

[1] 庞剑飞, 邱明国, 陈伟, 等. 基于边缘检测与支持向量机的关节软骨自动分割算法研究[J]. 第三军医大学学报, 2013, 35(16): 1653-1657.

Pang Jianfei, Qiu Mingguo, Chen Wei, et al. Segmenting articular cartilage automatically by edge detection and support vector machine[J]. J Third Mil Med Univ, 2013, 35(16): 1653-1657.



基于边缘检测与支持向量机的关节软骨自动分割算到:

《第三军医大学学报》 [ISSN:1000-5404/CN:51-1095/R] 卷: 35 期数: 2013年第16期 页码: 1653-1657 栏目: 论著 出版日期: 2013-08-30

Title: Segmenting articular cartilage automatically by edge detection and support vector machine

作者: 庞剑飞; 邱明国; 陈伟; 刘杰; 陈永林
第三军医大学: 学员旅十三队, 生物医学工程学院医学信息学教研室, 西南医院放射科

Author(s): Pang Jianfei; Qiu Mingguo; Chen Wei; Liu Jie; Chen Yonglin
13th Student Team, Department of Medical Informatics and Medical Imaging, College of Biomedical Engineering, Department of Radiology, Southwest Hospital, Third Military Medical University, Chongqing, 400038, China

关键词: MRI; 软骨; 分割; 边缘检测; 支持向量机

Keywords: MRI; cartilage; segmentation; edge detection; support vector machine

分类号: R312;R322.72;R445.2

文献标志码: A

摘要: 目的 设计并实现一种针对核磁共振成像(MRI)图像的关节软骨自动分割算法。方法 利用像素的整体与局部特征分别构建二分类支持向量机(support vector machine, SVM)分类器对股软骨、胫软骨及髌软骨进行自动分割。首先提出一种基于边缘数目反馈的Canny检测器阈值迭代法并利用该方法提取图像的主要边缘,随后根据特征参数对提取的边缘进行识别并标记出不同的骨-软骨边缘,利用训练的SVM分类器对软骨进行初步分割并根据软骨的解剖位置缩小搜索空间,最后利用形态学操作对初步分割结果进行优化。结果 自动分割结果中软骨的形态轮廓与原始图像吻合效果好,股软骨、胫软骨及髌软骨的Dice's系数平均值分别为0.80、0.76、0.74,与手工分割结果具有较好的一致性。结论 该算法能够准确、快速地分割出MRI图像中不同的软骨组织。

Abstract: Objective To explore the possibilities of automatic segmentation of articular cartilage in the MR images. Methods Three binary classifiers were built with edge-distance, intensity and other voxel features using support vector machine to segment the femur cartilage, tibia cartilage and patellar cartilage separately. Firstly, an iterative procedure based on the feedback of the number of main edges was designed to get an appropriate threshold for Canny operator and extract the main edges with it from MRI images. Secondly, the different edges with some feature parameters were identified, which distinguished

导航/NAVIGATE
本期目录/Table of Contents
下一篇/Next Article
上一篇/Previous Article
工具/TOOLS
引用本文的文章/References
下载 PDF/Download PDF(1650KB)
立即打印本文/Print Now
查看/发表评论/Comments
导出
统计/STATISTICS
摘要浏览/Viewed 288
全文下载/Downloads 126
评论/Comments



different cartilages synchronously. To improve the speed of segmentation, the search space was reduced according to the cartilage edge and its anatomic location. Thirdly, the cartilage tissues were segmented preliminarily with different trained classifiers. Finally, morphological operations were used to make those results better. Results The cartilage edge was smooth in automatic segmentation results and had a good consistency with manual segmentation results. The mean Dice similarity coefficient of femoral cartilage, tibial cartilage and patellar cartilage was 0.80, 0.76 and 0.74, respectively. Conclusion The algorithm can segment the articular cartilage automatically from MR images more accurately and quickly.

参考文献/REFERENCES:

庞剑飞, 邱明国, 陈伟, 等. 基于边缘检测与支持向量机的关节软骨自动分割算法研究[J]. 第三军医大学学报, 2013, 35(16): 1653-1657.

相似文献/REFERENCES:

- [1]刘智华, 钱学华, 周庭永, 等. 基于MRI的人脑海马结构的形态测量[J]. 第三军医大学学报, 2012, 34(16): 1636.
Liu Zhihua, Qian Xuehua, Zhou Tingyong, et al. Measurement of hippocampal morphology in human brain by MRI[J]. J Third Mil Med Univ, 2012, 34(16): 1636.
 - [2]焦北鱼, 王锡明, 王光彬, 等. 胎儿透明隔腔消失的超声与MRI对比分析[J]. 第三军医大学学报, 2012, 34(18): 1888.
Jiao Beiyu, Wang Ximing, Wang Guangbin, et al. Ultrasonogram vs MR image of absence of cavum septum pellucidum in fetuses[J]. J Third Mil Med Univ, 2012, 34(16): 1888.
 - [3]刘剑毅, 姚恒, 胡晓佳, 等. 鼻骨和鼻中隔软骨同期矫正治疗外伤性歪鼻畸形25例[J]. 第三军医大学学报, 2013, 35(02): 169.
Liu Jianyi, Yao Heng, Hu Xiaojia, et al. Simultaneous correction of nasal bone and nasal septum cartilage to treat traumatic wry nose deformity: report of 25 cases[J]. J Third Mil Med Univ, 2013, 35(16): 169.
 - [4]黄显龙, 李必强, 胡源浩, 等. 儿童假性垂体瘤MRI及临床表现[J]. 第三军医大学学报, 2008, 30(08): 769.
 - [5]戴书华, 邹利光, 廖翠薇, 等. 腰椎椎体后缘软骨结节的影像学诊断[J]. 第三军医大学学报, 2006, 28(01): 24.
 - [6]何晓静, 赵建农. 致心律失常性右室心肌病的MRI诊断价值[J]. 第三军医大学学报, 2008, 30(20): 1900.
HE Xiao-jing, ZHAO Jian-nong. MRI diagnosis of arrhythmogenic right ventricular cardiomyopathy[J]. J Third Mil Med Univ, 2008, 30(16): 1900.
 - [7]董伟强, 白波, 陈艺, 等. 基因重组人生长素对关节软骨缺损修复作用的实验研究[J]. 第三军医大学学报, 2006, 28(13): 1417.
 - [8]谢兵, 张绍祥, 王健, 等. MRI快速扫描序列在颈部磁共振扫描中的运用[J]. 第三军医大学学报, 2006, 28(11): 1240.
 - [9]刘颖, 陆明. 眼眶孤立性纤维瘤的CT和MRI诊断价值[J]. 第三军医大学学报, 2011, 33(15): 1636.
Liu Ying, Lu Ming. Diagnosis value of CT scanning and MR imaging for orbit solitary fibrous tumor[J]. J Third Mil Med Univ, 2011, 33(16): 1636.
 - [10]乔广宇, 张远征, 周定标, 等. 椎管内肠源性囊肿的诊治[J]. 第三军医大学学报, 2005, 27(08): 786.
-