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Innovative Approaches for Multiclass Identification of Paddy Diseases through Enhanced Feature Transformations

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Abstract :

This research addresses the significant challenges of pests and diseases in paddy production, causing a global loss of approximately 20% in rice yield. The focus is on early identification of rice leaf diseases using thermal image cameras to mitigate losses. The study introduces a Modified Lemurs Optimization Algorithm as a filter-based feature transformation technique to enhance the accuracy of paddy disease detection through machine learning.

Inspired by Sine Cosine Optimization, the Modified Lemurs Optimization Algorithm is applied to thermal images of paddy leaves, considering five diseases namely rice blast, brown leaf spot, leaf folder, hispa, and bacterial leaf blight are considered in our work. Six hundred thirty-six thermal images are analyzed, extracting statistical and Box-Cox transformed features. Four machine learning techniques are tested namely K-Nearest Neighbor (KNN), Random Forest Classifier, Linear Discriminant Analysis and Histogram Gradient Boosting Classifiers and their performance is enhanced by the proposed feature transform, with KNN achieving a balanced accuracy of 90%.

References :

1. <https://ieeexplore.ieee.org/document/10273722>

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