Prediction of Arrhythmia after Acute Myocardial Infarction using Machine Learning and Statistical Techniques

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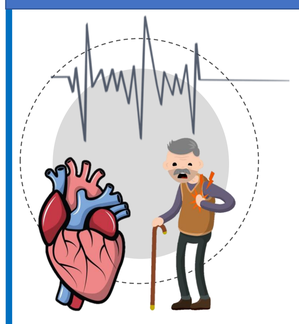
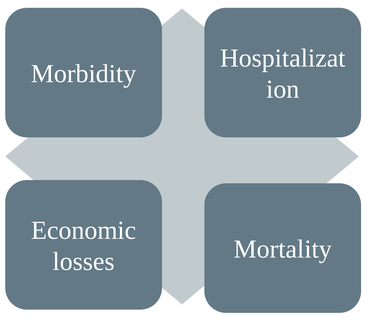
Abstract

Arrhythmia is a life-threatening condition and every year millions of people die because of it. The diagnosis process of conventional health-care system is time consuming and it worsens patients' condition which may lead to death of patients. With the help of conventional statistical and machine learning analysis, we have extracted important predictors so that arrhythmia can be predicted faster and more accurately. The statistical and machine learning techniques have returned the features RA (up and down), BBB, P-R, RA (up and down), heart beats and DD-P of the AMI dataset. With the help of an optimized random forest classifier we have predicted arrhythmia which has shown an accuracy 69.71% with all features and 68.89% with the extracted features. We have also analyzed the time complexity of the model to analyze how quickly our model can predict arrhythmia.

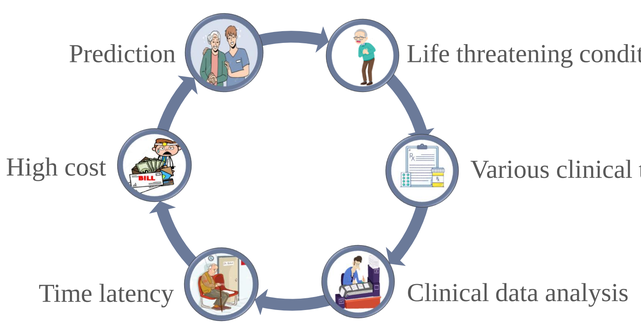
Introduction



Arrhythmia



Background



Motivation

Objectives

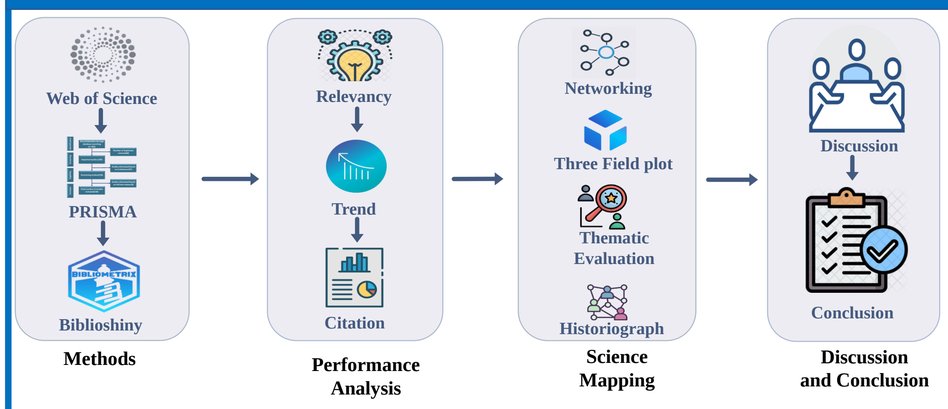
- To identify important features for predicting arrhythmia
- To reduce time complexity
- To investigate the acute myocardial infraction (AMI) dataset
- To analyze the model performance

Conclusion & Future Work

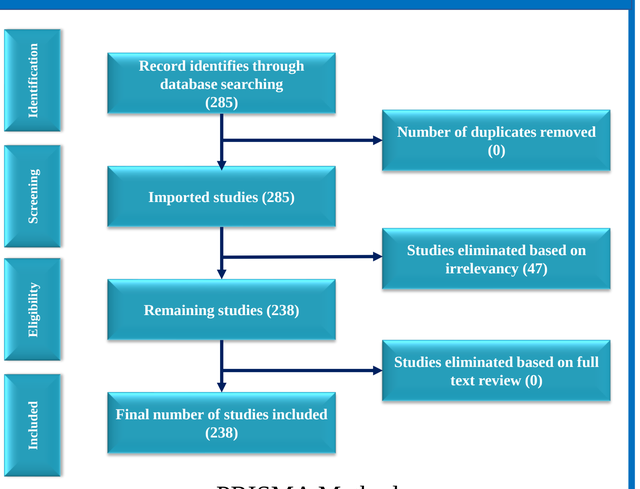
- Similar types of features returned from statistical and machine learning analysis
- Improved accuracy than the previous work [2]

- Model will be trained with more datasets
- Neural network will be applied to improve accuracy
- Real-time server-based patient monitoring system will be developed where this model will predict arrhythmia

