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Machine Learning Techniques for COVID-19 Detection: A Comparative Analysis

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Abstract : COVID-19 virus spread has been one of the extreme pandemics across the globe. It is also referred to as coronavirus, which is a contagious disease that continuously mutates into numerous variants. Currently, the B.1.1.529 variant labeled as omicron is detected in South Africa. The huge spread of COVID-19 disease has affected several lives and has surged exceptional pressure on the healthcare systems worldwide. Also, everyday life and the global economy have been at stake. This research aims to predict COVID-19 disease in its initial stage to reduce the death count. Machine learning (ML) is nowadays used in almost every area. Numerous COVID-19 cases have produced a huge burden on the hospitals as well as health workers. To reduce this burden, this paper predicts COVID-19 disease is based on the symptoms and medical history of the patient. This research presents a unique architecture for COVID-19 detection using ML techniques integrated with feature dimensionality reduction. This paper uses a standard UCI dataset for predicting COVID-19 disease. This dataset comprises symptoms of 5434 patients. This paper also compares several supervised ML techniques to the presented architecture. The architecture has also utilized 10-fold cross validation process for generalization and the principal component analysis (PCA) technique for feature reduction. Standard parameters are used to evaluate the proposed architecture including F1-Score, precision, accuracy, recall, receiver operating characteristic (ROC), and area under curve (AUC). The results depict that decision tree, random forest, and neural networks outperform all other state-of-the-art ML techniques. This achieved result can help effectively in identifying COVID-19 infection cases.

Keywords : supervised machine learning, COVID-19 prediction, healthcare analytics, random forest, neural network
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