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A Review of Heart Attack Prediction Systems Using Machine Learning Techniques

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Abstract: *Cardiovascular illnesses (CVDs), specifically heart attacks, are still the most common cause of death globally. It is vital to identify at-risk individuals at an early stage in order to facilitate early intervention and minimize fatal cases. Conventional methods are very useful but tend to fail in their ability to foretell heart attacks at an early stage because they are based on linear models and very few interaction features. With the high-rate increase in health care information and computing capabilities, machine learning (ML) is a new-age technology for ensuring the improved precision and efficacy of heart attack forecasting systems. This review delves into the existing state of ML methods used for heart attack prediction. It investigates a broad spectrum of algorithms such as logistic regression, decision trees, support vector machines, random forests, artificial neural networks, and ensemble methods. The paper discusses widely used datasets, performance metrics, and the importance of feature selection and preprocessing. It also emphasizes the strengths and weaknesses of different models and presents a comparative study of recent research in the area. Challenges like data imbalance, explainability of the model, generalizability, and clinical workflow integration are also discussed. The review summarizes by naming upcoming trends and avenues for future research, such as the application of deep learning, wearable devices, explainable AI, and federated learning for personalized and secure healthcare solutions. Through the synthesis of current literature, this paper seeks to present researchers and practitioners with a full understanding of the strengths and limitations of ML-based heart attack prediction systems, eventually helping to drive predictive cardiology forward.*

Keywords: Heart Attack Prediction, Cardiovascular Disease, Machine Learning, Artificial Intelligence, Healthcare Analytics, Predictive Modeling, Feature Selection, Deep Learning

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