

基于Multi-Agent的乳腺钼靶图像肿块分类方法

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摘要:

钼靶摄影是目前使用最广泛的乳腺癌早期诊断技术, 恶性肿块是钼靶图像中乳腺癌变的一种重要表现。本文提出了一种基于Multi-Agent (多智能体) 的多分类器融合乳腺肿块分类方法。首先将单分类器的结果作为初状态输入到各Agent (智能体), 接着通过引入决策共现矩阵, 利用分类器之间的决策相关信息, 在Agent之间进行信息交流, 指导各个Agent向不同类别溯源, 从而通过Agent之间的信息交互改变溯源概率, 最终达到群体决策, 得到决策类别。良性肿块在形状和边缘上的差异较大, 本文主要使用肿块的边缘特征和形状特征, 并提出了两个新的边缘特征。实验采用了美国南佛罗里达大学的DDSM数据库作为实验数据, 从中随机挑选了64个恶性肿块和64个良性肿块。实验结果表明, Multi-Agent融合算法的分类精度达94.87%优于传统的融合算法和经典的单分类器算法, 其稳定性性能也较融合算法及大多数单分类器的效果要好 (略低于BP算法)。同时, 实验结果也表明本文所提出的特征在表征肿块的良恶性时起到了较好的作用。

关键词: 关键词: 乳腺钼靶图像; 肿块; 分类器融合; Multi-Agent

A Novel Classification Method for the Masses in Mammography based on the Multi-Agent Algorithm

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Abstract:

Mammogram was most widely used in the early diagnosis of breast cancer and malignant masses were an important sign of breast cancer. In this paper we proposed the masses classification method based on Multi-agent method in Mammogram. Firstly, each Agent received the measurement result from every single classifier of the certain sample. Then, the related decision information among classifiers was introduced as a co-occurrence matrix in order to promote the communication among Agents. These Agents traced to the source and changed the traceability probability according to the communication. Finally, the group decision was made. In our experiments, 64 benign masses and 64 malignant masses were randomly selected from the DDSM. The results demonstrated that the multi-agent method outperformed classical fusion methods, especially in accuracy of 94.87%. Its robustness is also better than most of these classical single classifiers and these common fusion methods mentioned in this paper. In additional, two new features were introduced and the experiment results showed that the new features could provide a significantly classification performance in this experiment.

Keywords: Keyword: Mammogram; Mass; classifier fusion; Multi-Agent

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