

# User Guide to Compressive Sensing GUI

The Matlab code and GUI were developed by Zengli Yang, June 2011-May 2014.

The C programs in subdirectory "util" was developed by Toby Case in 2011 and is copyright protected under software package SAIL.

The user Instruction was written by Xiahan Yang Nov 2014.

All work was done in Missouri University of Science and Technology, Rolla, MO, 65409. For further information, please contact Dr. Y. Rosa Zheng at [yrz218@lehigh.edu](mailto:yrz218@lehigh.edu), tel: 610-758-5499.

## Package contents:

/@p2DFT subdirectory: (Implementation of partial Fourier operator)

(Follows classes are similar with @p2DFT class)

/ctranspose.m: generalize conjugate transposes.

/mtimes.m: overload Matrix Multiplication for p2DFT class.

/p2DFT.m: create p2DFT class.

/@SAR subdirectory: (calculate SAR phase-compensation parameter)

/ctranspose.m:

/mtimes.m

/SAR.m

/@TIDCT subdirectory: (Implements a segmented DCT operator)

/ctranspose.m:

/mtimes.m

/SAR.m

/private:

/FDCT.m: local dct implementation

/IDCT.m: local idct implementation

/@TVVOP subdirectory: (Implements a spatial finite-differencing operator):

/ctranspose.m:

/mtimes.m

/SAR.m

/private:

/adjD:

/D:

/@Wavelet subdirectory: (implements a wavelet operator):

/ctranspose.m:

/mtimes.m

/SAR.m

/utils: related sub-functions using in the GUI.

(Introductions are in the beginning part of each sub-function as comments)

## Data Files:

blue\_foam\_2d.mat: a sample SAR measurement data saved as "rawData" in X-by-Y array, where X is the number of rows, Y is the number of columns. This example has X=91, Y=61.

blue\_foam\_2d\_square.mat: the SAR measurement data in 32-by-32 array that is the center of

blue\_foam\_2d.mat.

boat128.tiff: image example with 128-by-128 pixels.

Phantom256.tiff: image example with 256-by-256 pixels.

