

Level Set Based Surface Capturing in 3D Medical Images

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Abstract

Brain aneurysm rupture has been reported to be directly related to the size of aneurysms. The current method used to determine aneurysm size is to manually measure the width of the neck and height of the dome on a computer screen. Because aneurysms usually have complicated shapes, using the size of the aneurysm neck and dome may not be accurate and may overlook important geometrical information. Here we present a level set based illusory surface algorithm to capture the aneurysms from the vascular tree. Our model is motivated by the illusory contour model [W. Zhu and T. Chan 2003] used for images. Since the captured aneurysms are described by level set functions, not only the volume but also various geometric quantities, e.g. curvature, of aneurysms can be computed for medical studies. Experiments of robustness and some comparisons are performed. This includes applications to clinical image data demonstrating the procedure of accurately capturing a middle cerebral artery aneurysm.