

Processing Diffusion Weighted MRI Images

Lung Magnetic Resonance Imaging (MRI) using signal from hyperpolarized noble gases is a technique to visualize the lung structure and defects. Diffusion weighted imaging is performed on the human lung to obtain the Apparent Diffusion Coefficient (ADC) values [1].

The computation of mean and standard deviation of the ADC values of lung MRI image will provide diagnosis of the lung activity. However, the diffusion-weighted images have high signal in the major airways compared to lung parenchyma region [2]. The high signal from the airways skews the mean ADC values. In order to obtain mean ADC values from the lung parenchyma we need to extract out the region containing the airways.

Several image processing techniques such as thresholding, edge detection, image subtraction, erosion – dilation, and manual selection of region of interest will be applied to obtain lung parenchyma without airways.

Our project aims to study the above-mentioned techniques to for processing of lung MRI images. We will also provide a Graphical User Interface (GUI) in Matlab that will perform Calculation of mean ADC on lung MRI images.

References

1] MR Imaging of Diffusion of He-3 Gas in Healthy and Diseased Lungs – Saam et.al. MRM 44: 174-179 (2000).

2] Dynamic functional lung MRI using hyperpolarized gases
Albert, M.S.; [Engineering in Medicine and Biology, 1999. 21st Annual Conf. and the 1999 Annual Fall Meeting of the Biomedical Engineering Soc.] BMES/EMBS Conference, 1999. Proceedings of the First Joint , Volume: 2 , 13-16
Oct. 1999, Pages:1327 vol.2