Chapter 6
A Machine Learning Approach Towards Heart Attack Prediction

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ABSTRACT

Various types of heart diseases and conditions leading to increasing chance of heart attack have been a serious concern all over the world. Several factors like blood pressure, cholesterol, diabetes, obesity can affect the heart, and thus, those should be monitored regularly to prevent the chance of heart attack in people of different age groups. This chapter at first has analyzed different existing benchmarks of heart attack analysis. Being motivated by the shortcomings of the state-of-the-art literature and to address the challenges, it has introduced support vector machine, the most popular supervised machine learning algorithm to classify the chance of heart attack using a dataset downloaded from Kaggle. The experimental result has been evaluated using different performance metrics, including accuracy, error rate, precision, recall, F1 score. Finally, the performance has been compared with the existing related works also to validate its effectiveness and efficiency in real-time heart attack prediction.

INTRODUCTION

According to World Health Organization, 12 million deaths happen to cardiovascular disorders every year. In most countries, due to heart diseases, the maximum of deaths happen. When a coronary artery becomes unexpectedly clogged, blood cannot circulate to all parts of the heart muscle. As a result, a fragment of heart muscle can't obtain adequate oxygen; in that situation, a heart attack occurs. Life relies on the element that operates the heart since the heart is a vital part of our body. Coronary illness

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is an infection that influences the heart's activity (Marimuthu et al. 2018). It has numerous names like cardiovascular sickness and blood vessel hypertension (Alotaibi 2019). The obstacle is normally caused when a plaque cracks. If the bloodstream isn't re-established hastily, also by a medication that breaks up the obstacle or a catheter located inside the channel that essentially opens the obstruction, the piece of the heart muscle will die.

As per the Indian Heart Affiliation, half of all cardiovascular failures in Indians happen under 50 years of age, and 25% of all cardiovascular failures in Indians happen under 40 years of age. In India, additional 17 Lakhs individuals pass away consistently because of heart illnesses. In Asian nations also, 22% of the transient (in all-out coronary illness passing) are because by Cardio Vascular Disease (CVD) (Lakshmanarao et al., 2019). Clinical experts working on coronary disease have their limits; they can forecast the probability of respiratory failure with up to 67% precision (Sharma, H. and Rizvi, M.A., 2021). In the current pandemic situation also, specialists need a backing network for a more exact prognosis of coronary illness so that proper rehabilitative aid (Ghosh, Saha, and Konar 2020) (Saha and Ghosh 2019) can be prescribed in proper time by consultation with a doctor. Respiratory failure can have various indications, some of which are extra normal than others. Normal respiratory failure indications are chest torment (angina), shortness of inhalation or trouble breathing, vomiting or stomach uneasiness, heart palpitations, nervousness, sweating, trembling, faint, etc.

The cause of Cardiovascular failure or heart failure is several for several people. The obstacle in blood veins happens due to different causes, such as harm to platelets, the body system, harm to heart muscles, and a lot more. The cause behind Cardiovascular failure is exercise less life, alcohol & smoking, age factor, diabetes facts, stressed lifestyle. Cardiovascular failure or heart failure is generally analyzed by a medical care supplier, which analyses a cardiovascular failure utilizing the set of experiences and symptoms, lab testing, heart-explicit symptomatic tests, imaging tests, etc. But the process is much more costly and takes a lot of time (Oxenham and Sharpe 2003). Thus, nowadays, doctors are adopting many scientific technologies which are very useful to predict diseases. However, sometimes doctors cannot decide whether the patient has undergone heart failure or not. So, in this scenario, machine learning systems can help the doctor make the right decision.

Thus, this chapter has attempted to save the existence of cardiac arrest patients and portraits a method for diagnosing the patients based on their clinical records. So, there is a huge scope of exploration in the prognosis of coronary illness in a person. In this chapter, we have designed a machine learning framework to predict the chance of heart attack. We have obtained data set from Kaggle with 303 instances and 13 attributes. Python has been used to build up the classifier. Compared to the other classifiers, Support Vector Machine (SVM) after hyperparameter tuning has shown the best performance for the given dataset, with 84% accuracy in testing and 87% accuracy in training. The proposed approach is well suited in its concerned domain since it has outperformed the existing benchmarks of state-of-the-art literature.

The rest of the chapter is organized as follows. The next section discusses and analyzes some existing frameworks of heart attack prediction using machine learning. Section 3 explains the working mechanism of SVM used as the classifier in our proposed framework. Section 4 describes the experimental result and compares it with some related works to evaluate its effectiveness in the real-world scenario. Finally, section 5 concludes the work and discusses the possible future extensions for better efficiency.