

Oxford Spectroscopy Analysis (OXSA)

v1.0

10th July 2017

Chris Rodgers – christopher.rodgers@cardiov.ox.ac.uk

Lucian Purvis – lucian.purvis@cardiov.ox.ac.uk

Overview

The OXSA package provides facilities for analysis of in vivo ^{31}P -MRS data acquired on the Siemens platform.

Spectro package class hierarchy

Spectro.dicom

Root of the hierarchy. Methods to decode Siemens private DICOM headers.

Spectro.dicomImage

Methods for interpretation and plotting of DICOM images.

Spectro.Spec

Base class for handling of spectroscopy DICOM files.

Spectro.InterpCsi

Subclass that transparently converts between raw and interpolated CSI matrix.

Spectro.ShiftCsi

Subclass that regrids CSI data.

Spectro.PlotCsi

Base class for spectroscopy GUI.

Spectro.dicomUiTree

GUI element for selection of DICOM study/series/instance.

Spectro.FileOpenGui

Dialog window showing a Spectro.dicomUiTree together with image preview.

Spectro.ItemChosenData

Utility class used during Spectro.dicomUiTree callback.

Spectro.ReferenceSliceChangeData

Utility class used during Spectro.PlotCsi user interaction.

Spectro.testNestedVarsClass

Development class used to benchmark data storage techniques and select the one used in Spectro.dicomUITree.

mypcolor2 class

This class plots DICOM images and spectroscopy maps with or without interpolation. It automatically accounts for the 1/2-voxel shift between Matlab interpolated and faceted surfaces.

It is intended to use this class to replace the current metabolite map plotting code.

processDicomTree.m

Java-based rapid parsing of folders containing DICOM files and for DICOMDIR folders (e.g. CDs).

specFft and specIfft

Discrete Fourier transform pair following conventions for MR spectroscopy. E.g. 1/2 sample of t=0 point in the FID.

specApodize

Apodization of spectra.

To be incorporated into Spectro.Spec class as a static method.

ProcessLong31pSpectra

This function will become a subclass of Spectro.PlotCsi. It provides more specialised methods to implement the 31P-MRS protocols used in Oxford. Coil flip angle calibration, coil positioning, and spectroscopy protocol interpretation.

AMARES

This kit also contains a set of tools for AMARES fitting of spectroscopy data. See osAMARES Guide for more details.

Key design ideas

Programming interface

All DICOM file scanning, searching, etc is handled by the Spectro.dicomTree class.

All DICOM files have an associated object in the Spectro.dicom, Spectro.dicomImage or Spectro.Spec hierarchy. These classes offer helper methods appropriate for the image or spectroscopy data that has been loaded.

GUI elements

`Spectro.dicomUiTree` provides a reusable Matlab GUI element for selecting DICOM files from a folder tree.

`Spectro.FileOpenGui` provides a pop-up dialog using the `Spectro.dicomUiTree` and a preview window. It can be used for interactive selection of DICOM files in other code.

`Spectro.PlotCsi` provides basic voxel selection, sat band drawing, spectrum plotting functions for 1D, 2D or 3D SVS or CSI spectroscopy data.