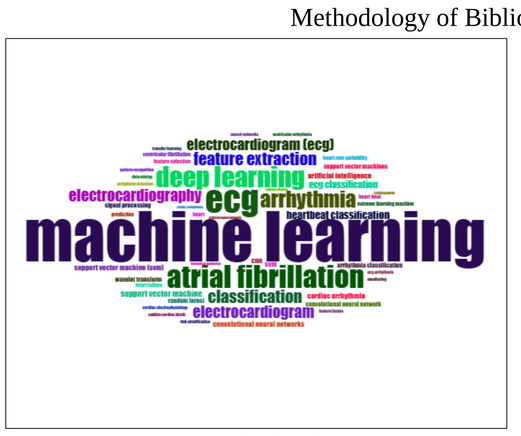
Literature Review



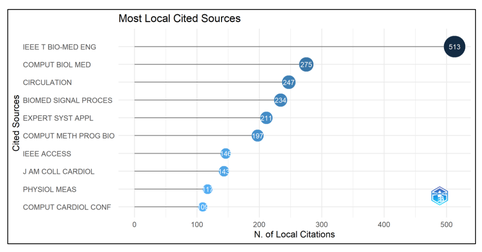
Methodology of Bibliometric Analysis



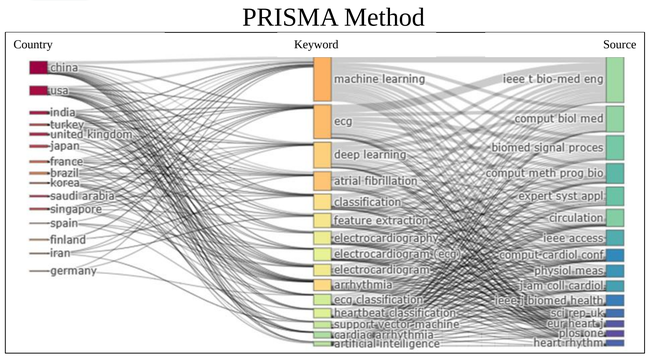
PRISMA Method



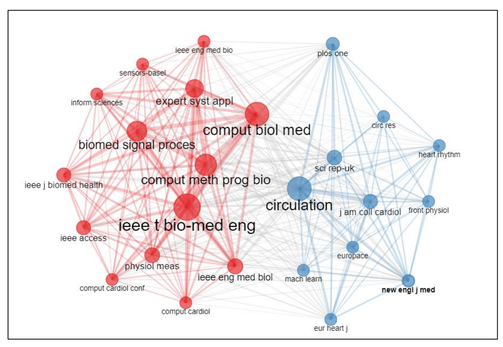
Word Cloud



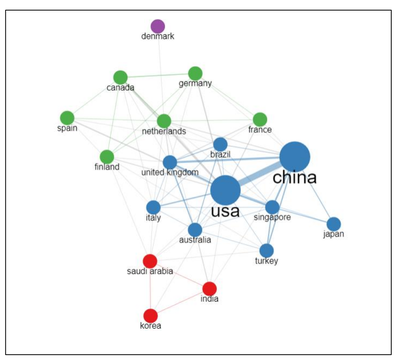
Most Cited Sources



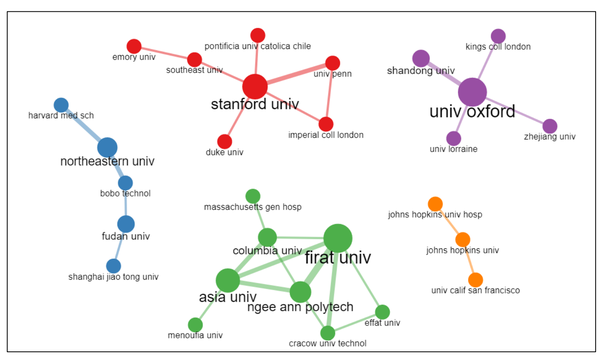
Three Field Plot



Co-citation Network of Journal

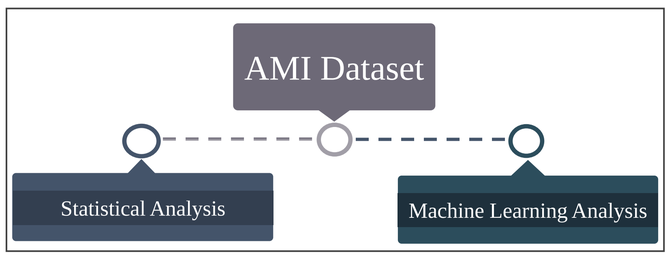


Collaboration Network of Institute

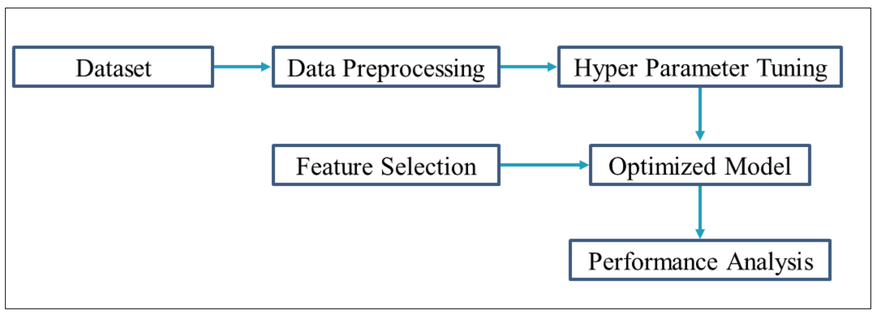


Collaboration Network of Institute

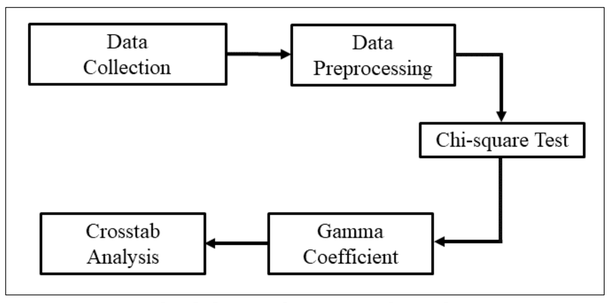
Methodology



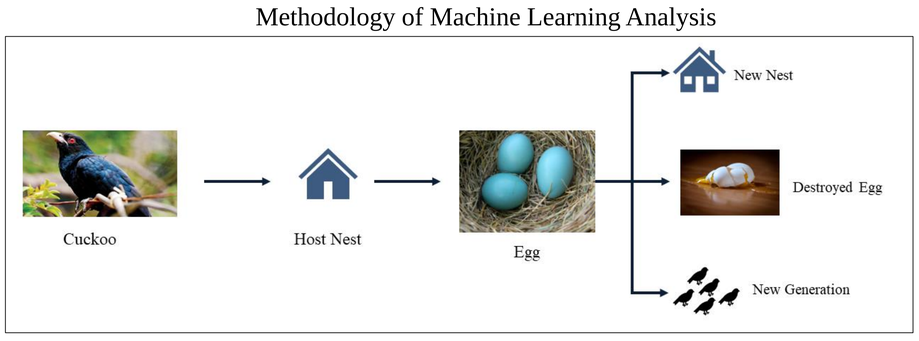
Methodology



Methodology of Machine Learning Analysis

