

**Abstract:**

The COVID-19 pandemic has placed immense strain on global healthcare systems, necessitating the rapid development of tools for early diagnosis, prognosis, and resource allocation. Machine learning (ML) techniques have shown promise in predicting the progression and outcomes of COVID-19 cases, assisting clinicians in decision-making processes. This paper explores the application of various ML algorithms in forecasting the prognosis of COVID-19 patients, focusing on outcomes such as disease severity, ICU admission, ventilation requirements, and mortality risk. Data sources used in ML models include patient demographics, comorbidities, clinical symptoms, laboratory results, and imaging data. The study compares the performance of different machine learning models, including decision trees, random forests, support vector machines (SVM), and deep learning approaches, with emphasis on accuracy, sensitivity, and interpretability. Additionally, we discuss the challenges of data quality, model interpretability, and the need for external validation in real-world settings. The results demonstrate that ML-based models can offer valuable prognostic insights, potentially improving early intervention strategies and personalized treatment plans, while also highlighting areas for future research and model refinement.