**基于字典学习和稀疏表示的眼部图像**

**背景去噪方法**

计算机与软件学院 计算机科学与技术 李奥

学号: 2012150401

**【摘要】眼部图像的处理在近些年越来越成为医学图像处理的研究重点，由于眼部图像有许多极弱的弱细血管且其强度与背景噪声相类似，因此大大提高去除眼部图像背景噪声的难度，所以如何将医学眼部图像中的背景去噪有着重要的研究意义。本文中研究的眼部图像增强方法，首先对其利用Frangi滤波进行图像增强，但是其增强效果对弱细血管效果不好。本文通过已有的人工眼部切割图，选取合适大小、具有明显特征的小块进行字典训练，分别对粗、弱细血管局部适应性增强，最后通过改良后的字典学习和稀疏表示的算法重构眼部图像。其中，改良的主要部分是通过方向滤波判断弱细血管的线性结构，对其加权后再进行稀疏分解。实验结果表明本文提出的方法能改善弱血管的增强效果。**

**【关键字】K-SVD；方向滤波；学习型字典；稀疏表示；图像背景去噪**

**Research on fundus image denoising based on**

**the learned dictionary and sparse representation**

**【Abstract】** The processing of fundus image has played an increasingly important role in medical imaging recent years. However, because there are many weak capillary vessel in the fundus image and most of them are similar to the strength of the background noise in the image, It makes the denoising background noise task become much more difficult than the other types of image. So, how can effectively denoise the background noise in the fundus image is pretty significant in the area of medical and computer science. In this paper, firstly, we adopt the Frangi vessel enhancement algorithm to enhance the fundus image, which was not directly used to the whole image, but it was used local adaptively to pre-processing the fundus image, especially aiming to distinguish the patches of wide vessel or the small weak capillary vessel by the size of the variance. The purpose of doing this work is to minimize the number of the noise in the fundus image after the fundus image has finished enhancement. Then use the exist manual fundus image. Dividing it into a appropriate size of patch, which has the fundus image’s main characteristics. Set a sliding window, using a specific algorithm to select a certain number of smaller patches to initialize the dictionary. In the end, using the basic principle of the K-SVD learned dictionary and sparse representation and make some improvements to reconstruct the fundus image. Then mainly section of the improve methods is to set a directional filter to detect the linear structure in the fundus image. The linear that can discriminate the weak small capillary vessel and the noise in the fundus image. Then to find a suitable threshold to distinguish the wide vessel and the weak small vessel through the experiments, giving a weighting to the weak small vessel for the sparse representation.

【**keywords**】 K-SVD; directional filter; learned dictionary; sparse representation; image denoising

指导老师：杨烜