Title: Machine learning for early detection of post-acute sequelae of COVID-19 (PASC): A comparative review of symptoms and risk factors

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Abstract: SARS-CoV-2 is a multi-organ disease with a broad range of symptoms. Extensive research has been conducted to improve early detection, syndrome prediction, and diagnosis. However, the persistent condition experienced by recovered patients with COVID-19, known as post-acute sequelae of COVID-19 (PASC), remains underexplored. This review aims to analyze PASC symptoms, assess their risk intensity based on medical history, and highlight emerging variants. Unlike existing reviews, this article uniquely integrates machine learning techniques for personalized assessment of PASC risk and mapping of symptoms through an interactive platform. It introduces a conceptual framework that utilizes real-time patient data, enabling more accurate predictions and multidisciplinary treatment recommendations. The framework allows long-COVID patients to input symptoms via an app or website, which are then mapped against PASC datasets to assign risk levels (low, medium, or high). Machine learning models process these data for feature engineering and classification to predict the persistence of PASC. By leveraging machine learning for real-time risk stratification and treatment suggestions, this study advances post-COVID care beyond traditional symptom tracking. The proposed methodology is expected to outperform existing systems in predictive accuracy and patient-specific recommendations.

Keywords: Covid-19, Early detection, Variant, PASC, Risk factors,Machine learning

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