

Detection of Inferior Myocardial Infarction: A Comparison of Various Decision Systems and Learning Algorithms

Jiří Spilka*, Václav Chudáček, Jakub Kužílek, Lenka Lhotská and Martin Hanuliak

Biodat Research Group, FEE, CTU in Prague, Prague 2, Czech Republic

Myocardial infarction (MI) is one of the most common causes of death or disability in the Western world. It could be a minor event, perhaps not even recognized, or it may be a major attack with results varying from acute pains, hemodynamic deterioration to sudden death. Nevertheless, detection of an infarction greatly improves patient's chances of surviving and returning to health, therefore the task is of great importance. In this work we focused on detection of inferior MI. Our database consisted of 6350 ECG records and interpretation was made by cardiologist; 512 records were assessed as inferior MI and 1598 as normal sinus rhythm the rest contained other types of pathologies. We evaluated the three most known decision systems, the Selvester QRS score, the Novacode, and the Siemens 440/740 with respect to prediction accuracy of inferior MI. In addition, we compared their performance to learning algorithms, such as Ripper, C4.5, SVM, and Naive Bayes. Then, we chose the best performing decision system and, according to data distributions, modified decision rules to improve performance. We found performance of the decision systems questionable even when only records of normal sinus rhythms and inferior MI were used. The best results were achieved by the Selvester and Siemens. The Selvester, while having great specificity of 0.99, achieved low sensitivity of 0.41. On the contrary, Siemens had good sensitivity of 0.80 but lacked specificity 0.87. Better results were achieved using Ripper with 0.83 sensitivity and 0.92 specificity. The modification of the Selvester improved sensitivity from 0.58 to 0.85, on the other hand specificity lowered from 0.93 to 0.90. In this work we showed that decision systems for prediction of inferior MI need further improvements; by modifying parameters in the Selvester QRS score we improved results that were comparable to those of Ripper.