniques automatic system is introduced in agriculture area.

Weeds are the most challenges in agriculture field because these weeds present anywhere in the crops field. As a result of this weeds the crop yields get more loss(Alexander et al., 2017). Farmers are currently manually removing weeds wherever possible, or spraying weed killers/herbicides all over the field to keep them under control(Donatelli et al., 2017). This method is ineffective since chemicals are sprayed on plantation crops as well, damaging the environment and causing human health concerns. A sophisticated weed management method should be used to avoid these outcomes. The system must be capable of detecting weeds in the field and notifying farmers to their precise positions. So those pesticides are only applied in certain areas. It focuses on decreasing the usage of pesticides that impair plant growth and cause major health problems in humans. So, attention has to be taken to identify the weeds present in the crop field. Hence, the yield loss occurs due to unneeded weed plants, plant disease, nutrition deficiency and quality of yield. The farmers are benefited according to the well growing technology such as image processing and communication systems(Hugar, 2016)(Liakos et al., 2018).

The amount of well growing technology with computer vision applications are quality of yields, disease identification, monitoring irrigation and water stress management(Gao et al., 2018)(Jayanthi et al., 2019). Hence, the weeds are identified and classified by using different machine learning techniques(Qin et al., 2016). Initially to show the weeds different features were extracted and categorized into different classes including color, shape and texture. Shape, colour, and size characteristics distinguish weed recognised from photos utilising image processing techniques. Different weeds and crop species are classified based on these features. Images of the plantation rows are taken at regular intervals using image processing methods (Contreras-Medina et al., 2012). Herbicides are sprayed by robots if the weed is recognised. Probabilistic neural networks may also identify weeds. The automatic threshold for weed segments is based on Otsu's technique. Weed is detected using angular cross-section intensities, and support vector machines (SVM) can be utilised for high accuracy. Weed identification and classification are critical

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