# Title: Detection of Shadow in Intravascular Ultrasound Images

# ABSTRACT

Heart attack is the main cause of death and also causes serious disability. The artery stenosis is caused by stroke. A stroke occurs when the supply of blood to body stops due to blockage. This blockage refers to atherosclerosis. Atherosclerosis is a process of slowly narrowing down of arteries due to the deposition of plaque, cholesterol, calcium etc. Coronary angiography is generally used to diagnose atherosclerosis. But this medical technique does not give accurate information about stenosis. A new technique Intra Vascular Ultrasound (IVUS) images is established that uses ultrasound rays for artery imaging. IVUS is used to capture the internal view of arteries where as angiography shows the outer view coronary arteries. The IVUS images suffer from many artifacts but the shadow artifact causes more damage. When the ultrasound waves strike to calcification region, the ultrasound waves are either reflected back or absorbed. This leads to shadow behind the calcium region. The shadow in image usually degrade the results of image processing such as object detection, segmentation etc. This issue can be addressed by shadow border detection.

The proposed algorithm detects the border in IVUS that uses regional information of the image. The catheter zone is identified by OTSU’s algorithm and then removed. The calcification plaque is segmented by OTSU’s algorithm. The acoustic shadow behind the calcification region is identified by algorithm. The border of shadow is detected by region growing technique. It shows the shadow border more clearly.

The shadow border detection technique works well than the other state-of-the-art techniques as it does not detect wrong shadow regions, nor does it amplify noise. It detects the border of shadow using image information. The shadow region could be artery tissue, or calcification, or some other kind of plaque. The shadow border detection technique is clinically validated by a cardiologist from Dayanand Medical College and Hospital Unit- Hero DMC Heart Institute, Ludhiana.

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