Automated Comparison of 3D Images

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SUMMARY

UCLA researchers in the Department of Radiology have developed an accurate and automatic segmentation algorithm for contouring cerebral blood vessels.

BACKGROUND

Active contouring is a commonly used image processing method for segmenting cerebral blood vessel aneurysms from computed tomography angiography (CTA) images and evaluating the treatment options. However, conventional active contouring methods such as geodesic active contouring and region completion are limited by: a.) the need to manually input a right set of parameters that may be difficult for users unfamiliar with the algorithm; and b.) inaccurate boundary localization in the regions with poor signal-to-noise ratio (such as bony structures). This is in turn can lead to inaccurate characterization of the aneurysms, and therefore an inaccurate diagnosis.

INNOVATION

Dr. Aichi Chen and colleagues at UCLA have developed a novel segmentation algorithm by modifying existing geodesic active contouring method for accurate and automatic contouring of cerebral blood vessels. This algorithm uses an iterative image construction to segment blood vessels, and requires minimal user input. Unlike conventional active contouring methods that segment all the pixels in an image using the same model and GAC parameters, the proposed method segments each individual pixel using separate models and GAC parameters depending on the shape information from only the neighboring pixels. Therefore, the technique is robust to falsely detecting non-vessel components as vessel components.

APPLICATIONS

The image processing method can be used for automatic segmentation of the following pathologies from images acquired using CT and other imaging techniques:

- Cerebral aneurysms
- Thrombosis
- Atherosclerotic plaques
- Tumors
- Other blood vessel inflammatory disorders

ADVANTAGES

- Minimal user input
- Robust to falsely detecting non-vessel components (e.g., bony structures) as vessel components
- Accurate blood vessel segmentation even in low signal-to-noise regions

STATE OF DEVELOPMENT

Working software has been developed. Preliminary studies have shown superior segmentation accuracy of the proposed algorithm for contouring human cerebral aneurysms from CTA images compared to conventional segmentation methods.

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- Chien, Aichi

OTHER INFORMATION

KEYWORDS

segmentation, 3D images, 3D segmentation, geodesic active contour, active contour, iterative

CATEGORIZED AS

- **Imaging**
  - 3D/Immersive
  - Medical
  - Software
- **Medical**
  - Imaging
  - Software

RELATED CASES

2015-024-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,074,208	09/11/2018	2015-024

RELATED MATERIALS

- Yang, X., Cheng, K. T. T., Chien, A. Geodesic active contours with adaptive configuration for cerebral blood vessels and aneurysm segmentation. Proceedings of the 2014 22nd International Conference on Pattern Recognition, 2014

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Volumetric Analysis of Multi-dimensional Images

UCLA Technology Development Group
10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095
https://tdg.ucla.edu
Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu