IDL applications

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Summary

This document describes IDL tools that were developed for various Clinical Science projects in Japan. Most tools do not rely on PRIDE environment and can be used on computers that have only IDL virtual machine installed. The main reason for this is reliance on personal utilities that were built over 7 years prior of my joining Philips. An effort was made to create platform independent tools (at least WindowsXP and Linux). Development was done using IDL 6.1 and testing using IDL virtual machine 6.1 and 6.3.

Applications are organized as:

```
apps/
|-- tool_name/
    |-- tool_name.sav
    |-- ex_data/
    `-- src
        |-- tool_name.pro
        `-- make.pro
```

`tool_name.sav` is the tested 'compiled' version. `src` contains application specific source code (mainly GUI) and the necessary data processing code. Application can be recompiled using `make.pro` (both `apps` and `lib` should be in added to !`path`). `ex_data` contains typical data set for `tool_name`. `REC.gz` files are 'gzip' compressed (can be read with `parrec` function or using `openr, fd, file, /compress`).

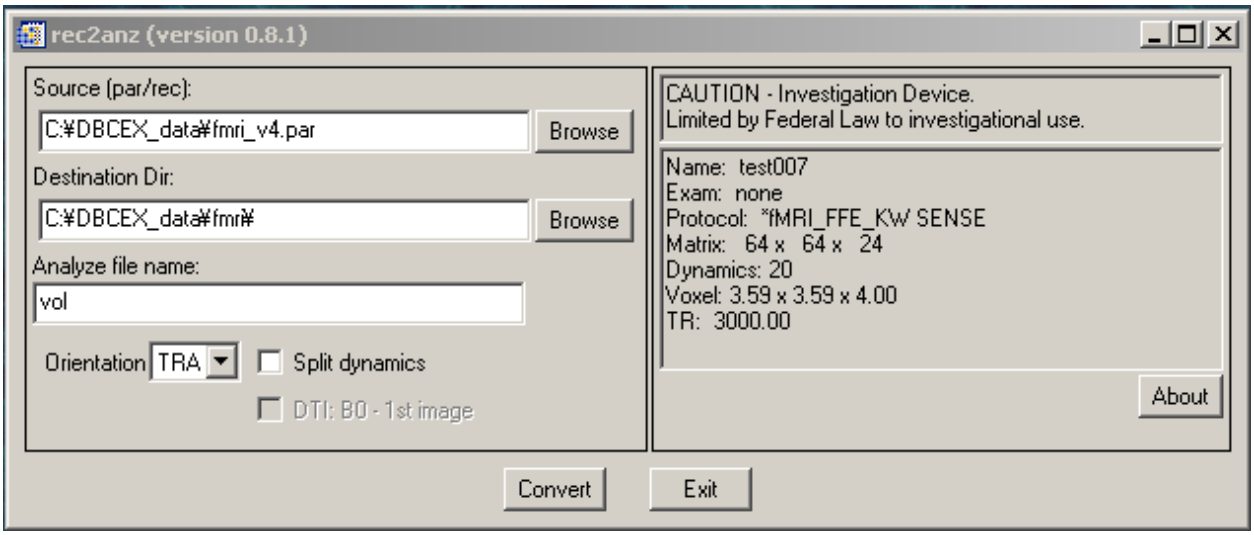
Brief description of available applications:

`fatfrac`	fat fraction calculation using 3 or 4 parameter fit to multi-echo FFE data
`objappex`	simple example of GUI app written as an object
`qasl_spect`	comparison of CBF maps obtained with ASL (QUASAR) and SPECT (used for ISMRM 2009)
`qasltime`	extraction of time-to-peak using gammvar fitting from ASL (QUASAR) data
`rec2anz`	converter from PAR/REC to ANALYZE
`rpi_eval`	evaluation of regional ASL 'rotating subtraction' (used for ISMRM 2010)
`rpiview`	viewer for regional ASL data
`t1rho`	Simple T1rho mapping tool

