Three dimension reconstruction of coronary artery tree using single-view cineangiogram.

ABSTRACT

Whereas most of the conventional techniques propose using multiview cineangiograms to reconstruct 3D objects this article proposes to integrate a Three Dimension(3D) model of the coronary artery tree using a standard single-view cineangiogram. Splitting the cineangiograms into non-sequenced and different angle views is how the data is supplied in this method. Each single view can be used to reconstruct a robust 3D model of the coronary artery from that angle of view. Although the dynamic variations of blood vessels curvature have been difficult to study in Two Dimension (2D) angiograms, there is both experimental and clinical evidence showing that 3D coronary reconstruction is very useful for surgery planning and clinical study. Approach: The algorithm has three stages. The first stage is the vessel extraction and labeling for each view for the purpose of constructing the 3D model, while in the second stage, the vessels information (x, y and z) will be saved in a data file to be forwarded to the next stage. Finally, we input the x, y and z of a specific coronary artery tree to the OPENGL library included in the software, which we developed and called Fast 3D (F3D) and which is displayed in R3. Results: Experimental evaluation has been done to clinical raw data sets where the experimental results revealed that the proposed algorithm has a robust 3D output. Conclusion: Results showed that our proposed algorithm has high robustness for a variety of image resolutions and voxel anisotropy.

Keyword: Angiogram; 3D coronery artery tree; 3D reconstruction; Single-view cineangiogram; 3D model of coronary artery.