

光电信息获取与处理

中药光谱成像图像自适应区域增长分割方法

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摘要:

为了消除背景噪声对药材光谱图像检测结果的干扰, 根据中药材光谱图像的特点, 设计一种能够自适应对中药材光谱图像进行有效区域(ROI)分割的区域增长算法。该区域增长算法根据药材光谱图像的灰度直方图分布来自动选取种子点和分割阈值, 在生长的同时进行连通性分析, 生长结束后通过区域填充技术来消除图像中出现的孔洞。实验表明: 该方法能够自动、准确地进行ROI分割, 分割偏差小于8%, 并且能较好地消除噪声的干扰, 没有产生无意义的生长区域。

关键词: 光谱成像 自适应图像分割 区域生长算法 自适应 中药检测

Self-adaptive region growing algorithm to segment images of spectral imaging for TCM assessment

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Abstract:

The spectral imaging method for assessing the traditional Chinese medicine (TCM) can evaluate the quality of the medicines and identify their authenticity by using their spectral images. It can also make the assessing procedure fast and non-destructive. In order to eliminate the influence of the background noise on the assessing results of TCM spectral images, extraction of ROI (region of interest) of the TCM spectral images is needed. Since the difference inherent in different kinds of TCM spectral images and the available fixed threshold segmentation method can not meet the demand of self adaptive segment, a self-adaptive region growing algorithm to extract ROI of the images is proposed based on the characteristic of TCM. This algorithm can automatically choose the seeds and threshold of the region growing process according to the gray-level histograms of the TCM spectral images, the connectivity among the pixels is taken into the consideration during the growing period, and the region-fill technique is applied to modify the cavity in ROI after the growing. It proves that this algorithm can extract ROI of the images automatically and precisely, the deviation of segmentation is less than 8%, its antinoise ability is good, and the nonsensical growing result is not appear.

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参考文献:

[1] 孙素琴,周群,郁鉴源,等.分子振动光谱法与中药研究的最新进展 [J]. 光谱学与光谱分析, 2000(02): 199-202.

SUN Su-qin, ZHOU Qun, YU Jian-yuan, et al. The latest development of the research on Chinese medicine by molecular vibrational spectroscopy [J]. Spectroscopy and Spectral Analysis, 2002(02): 199-202. (in Chinese with an English abstract)

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- [2] 赵静, 庞其昌, 马骥, 等. 基于液晶滤光器的连续光谱成像测试装置 [J]. 光子学报, 2008,37(4): 758-762.
- ZHAO Jing, PANG Qi-chang, MA Ji, et al. Design of a continuous spectrum imaging apparatus based on LCTFs [J]. Acta Photonica Sinica, 2008,37(4): 758-762. (in Chinese with an English abstract)
- [3] 范世福, 李响, 赵友全. 光谱成像的原理、技术和生物医学应用 [J]. 生命科学仪器, 2004(04): 24-27.
- FAN Shi-fu, LI Jun, ZHAO You-quan. Principle, technique, and biomedical applications of spectral imaging [J]. Life Sciences Instruments, 2004(04): 24-27. (in Chinese with an English abstract)
- [4] KOPP G. Liquid crystal tunable birefringent filters [J]. SPIE, 1996, 2830: 345-350.
- [5] GONZALEZ R C, WOODS R E. Digital image processing using MATLAB [M]. Beijing: Publishing House of Electronics Industry, 2005.
- [6] SCHWARTZ A, WANG L L, EARLY E, et al. Quantitating fluorescence intensity from fluorophore: the definition of MESF assignment [J]. Journal of Research of the National Institute of Standards and Technology, 2002, 107(1): 83-91.
- [7] 舒添慧, 胥布工, 胡战虎. 基于区域生长法的医学图像分割 [J]. 微计算机信息, 2008(6): 284-285.
- SU Tian-hui, XU Bu-gong, HU Zhan-hu. Medical image segmentation based on region growing arithmetic [J]. Control & Automation, 2008(6): 284-285. (in Chinese with an English abstract)
- [9] 罗国安, 王义明. 中药指纹图谱的分类和发展 [J]. 中国新药杂志, 2002(01): 46-51.
- LUO Guo-an, WANG Yi-ming. Classification and development of TCM fingerprint [J]. Chinese Journal of New Drugs, 2002(01): 46-51. (in Chinese with an English abstract)

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2. 李良福; 冯祖仁; 陈炜; 白波; 陈卫东; 纪明. 基于变分辨率的自适应窗口目标跟踪方法研究[J]. 应用光学, 2009,30(2): 177-182
3. 王红红; 陈方斌; 江涛; 李广良. 不确定非线性光电伺服系统滑模自适应控制[J]. 应用光学, 2009,30(2): 242-245
4. 张帆; 陶坤宇. 空间环境高精度光电轴角测量研究[J]. 应用光学, 2008,29(4): 614-618
5. 潘伟; 赵毅. 光栅投影测量技术中的自适应采样方法[J]. 应用光学, 2004,25(2): 58-61
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7. 俞兵; 吴宝宁; 李宏光; 曹锋. CPLD在光谱色彩分析仪中的应用研究[J]. 应用光学, 2006,27(supp): 102-104
8. 陈蕾; 章恩耀; 孙利群; 郭宏. 正交偏振光谱微循环成像方法及装置[J]. 应用光学, 2007,28(2): 169-172
9. 成刚; 杨随虎. 无人机机载光电系统综述[J]. 应用光学, 2005,26(4): 1-4
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12. 陈力子; 景春元; 谭碧涛; 关小伟. 600mm自适应望远镜最佳子孔径数仿真研究[J]. 应用光学, 2009,30(1): 25-28
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