ObjAppEx

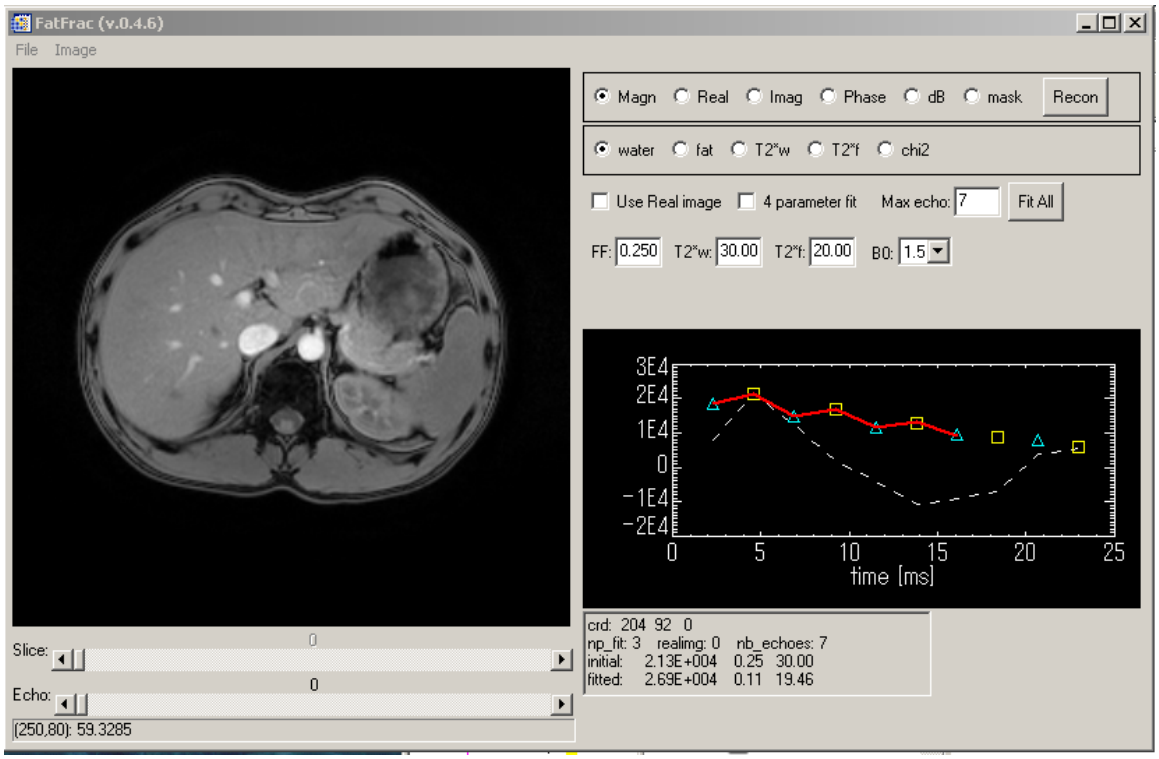
Request	NA (teaching example)
Purpose	This is a simple widget application written as an object. Its main purpose is to demonstrate how to pass widget events to object's methods. It can also be used as a skeleton for other applications (see `qasltime`). The main advantage of creating a widget application object is relatively easy access to '`self`' which can be made to hold all the necessary application variables.

