

AbstractID: 5576 Title: Java-based plugin for tomographic reconstruction for SPECT data

Purpose: To implement a plugin for the software ImageJ, a public domain and open source software, written in JAVA, used for image processing and analysis, able to perform the filtered backprojection (FBP) algorithm for tomographic reconstruction of SPECT data.

Method and Materials: New classes were added to the software ImageJ in order to implement the plugin. The following classes have been developed: (1) the backprojection process, in which data from projections or filtered projection are smeared back into the image matrix; (2) the tomographic reconstruction ramp filter with other windowing possibilities using loss-pass filters such as Butterworth, Shepp-Logan and Hamming; (3) the one-dimensional Fourier transform to perform the projection filtering; (4) and the user interface of the plugin. The plugin was tested with Monte Carlo simulated projection data of Zubal brain phantom, NCACT phantom and patient data.

Results: The plugin is able to reconstruct sinograms of 8, 16 and 32-bits. Users can choose filter/window combinations. After the user sets the parameters needed for each combination (cutoff frequency and/or order), the filter curve can be visualized. When no filtering is chosen, simple backprojection is performed. The final reconstructed image is displayed and can be visualized or analyzed using segmentation and processing tools available in ImageJ.

Conclusion: The outcome of this work consists of a plugin for the software ImageJ to reconstruct images from SPECT data as sinograms using filtered backprojection or simple backprojection. The plugin is platform independent and runs either in Windows or Linux, freely downloadable and accessible, and based on open source code. Further implementations will allow this plugin to work with DICOM images and offer iterative methods of tomographic reconstruction.

Research sponsored by FRIDA Program/LACNIC and CNPq.