

## **Fuzzy-based boundary enhancement for echocardiogram using local image characteristics**

### **Abstract**

Speckle noise and artifacts in echocardiogram may cause edges to manifest themselves in different manners. As a result, edges in echocardiogram are identified with ambiguous definitions and they pose challenges for conventional gradient approximations that typically characterize an edge as an abrupt change in gray-level. Therefore, an approach using fuzzy reasoning that works on a different notion from the typical edge definition is introduced to enhance the boundary of echocardiogram. The fuzzy reasoning employed in the proposed method defines edges by local image characteristics computed based on local statistics of the image. The proposed method addresses the challenge in two levels. Initially, noise suppression is applied without incurring over-blurring across the boundaries. Subsequently, fuzzy reasoning is employed to determine the edginess of each pixel of the enhanced echocardiogram to detect the boundaries. For performance measure, the results of the proposed method are compared to that of a conventional method, qualitatively and quantitatively.