rec2anz



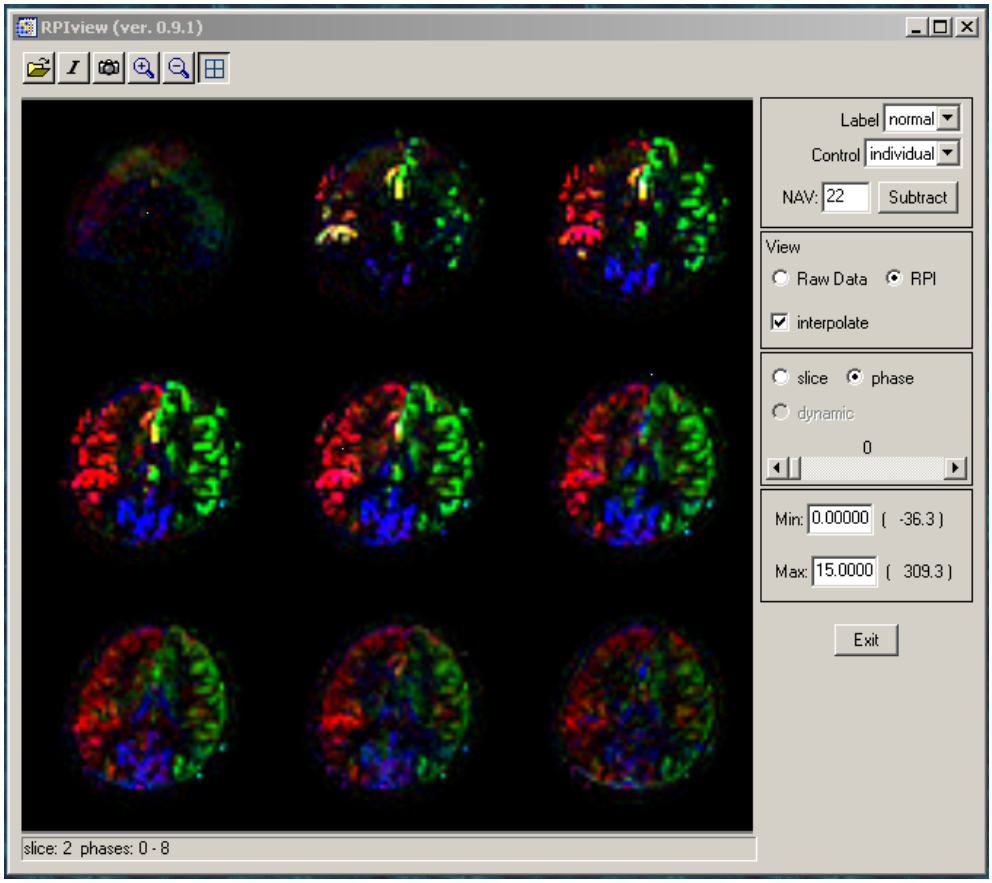
Request	Dr. Yoshiura (Kyushu) and Dr. Yamada (Kyoto)
Purpose	GUI application to convert PAR/REC (V3, V4 and V4.1) to ANALYZE7.5 (adaptation of an old app) Main purpose is to convert fMRI and DTI data (4D) into 3D volumes.
Notes	handling of images in non-axial orientation has not been thoroughly tested (latest version of MRIcro is probably better suited for this task)

FatFrac



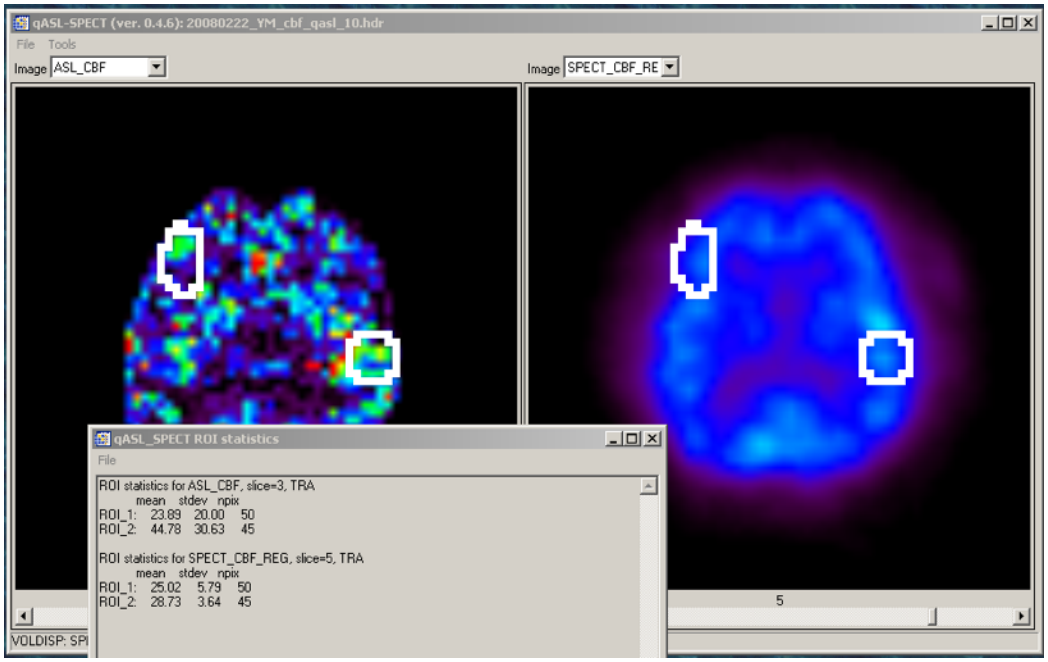
Request	Tomoyuki Okuaki (for Kyushu University)
Purpose	Tool for computing fat fraction map from multi-echo FFE (mFFE) complex data using 3 or 4 parameters fit to the following model: Sig = A * sqrt(((1-ff)*E_T2sw)^2 + (ff*E_T2sf)^2 + 2*(1-ff) * ff * E_T2sw * E_T2sf * cos(wfs*TE)) with E_T2sx = exp(-TE/T2sx) fitted parameters are [scale, ff, T2sw, T2sf] (for 3-parameter fit T2sw and T2sf are assumed to be the same. Fit can be limited to certain number of echoes Resulting maps are saved in ANALYZE 7.5 format
Notes	image display using IDLgrXXX objects `fatfrac` is GUI around `fatcalc` data processing object. errors (noise) are not handled properly during fitting