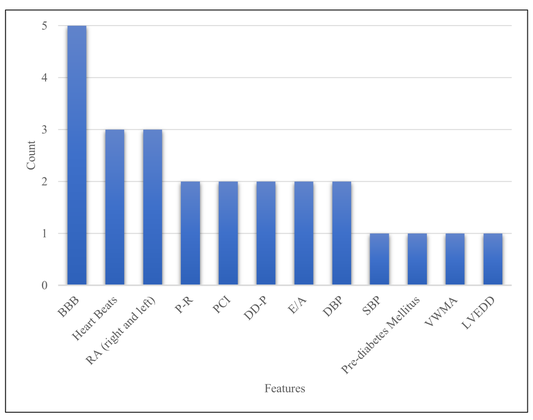


Methodology of Statistical Analysis

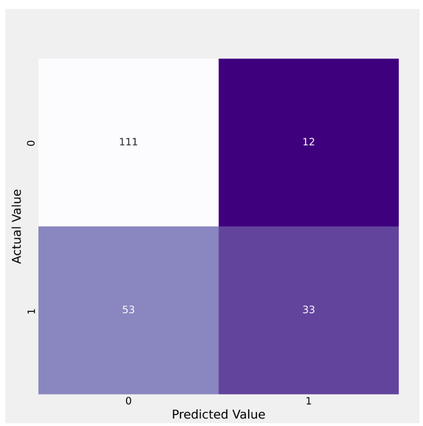


Cuckoo Search Algorithm [1]

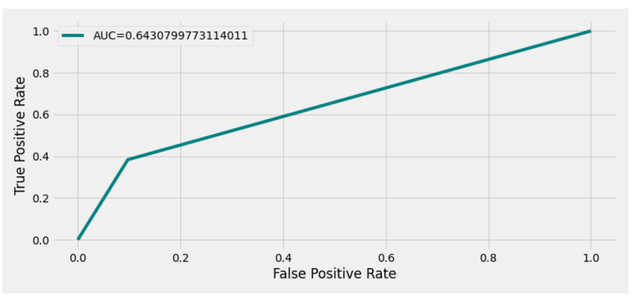
Result



Features Returned from the CSA



Confusion Matrix



ROC Curve

Features Returned from Statistical Analysis: RA (right and left), BBB, P-R and RA (up and down)

References
[1] X.-S. Yang and S. Deb, "Cuckoo search via Lévy flights," in *2009 World congress on nature & biologically inspired computing (NaBIC)*, 2009, pp. 210-214: Ieee.
[2] S. Wang *et al.*, "Application of machine learning to predict the occurrence of arrhythmia after acute myocardial infarction," *BMC medical informatics decision making*, vol. 21, pp. 1-14, 2021.