

AbstractID: 3967 Title: Interactive CT based seed visualization, localization and verification in 3D

Purpose:

This work is to introduce an intuitive tool utilizing a home-made user-interactive 3D visualization interface for prostate seeds verification after automatic and manual seed searching.

Method and Materials:

This home-made program is written In C++ and QT (Trolltech, Inc) and VTK library (Kitware, Inc) for both Windows and Linux. CT raw data was reconstructed with a slice thickness of 0.7mm to reduce under sampling problem. First threshold with user chosen value, then iso-surfaces were rendered with a user-chosen color for easy visualization. An automatic method will localize the well-separated seeds whose volume is within 0.5-1.5 times of actual seed size. Then manual pick up could select the overlapped seeds by just one mouse click. All distances between the newly selected seed to already selected seed coordinates are calculated. If less than 1mm, the seed will be discarded. The seed orientation is defined as the orientation of the longest axis of the volume bounding box. The seed coordinates and orientations can be exported as an ASCII file.

Results:

A phantom with dummy seeds in different orientation and regular spacing and a clinical prostate CT data set were used for testing. The standard deviation for positioning is 0.29mm, 0.34mm in plane and 0.19mm in axial direction. Clinical patient CT data is used to test the seed localization program, the fake seed like bone or calcification can be deleted, by selecting structure then assigning background CT number.

Conclusion:

Manually seeds identification and verification are necessary even though there are many automatic seeds searching algorithms proposed.

Unlike viewing conventional 2D slice-by-slice CT images, user can visualize the 3D object in any direction and from any position, interactively by zooming, rotating, translating. The seeds being selected will change color for easy recognition.