RPIview



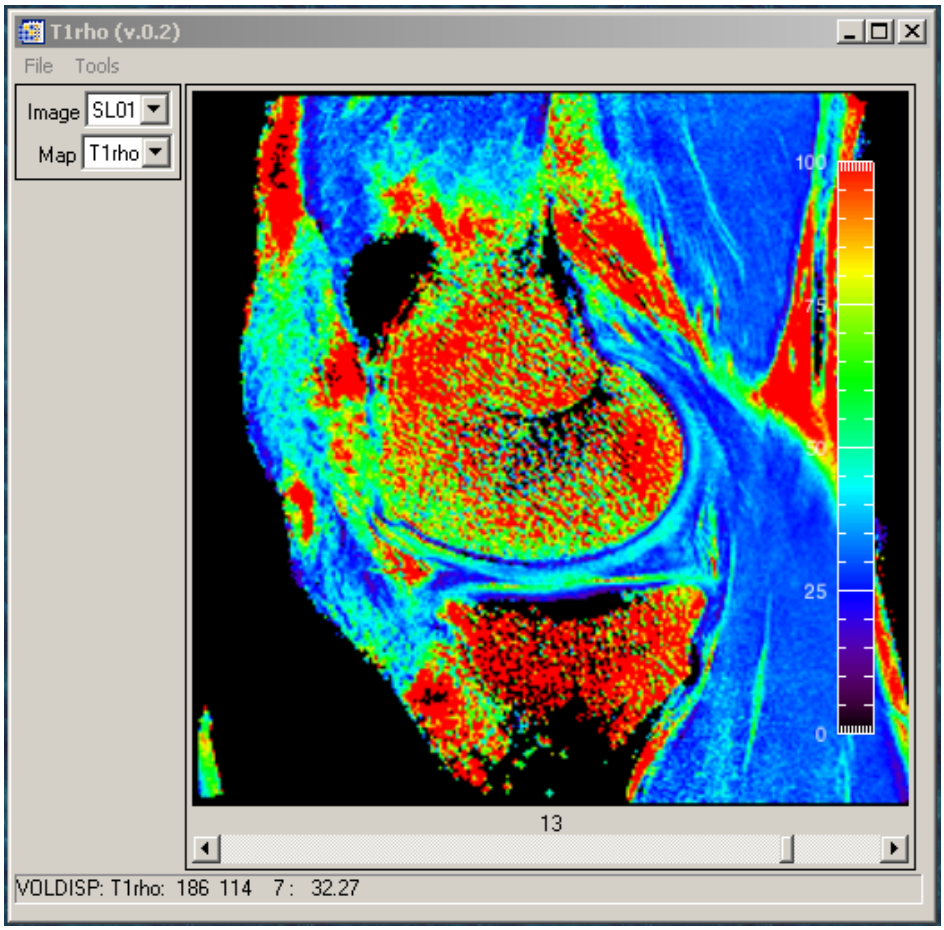
Request	NA (tool used in Kyushu, Tohoku, Kumamoto, Kobe, Juntendo)
Purpose	Tool for subtraction and display regional ASL data (old term RPI stands for regional perfusion imaging) The tool has been created and tested using QUASAR data (interleaved territories acquisition), but can be used with CSK data as well.
Notes	image display using IDLgrXXX objects slice/phase navigation needs to be improved data processing is implemented in `rpicalc` object.

