Rice Leaf Disease Identification Using Adam Optimizer Based Modified Differential Evolution Algorithm

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Recently, one of the grain-based crops that is farmed the most is rice, which is important to the agricultural sector. Furthermore, rice is a significant crop that is consumed by almost half of the global population. However, biotic and abiotic elements including bacteria, viruses, pests, soil fertility, and so forth have an impact on agricultural production. Early disease identification saves farmers time, increases crop yield, and guards against production loss in rice plants. The rice fields used for cultivation are the source of the rice leaf image dataset. The three disease classes that made up the data acquisition were Brown Spot, Bacterial Blight, and Leaf Blast. The ultimate goal of this proposed study is to improve rice leaf detection and classification performance. Thus, using a deep learning approach, this study presented an Adam Optimizer (AO) to carry out an efficient classification of rice leaf disease. Moreover, rice leaf disease detection and classification involve the use of Transfer Learning in conjunction with Inception V3 architecture. The Modified Differential Evolution Algorithm (MDEA) technique is used to determine the transfer learning approach's optimal learning rate. Finally, the proposed AO-MDEA shows better performance metrics in terms of accuracy (98.74%), precision (99.04%), recall (99.12%) and F1-score (99.15%) respectively.

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Contents

Agriculture is considered as one of the main sources of income for the people who lives in African and Asian countries. Moreover, agriculture plays a significant role for the economic growth of farmer and the nation [1]. The farmers select the appropriate crops based on the soli type, selling value and environmental conditions. The industries which are based on the agriculture look for the development of modern technologies to increase the yield of food at varying weather conditions and uncertain environment [2], [3]. There are numerous factors such as soil quality, environmental conditions, low quality manure, pests, and different plant diseases can cause various type of infections in plants [4]. Comparing to plant disease, leaf disease tends to create a major impact on crops and affects the agricultural production. Since leaf plays a significant role in the process of photosynthesis and helps in supplying energy to plant, any infection in leaf affects the growth of plant and even leads to death of plant [5]. The disease in the leaf of plant is contagious which is due to pathogens such as viroid, protozoa, nematodes, fungus like species, bacteria, Fungi, virus-like organisms, algae, parasitic plants and viruses [6].

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