

基于主成分分析进行特征融合的心拍分类

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Heart beat classification based on feature fusion by principle component analysis

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摘要 针对心拍分类中单一特征分类准确率低而组合特征存在特征冗余和维度过高的问题,提出了一种基于主成分分析(PCA)进行特征融合的心拍分类算法。该算法在对单一特征进行规范化后,将多种特征组合为一个具有大量信息的高维特征;之后引入PCA算法去除冗余成分,得到低维融合特征;最后,利用支持向量机(SVM)为分类器完成心拍分类。以心拍时域特征、离散小波特征、离散傅里叶特征为例,在MIT-BIH数据库上进行了实验。实验结果表明,融合特征维度为100时,分类准确率达97.389%。与单一特征相比,融合特征提高了分类准确率;与组合特征相比,融合特征降低了特征维度。

关键词 : 心拍分类, 分类准确率, 特征融合, 主成分分析, MIT-BIH数据库

Abstract : For lower accuracy by a single feature and too high dimensionality by a combined feature in heartbeat classification, a new heartbeat classification algorithm was proposed based on the feature fusion by using Principle Component Analysis(PCA). With proposed algorithm, each single feature was normalized, then all kinds of features were combined together to a new one with high dimensionality and more information. In order to reduce dimensionality of combined features, the PCA was employed to remove redundant components. Finally, the Support Vector Machine(SVM) was used as a classifier to classify different heartbeats. By taking time domain feature, Discrete Wavelet Trans form(DWT) feature and Discrete Fourier Transform(DFT) feature as examples, the experiments were performed in MIT-BIH database. This study was compared with the new feature mentioned above, three single features and combined feature without Principle Component Analysis. The experiments results indicate that the accuracy of the new features is 97.389% when its dimension is 100. The new fusion feature has lower dimension than combined feature and higher classification accuracy than single feature.

Key words : heart beat classification classification accuracy feature fusion Principle Component Analysis(PCA) MIT-BIH database

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