

Title: Deep Learning for Plant Disease Detection and Classification: A Systematic Analysis and Review

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Abstract: Detection and classification of leaf and crop diseases in a traditional way is a very laborious task as it involves a significant amount of physical work, huge expert manpower, and valuable time. Automatic systems are more accurate and require less time, labor, and physical work. Artificial intelligence and deep learning-based systems can help in the rapid detection and classification of plant leaf and crop diseases as they occur and help to reduce the hostile effects of disease on food security and the economy. In this systematic and state-of-the-art review, an in-depth study was performed to find and assess the use of different deep learning methods in leaf disease detection and classification. In this study, we exhaustively reviewed contemporary research work on leaf and plant disease detection and classification using deep learning methods performed by several researchers worldwide. Various deep-learning techniques with intermediate steps, public datasets, types of diseases detected and classified, types of plants used, performance metrics used to evaluate models, and achieved results are summarized. Finally, various challenges encountered in using deep learning methods were summarized along with some guidelines that will be helpful for future researchers in this area.

Key words: deep learning CNN leaf disease classification crop disease detection image datasets

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