qASL-SPECT



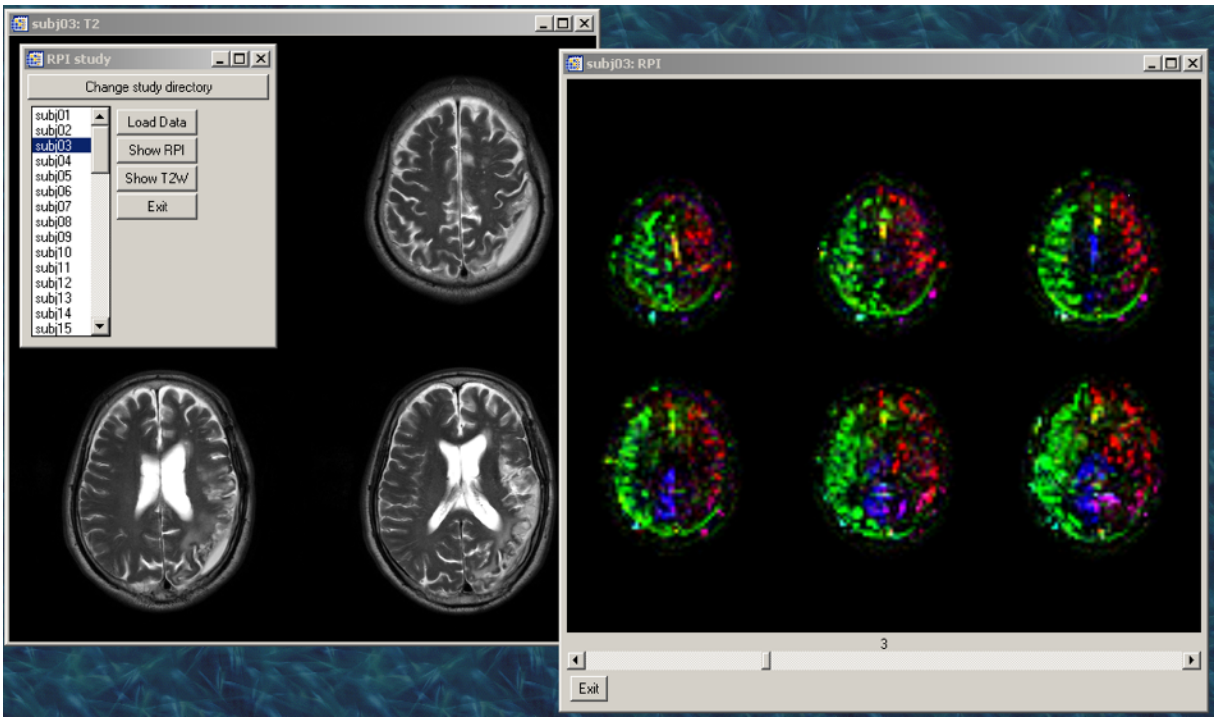
Request	Prof. Hosoda and Dr. Uchihashi (Kobe University)
Purpose	Tool for comparison of CBF maps obtained with ASL (QUASAR) and SPECT (used for ISMRM 2009 abstract and presentation) ASL CBF maps are from EasyMRI tool (by Esben Petersen) in ANALYZE format and SPECT CBF are multi-frame DICOM files (Toshiba or Siemens). Assuming that maps are in the same coordinate space (after registration), average CBF from hand-drawn ROIs can be compared.
Notes	Original requirement included image registration step using AIR package (see `ph_imgreg__define`). This step is only partially completed/tested because final registration of all CBF maps was done by batch processing using FSL on Linux and OSX (due to abstract submission deadline). `slice_stack` and `voldisp` object were created specifically for this app (very raw code)

