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Future Trends in Digital Healthcare: Predicting Sepsis Risk Using LGBM Machine Learning Model

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INTRODUCTION

Sepsis is a severe medical concern, and timely and accurate risk prediction is crucial for improving patient safety and treatment outcomes. Traditional methods of sepsis risk assessment have their limitations. This study aims to explore the use of advanced machine learning techniques, particularly the light gradient boosting machine (LGBM), to enhance the accuracy of sepsis risk prediction and its potential application in the digital transformation of healthcare.

AIM

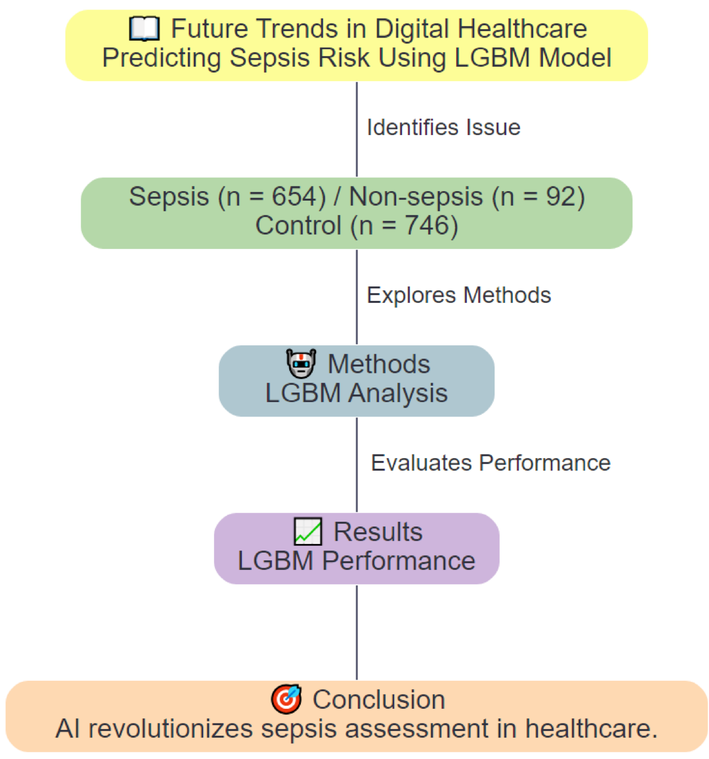
To enhance the accuracy of sepsis risk prediction by utilizing the LGBM model, and to explore its potential role in the digital transformation of healthcare.

METHOD

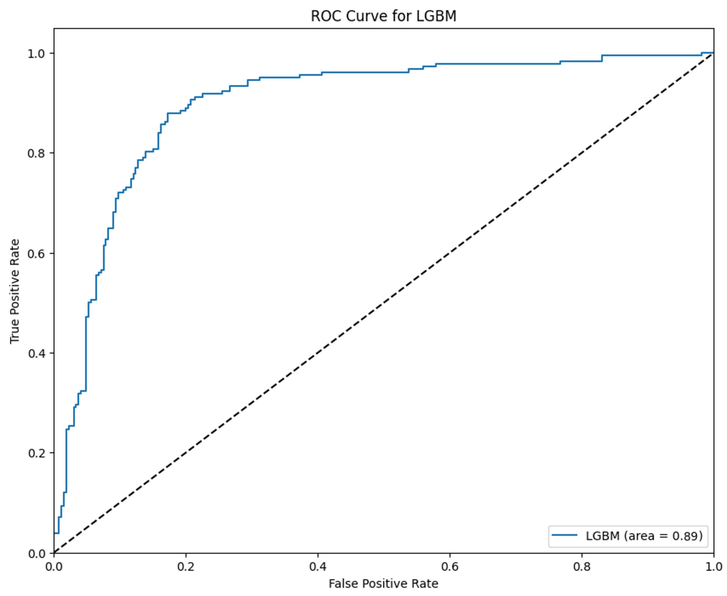
This study employed the LGBM model to analyze a vast amount of clinical data to assess the risk of patients developing sepsis. Various risk factors were considered, and evaluation was performed using metrics including AUC, accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and F1 score.

RESULTS

The LGBM model achieved a perfect AUC value of 0.99 during the training phase and an AUC of 0.89 during the testing phase. The model's accuracy was 83.04%, sensitivity was 85.16%, specificity was 81.58%, PPV was 75.98%, NPV was 88.93%, and the F1 score was 0.81. These results demonstrate the high accuracy and reliability of the LGBM model in predicting sepsis risk.



Overview of the study on using the light gradient boosting machine (LGBM) model to predict sepsis risk. The figure outlines the progression from identifying the issue in digital healthcare, through exploring methods with LGBM analysis, to evaluating the performance of the model. The study concludes that AI has the potential to revolutionize sepsis assessment in healthcare by enhancing prediction accuracy and efficiency.



Receiver Operating Characteristic curve for the light gradient boosting machine model in predicting sepsis risk. The curve demonstrates the model's performance, with an Area Under the Curve (AUC) of 0.89, indicating strong discriminative ability between patients at risk of sepsis and those who are not.

CONCLUSIONS

This study validates the high performance of the LGBM machine learning model in sepsis risk assessment, showcasing the significant potential of artificial intelligence technology in enhancing healthcare quality and efficiency.

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