Abstract

Food crop production is highly effected by the rise in crop diseases which eventually cause serious agriculture yield loss and retrain the crop productions. Currently to deal with this issue, expert helps is used to monitor crop health. This method of visual observation is expensive and as well as time consuming. Moreover it leads to delayed remedial actions in order to deal with the infectious crop. For this exact reason we need an effective and efficient way to recognize and monitor the crop conditions. In this aspect we choose an automatic way to detect and classify various crop diseases for accurate and faster identification. Proposed research is done in two parts, where potato leafs is detected as healthy/diseased using Machine Learning technique, where k-foldxvalidation is used on 7 classical machine learning algorithms. The best performed classifiers i.e. Random Forest, is then choose to train and predict the healthy/diseased potato leafs. Whereas in second part, disease category classes are identified using deep learning approach. CNN is built and used to classify and predict disease categories. Proposed technique with ML showed 10foldxvalistaion scores as LR: 0.875934, LDA: 0.863527, KNN: 0.891400, CART: 0.879656, RF: 0.954720, NB: 0.761153, SVM: 0.890806. Random forest is used for training and achieved accuracy of 96% on test dataset. Whereas proposed technique for deep learning CNN model achieved accuracy of 99% on test dataset. Moreover the research is done considering potato diseases available globally and in Pakistani region as well. For this reason, cross dataset is used by fusing PlantVillage dataset and PPLD (Pakistan potato leaf diseases). Both datasets are publicly open repositories. Fused dataset contain 5403 images in total for disease detection.