T1rho



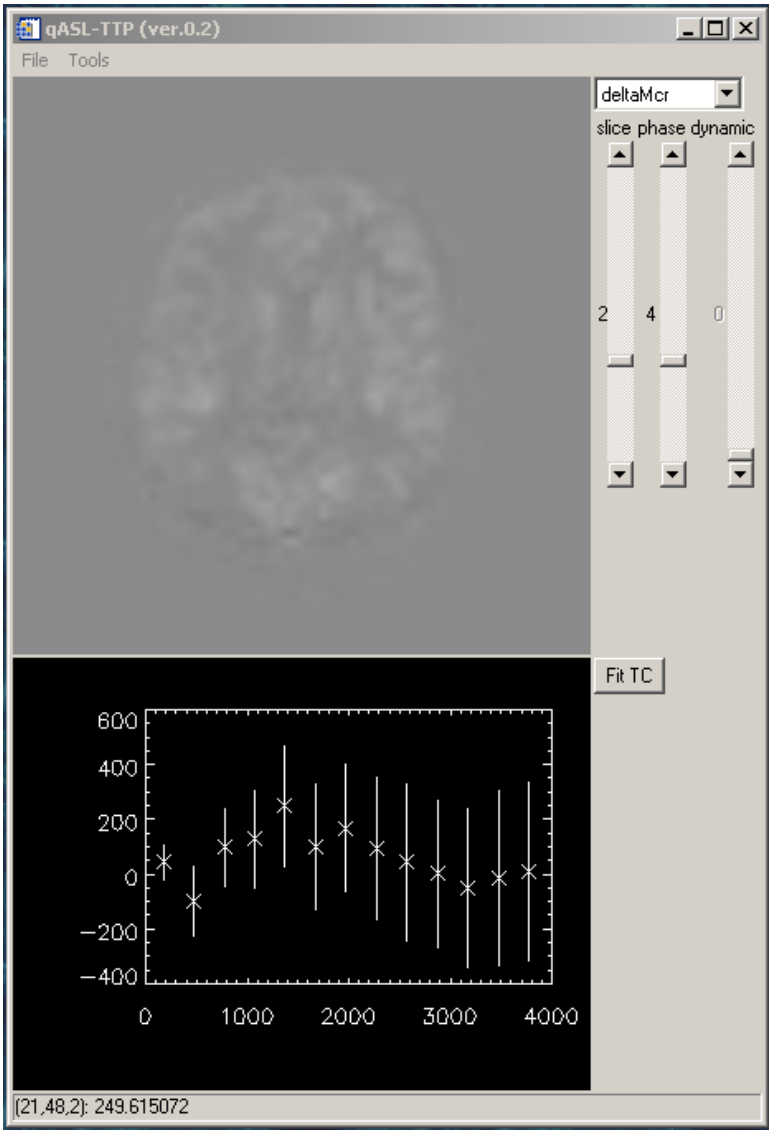
Request	Tomoyuki Okuaki (for Kyushu University)
Purpose	Tool for computing T1rho maps from data obtained with spin-lock patch (by Ivan Dimitrov and Tetsuo Ogino) Linear fit of Log transformed data Resulting maps saved in ANALYZE 7.5 format
Notes	Input data is in DICOM files organized in directories with names containing spin-lock time! (this info is used during fitting). uses `voldisp` for image display

rpi_eval



Request	Dr. Yoshiura (Kyushu University)
Purpose	Tool for scoring RPI maps obtained with normal subtraction and 'shared rotating-control' methods (abstract for ISMRM 2010) Rather generic tool that can be used other similar "blind" comparison projects
Notes	maps are standard png. RPI processing was done using `rpicalc` object from rpiview app (see `rpi_rot`).

qASLtime



Request	Dr. Yoshiura (Kyushu University)
Purpose	Tool for extraction of timing parameters from multi-phase ASL data. Original request is to obtain bolus arrival time, time-to-peak and full-width at half maximum parameters. time-to-peak is obtained using gammavar fitting
Notes	currently can only use data from QUASAR (R2.1.3) patch (very alpha stage)