Hybrid features and ensembles of convolution neural networks for weed detection

Sandeep Kumar Kempegowda, Rajeswari Rajeswari, Lakshmikanth Satyanarayana, Siddesh Matada Basavarajaiah

Abstract

Weeds compete with plants for sunlight, nutrients and water. Conventional weed management involves spraying of herbicides to the entire crop which increases the cost of cultivation, decreasing the quality of the crop, in turn affecting human health. Precise automatic spraying of the herbicides on weeds has been in research and use. This paper discusses automatic weed detection using hybrid features which is generated by extracting the deep features from convolutional neural network (CNN) along with the texture and color features. The color and texture features are extracted by color moments, gray level co-occurrence matrix (GLCM) and Gabor wavelet transform. The proposed hybrid features are classified by Bayesian optimized support vector machine (BO-SVM) classifier. The experimental results read that the proposed hybrid features yield a maximum accuracy of 95.83%, higher precision, sensitivity and F-score. A performance analysis of the proposed hybrid features with BO-SVM classifier in terms of the evaluation parameters is made using the images from crop weed field image dataset.

Keywords

Bayesian optimization; Color moments; Convolution neural network; Gabor wavelet; Grey level co-occurrence; Support vector machine

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