

Hybrid CNN–SVM Approach for Accurate COPD Classification on Chest Radiographs

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Abstract:

Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory illness that includes airflow limitation, emphysema, and chronic bronchitis which also has it to be a main cause of morbidity and mortality worldwide. Chest X rays are very common and low cost for initial screen out, but also, they present in other pulmonary diseases which causes the identification of COPD to be a difficult task. For a long time, we depended on manual feature extraction and clinical judgement which was very time intensive and also very variable. But we see in recent research that deep learning has had great success in medical image classification which in turn has brought about the development of automatic COPD prediction systems. This study reports on a deep learning that we have put together which is a combination of CNNs with an SVM for the issue of COPD in chest X rays. We do discriminative feature extraction and classification which we carry out with a support vector machine which we refer to as a "hyperplane" that we use to establish decision boundaries that may do better in which we are looking at small sets which we do through transfer learning with ResNet50. Also, we present a confusion matrix for the evaluation of our model in addition to in depth performance measures (precision, recall and F1 score).

Keywords: Chronic Obstructive Pulmonary Disease, COPD Classification, Chest X-ray, Convolutional Neural Network,