

Research Article

Soft Computing Optimized Models for Plant Leaf Classification Using Small Datasets

Priya and Jasmeen Gill

RIMT University, Mandi Gobindgarh, Punjab, India; E-mail: er.jasmeengill@gmail.com

Abstract

Plant leaf classification is an imperative task when their use in real world is considered either for medicinal purposes or in agricultural sector. Accurate identification of plants is, therefore, quite important, since there are numerous poisonous plants which if by mistake consumed or used by humans can prove fatal to their lives. Furthermore, in agriculture, detection of certain kinds of weeds can prove to be quite significant for saving crops against such unwanted plants. In general, Artificial Neural Networks (ANN) are a suitable candidate for classification of images when small datasets are available. However, these suffer from local minima problems which can be effectively resolved using some global optimization techniques. Considering this issue, the present research paper presents an automated plant leaf classification system using optimized soft computing models in which ANNs are optimized using Grasshopper Optimization algorithm (GOA). In addition, the proposed model outperformed the state-of-the-art techniques when compared with simple ANN and particle swarm optimization based ANN. Results show that proposed GOA-ANN based plant leaf classification system is a promising technique for small image datasets.

Key words: Artificial neural networks, grasshopper optimization algorithm, particle swarm optimization, optimization techniques, plant leaf classification

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