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Plant leaf disease identification using exponential spider monkey optimization

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ABSTRACT

Agriculture is one of the prime sources of economy and a large community is involved in cropping various plants based on the environmental conditions. However, a number of challenges are faced by the farmers including different diseases of plants. The detection and prevention of plant diseases are the serious concern and should be treated well on time for increasing the productivity. Therefore, an automated plant disease detection system can be more beneficial for monitoring the plants. Generally, the most diseases may be detected and classified from the symptoms appeared on the leaves. For the same, extraction of relevant features plays an important role. A number of methods exists to generate high dimensional features to be used in plant disease classification problem such as SPAM, CHEN, LIU, and many more. However, generated features also include unrelated and inessential features that lead to degradation in performance and computational efficiency of a classification problem. Therefore, the choice of notable features from the high dimensional feature set is required to increase the computational efficiency and accuracy of a classifier. This paper introduces a novel exponential spider monkey optimization which is employed to fix the significant features from high dimensional set of features generated by SPAM. Furthermore, the selected features are fed to support vector machine for classification of plants into diseased plants and healthy plants using some important characteristics of the leaves. The experimental outcomes illustrate that the selected features by Exponential SMO effectively increase the classification reliability of the classifier in comparison to the considered feature selection approaches.

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1. Introduction

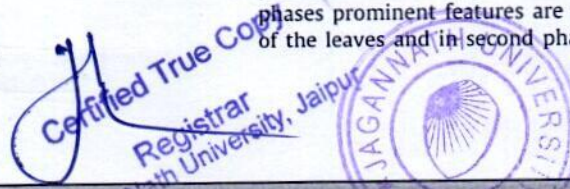
Agriculture is one of the important sources of earning for human beings in many countries. A different variety of food plants are harvested as per the need and environmental conditions of land. However, a number of problems are also faced by the farmers such as shortage of water, natural disasters, plant diseases and many more. However, some of the problems may be reduced by providing technical facilities to the farmers. Automated plant disease identification and prevention system is one of such solutions that can aid the farmers. This type of system can overcome from the problems of lack of plants' disease knowledge as there are very few experts for the same [1,2]. Moreover, it may increase the food productivity

by performing the on time prevention from the disease and there is no need to search for an expert. Such automated system will also be time and cost efficient. Therefore, this manuscript proposes a novel strategy to recognize the various plant diseases.

Generally, leaves of the plants are first source to detect the most of the plant diseases. Yellow and brown spots, primary and late blister, and other ailments caused by bacteria, virus and fungus can be detected automatically through efficient image processing techniques [3,4]. Therefore, this paper focuses on the plant disease identification using leaves properties only. However, plant disease identification through image processing is not an easy job because of the huge disparities available in the leaves of different and similar plants for instance size, texture, color, shape, etc. Various image processing strategies have been anticipated to overcome from such problems and normally all methods have two steps [3]. In the first phases prominent features are extracted from the input images of the leaves and in second phase, a particular classifier is used


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List of Publications

1. Strategies for Reducing Farmers Suicide using ICT. BRICS Journal of Educational Research. Vol 6, Issue 4, (2016). pp. 284-285. ISSN 2231-5829.
2. Enigma in E-Agriculture and Their Solutions in Indian Perspective. In Proceedings of First International Conference on Research in Intelligent Computing in Engineering (RICE-2016).
3. Plant Leaf Disease Identification using Exponential Spider Monkey Optimization, Sustainable Computing: Informatics and Systems. (SCI) Elsevier.
4. Automated Soil Prediction using Bag-of-Features and Chaotic Spider Monkey Optimization, Evolutionary Intelligence, DOI: 10.1007/s12065-018-0186-9. (ESCI, Scopus) Springer.
5. Diseased Leaf Identification using Bag-of-Features and Sigmoidal Spider Monkey Optimization, In Proceedings of 3rd International Conference on Soft Computing: Theories and Applications, organized at Dr B R Ambedkar NIT, Jalandhar, Punjab, India. Proceeding will be published by Advances in Intelligent Systems and Computing, Springer. (Scopus)


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