Automated 3D Reconstruction of the Cardiac Chambers From MRI of Ultrasound

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BRIEF DESCRIPTION

This invention is a cardiac imaging tool that can create a 3D reconstruction of cardiac chambers using MRI or ultrasound data.It features automated reconstruction, limited user interaction, and a three step algorithm, involving active contour method.

FULL DESCRIPTION

This invention is an algorithm for performing simultaneous segmentation of the cardiac chambers and 3D reconstruction of cardiac images. The software optimizes the process of creating a 3D representation of cardiac chambers.It is faster and more accurate than many of the currently commercially available cardiac reconstruction software and is largely automated, limiting user interaction to a single click on the chamber of interest.In addition, it uses no statistical model as a starting point by which to reconstruct the cardiac chambers, which makes it more malleable than current technologies in that it can be used to reconstruct images of hearts with broadly different pathologies and from different CMR imaging techniques.

The software uses a 3 step algorithm that involves an active contour method to first, estimate the 3D representation of the heart chamber, then, modify the resulting estimation by adding intra-chamber structures, and finally identify the enclosing myocardium to create a final result.

Cardiac Magnetic Resonance (CMR) Imaging is an important tool used in diagnosis and evaluation of cardiac abnormalities and disease.Many of the currently commercially available software used to evaluate these images provides a suboptimal reconstruction of the heart and requires a substantial amount of manual support from the user, which is time consuming and inefficient.This software optimizes the process of 3D cardiac reconstruction. It requires little user input and does not rely on training data sets for segmentation of the heart and in doing so provides a faster, more accurate, reproducible, and automated 3D reconstruction of the cardiac chambers using CMR or Ultrasound images.

SUGGESTED USES

Post-processing software used in analysis of MRI and ultrasound images of the heart.

ADVANTAGES

- Limits user interaction to a single click
- Faster, more accurate 3D cardiac reconstruction
- Can use MRI or Ultrasound data

PATENT STATUS

Country	Type	Number	Dated	Case

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OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Computer**
  - Software
- **Engineering**
  - Engineering
- **Imaging**
  - 3D/Immersive
  - Medical

United States Of America	Issued Patent	9,875,581	01/23/2018	2015-029	

» Software

» **Medical**

» Diagnostics

» Disease: Cardiovascular and Circulatory System

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RELATED CASES

2015-029-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Percutaneous Heart Valve Delivery System Enabling Implanted Prosthetic Valve Fracture
- A distensible wire mesh for a cardiac sleeve
- Method to Improve the Accuracy of an Independently Acquired Flow Velocity Field Within a Chamber, Such as a Heart Chamber
- Percutaneous Heart Valve Delivery System
- System for Transcatheter Grabbing and Securing the Native Mitral Valve's Leaflet to a Prosthesis
- Multiple-Input Multiple-Output (MIMO) Systems for Multi-Packet Reception (MPR)
- Real-time 3D Image Processing Platform for Visualizing Blood Flow Dynamics
- Method for Synchronizing a Pulsatile Cardiac Assist Device with the Heart
- Fully Automated Multi-Organ Segmentation From Medical Imaging
- Cost-Efficient Repair For Cloud Storage Systems Using Progressive Engagement
- Simple, User-friendly Irrigator Device for Cleaning the Upper Aerodigestive Tract and Neighboring Areas
- Minimally Invasive Percutaneous Delivery System for a Whole-Heart Assist Device

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