A Java-Based, Platform-Independent Viewer for Magnetic Resonance Spectroscopic Imaging

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Introduction: Recent improvements in MR acquisition hardware and technology has led to the increased use of magnetic resonance spectroscopic imaging (MRSI) for research and routine clinical purposes.. Viewing MRSI data in anatomically registered space has generally been possible only through the use of proprietary software operating on scanners produced by the various manufacturers. "Off-line" MRSI data viewing on other platforms has generally not been available. To address this limitation, a platform independent Spectroscopic Imaging Viewer with data acquisition flexibility, was developed as part of the MRSI processing, analysis and visualization tools for the MIDAS (**M**etabolite **I**mage **D**ata **A**nalysis **S**ystem) project .

Methods: The Spectroscopic Imaging Viewer was written in JAVA. It uses an XML metadata file to give the user flexibility in adjusting for varying data acquisition, file storage structures, operating systems and hardware platforms. The Viewer reads image header information and slice locations from an XML file created by the MIDAS tools suite. It displays user chosen spectroscopic images in spatial registration with available user selected MRI slices. (Figure 1). A slider allows the user to simultaneously traverse through the slices, thus allowing comparison of spectroscopic data and anatomical information in registered space. By clicking at a particular voxel on one of the slices, the Viewer displays the spectrum corresponding to that voxel in the adjacent window. The user can rescale the frequency intensity axes for closer and localized inspection. A voxel detail widget provides orthogonal views of the voxel in a separate window (Figure 2). The user can also closely examine the volume by viewing one of the multi-slice view of the selected orientation orthogonal view of the volume data, and the spectrum associated with it. Another tool is provided to overlay metabolite image volumes on corresponding MRI images. Additional controls include Window/Level, Zoom, Pan, Color look-up table assignment, and a variety of image manipulation tools.

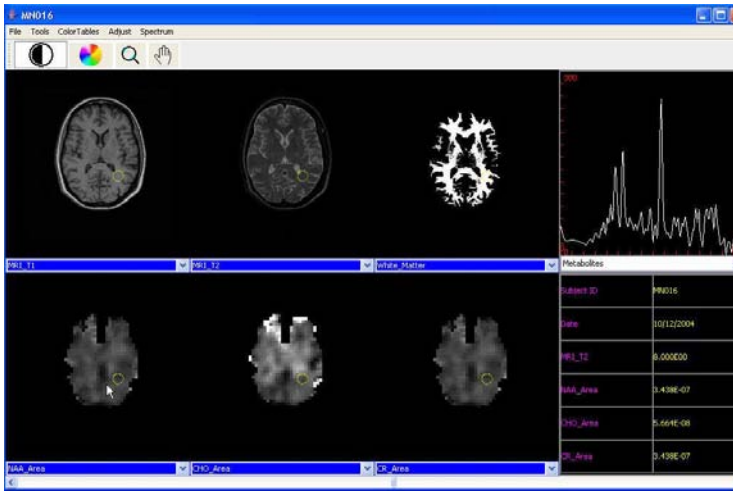

Figure 1: Main Window of Viewer. The three left columns of images display user selected image modalities with the selected voxel highlighted. The right most column displays scalable view of the selected voxel spectrum. User can use the drop down menu to choose between the water suppressed spectrum or the metabolite spectrum

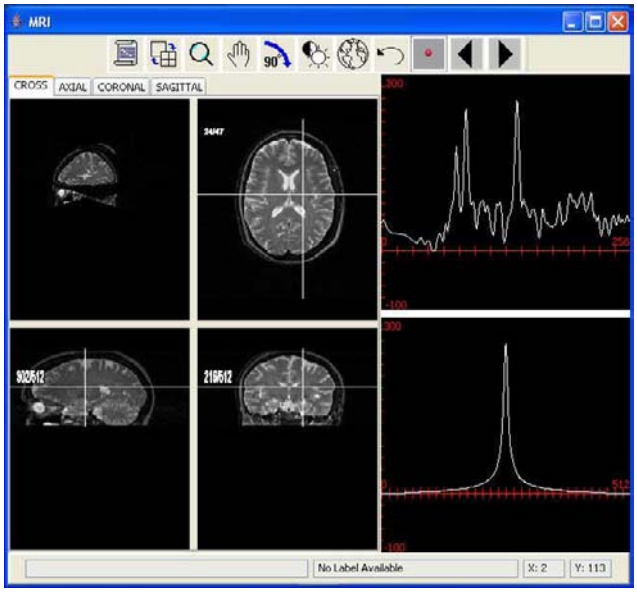

Figure 2: Voxel Detail Window showing voxel spectrum as well as orthogonal reference images. User can click at any point in any of orthogonal views to see the three views as well as spectrum corresponding to the selected voxel

Results: The Spectroscopic Imaging Viewer has been successfully tested on Windows and MAC operating systems. Spectroscopic Imaging data were displayed in co-registration with standard anatomical T1- and T2-weighted Images on 15 cases.

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