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Jan Bohacik ; Michal Zabovsky

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Heart disease belongs to one of the main reasons for mortality nowadays and it is expected to become worse due to factors such as aging, diabetes and obesity. In addition, existing misdiagnosis of patients reporting heart related ailment worsens this situation even further. In the paper, a probability approach to recognition of heart disease is analyzed with the employment of Naive Bayes on Statlog Heart Database and with the search of data preprocessing techniques for its improvement. A discretization algorithm of numerical attributes which takes the specifics of given heart disease patients into account is presented. It is based on supervised discretization with consideration of Equal Frequency Discretization. Experiments making use of 10-fold cross-validation show improvements of accuracy which are measured with sensitivity, specificity and their sum and the results are also compared with other classification algorithms.

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I. Introduction

Heart disease is associated with more than one disorder and any of these disorders involves the heart [11]. Coronary artery disease is the most common and it is often related to heart attack. Other disorders include difficulties of the heart to work as the pump well, heart arrhythmia, rheumatic heart disease or valves in the heart. It is a lifelong condition which stays with the patient once (s)he gets it. Sometimes people are born with it. Some of known risk factors for heart disease are smoking, high cholesterol, physical inactiveness, diabetes, high blood pressure, obesity, depression and social isolation [10]. The term "heart disease" is often used interchangeably with the term "cardiovascular disease" which also includes conditions related to narrowed or blocked blood vessels. According to World Health Organization [19], 17.5 million people die from cardiovascular disease each year, which is an estimated 31 percent of all deaths in the world. More than 75 percent of the deaths occur in low-income and middle-income countries [18]. Specifically, the poor do not have the ability to access or afford preventive services and ongoing treatments [3]. Low and middle-income countries also experience an increase in the prevalence of risk factors [2]. The signs and symptoms of heart disease depend on the specific disorder involving the heart [11]. Emergency signs are perceived to be chest discomfort, shortness of breath and fainting [16]. Other symptoms include: a) discomfort radiating to the arm, back, jaw, or throat; b) sweating; c) nausea

and vomiting; e) anxiety; and f) indigestion. However, there do not have to be any symptoms at all. For example, according to [21], nearly half of all heart attacks may cause no obvious symptoms and it does not mean that these silent heart attacks are less dangerous than heart attacks with symptoms. Although people may sometimes learn about their silent heart attack accidentally when the doctor is testing for something else, this is not guaranteed at all and it can be too late. Therefore, it is important to diagnose the presence of heart disease for people with high risk factors as precisely as possible and as soon as possible and give them effective treatment promptly.

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