The hybrid feature incorporated dual deep learning architecture for the automatic jasmine plant disease detection and classification

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Agriculture is the strength of our nation, and its production rate is also important for feeding food to all. The crop production rate is more significantly affected by various diseases. Currently, these diseases are identified and classified using a visual inspection method, which is not suitable for larger crop fields. Therefore, a machine-based, systematic approach is needed to identify various diseases that occur on the leaves of the jasmine plant. The present article develops and proposes a computer-based systematic approach to the detection and diagnosis of jasmine plant diseases using the dual deep learning method. The proposed classifier consists of a general adversarial network (GAN) module and a proposed convolutional neural network (CNN) architecture for diagnosing diseases in the jasmine plant. The GAN module extracts the features from the data-augmented jasmine plant leaf image, and the CNN module performs the disease classification process. The proposed CNN module contains both lower and higher-order kernels that produce the hybrid features, which are further classified by the CNN architecture. The proposed classification approach is validated on the set of jasmine plant leaf images. The simulation is carried out using MATLAB software, and the results of the plant leaf classification system are compared with state-of-the-art models in terms of crop sensitivity, crop specificity and accuracy.

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affect the production of crops[1–3]. The second issue in agriculture is pests, the main reason for the anti-growth of crop production rates. To combat this problem, various advanced pest control agents are used to mitigate these issues in crop production due to pests. The third and most important issue of crop production is the effect of various plant diseases. Numerous diseases occur in plants, which are identified through visual inspection. Visual inspection consumes more time and is unsuitable for large crop fields[4,5]. Moreover, visual inspection leads to physical errors, which degrade the crop's production rate. The leaf of jasmine plants is considered in this study, and their production growth is improved by adopting various soft computing algorithms in a computer-assisted automatic approach. The soft computing approaches are entirely based on artificial intelligence algorithms, and the developed artificial intelligence algorithms are classified into machine-based and deep learning-based approaches. Machine-based algorithms such as support vector machine (SVM) and random forest (RF) detect a greater number of diseases in jasmine plant images[6,7]. Although this method is effective in crop production rate, it uses more images of jasmine plants during its training, and overfitting takes place during the training of the machine learning algorithm. Therefore, the proposed jasmine plant leaf disease classification system requires a strong and effective algorithm or system for automatic disease identification in jasmine plant leaf images. This requires the adaptability of deep learning algorithms instead of machine learning algorithms for the jasmine plant leaf