Segmentation of the Lateral Ventricle

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Experiment:

The goal is to apply a very brief application of the segmentation utilities of the Insight Toolkit to a particular three-dimensional image file, producing an output containing a segmented brain ventricle and nothing else. The output file has all segmented elements set to value 100, and all other elements set to zero.

Method:

The ConnectedThreshold Region Growing filter is used, seeded with a point (205, 236, 86) located in the upper lateral ventricle in the input file Normal100-T2.mha. The filter cuts off at low value 250 and high value 600; the seed itself has intensity value 465. The ConnectedThreshold method was selected for its relative simplicity.

Environment:

Gentoo Linux
gcc/g++ version 4.1.2
cmake version 2.4.6
IT version 3.4.0

Instructions:

Assuming IT is configured and installed, extract/download the MyApp directory and run "ccmake ./". Configure IT _DIR to the proper location (normally the lib directory of an installation). Generate the Makefile and build with "make". The application takes no arguments, and transforms the expected input file Normal100-T2.mha to Output.mhd and Output.raw. Run "make test" to execute the program and confirm that it does not crash (test 1), and that the output is the same as the expected segmentation provided in Output.mhd.base.mhd and Output.raw.base.raw (test 2). On my K7 sempron box with 512 MB, test 2 did not complete in a reasonable amount of time, due to uncontrolled swapping, even though the two files were binary equal. On a much newer dual core machine with 2 GB, the test completed in half a minute.

Results:

The segmentation can be viewed in both Paraview and ImageView. I prefer the latter. The segmentation contains the lateral ventricle and seems to be well defined for the upper region of the brain. Below the lateral ventricle, the rest of the ventricle and some tissue that may or may not be related are contained as well.