Abstract

Air embolism often causes severe consequences in patients, in which several cases need fast treatment at the earlier stage. This paper proposes a computerized approach for detection as well as estimation of motion trajectory of air emboli using OCT contrast imaging technique. Due to change in optical properties, speckle pattern changes from fluid to air bubble and so does the speckle pattern on the image plane. This phenomenon helps to track the air bubble due to change in brightness pattern over a sequence of images. A top-down approach has been demonstrated from the image acquisition to the application of different image processing algorithms. Segmentation of the embolus has been carried out primarily by selecting seed contour through anisotropic diffusion (AD) technique and then implementation of a snake based active contour (AC) method. Both the techniques reduce the manual labour and computational time, thereby substantially increasing the segmentation accuracy (92% - 94%). Besides, pyramidal construction of the Lucas – Kanade optical flow precisely optimizes the flow velocities of air bubble and also increases larger motion tracking ability. Hence, the proposed technique can becoming an assisting tool to the clinician for early detection of air embolism and tracking the air bubble through microcirculation.
Pyramidal Refinement of Lucas – Kanade Optical Flow based Tracking of Peripheral Air Embolism in OCT

References


Index Terms
Keywords
Optical coherence tomography (OCT)  active contour  air embolism  image segmentation  optical flow  least square estimation