Design and Comparative Study of Genetic Algorithm Optimized SVM (Support Vector Machines) Configurations to Classify Crop/Weed Using Shape/Color Features

Abstract

This research work seeks to optimise classifiers to identify several types of weeds namely mixed Monocotyledon weeds , Agerantum Conyzoides (AGECO), Borreris Repens (BOIRE) and Brassica Juncea (BRSJU) for an selective automatic robotic sprayer. Tuning the parameters and selecting the feature for SVM requires extensive analysis on the features if performed manually. An alternative to tuning the SVM is by using Genetic Algorithm which enables simultaneous feature selection /weightage and hyper parameter selection. In this research work, two configurations were used which are the selected feature configuration which uses a selected subset of feature for classification and weighted features configuration which uses all the features with weights on the features. Both GA optimised configuration types were compared to a grid search followed by backward sequential selection optimisation. Test results showed that the weighted feature configuration outperformed the other configurations. The generated configurations showed almost similar performance for both GA optimised configurations which outperformed the sequential search/grid search optimised configuration.