### Matlab Files:

CS3.m: the top matlab script to run the package

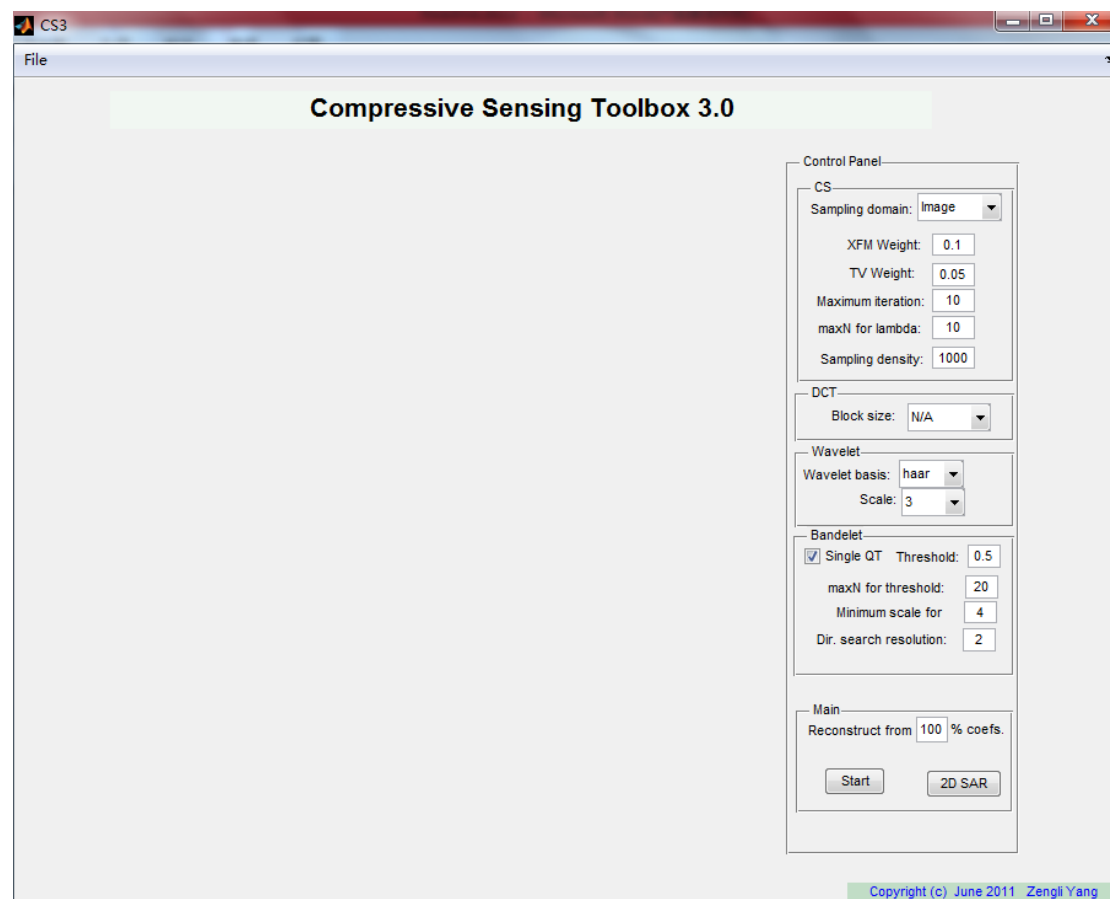
CS3.fig: GUI for the package

perform\_CS.m: function called by CS3.m to perform the conjugate gradient algorithm for compressive sensing image recovery

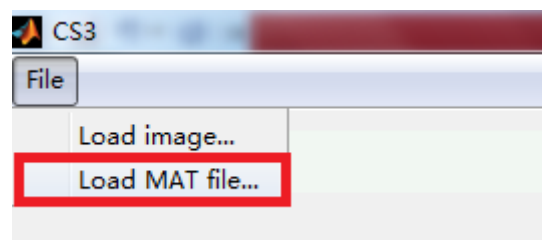
### Instructions to using the GUI:

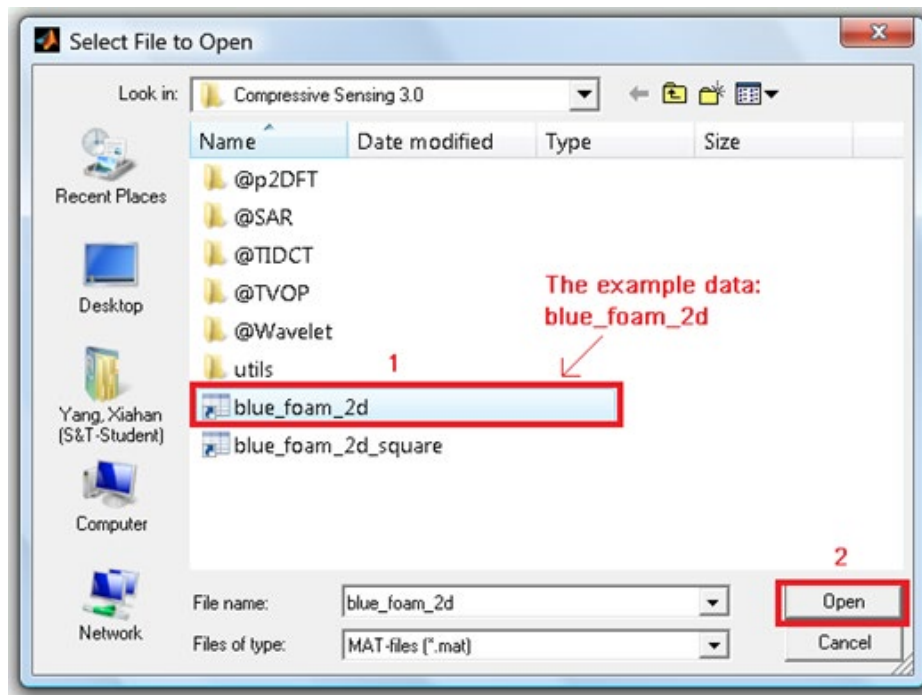
**Note: Please update MATLAB version to 2012a or above. Previous version may not support all the features.**

1. Launch Matlab, run CS3.m. The GUI appears as follows:

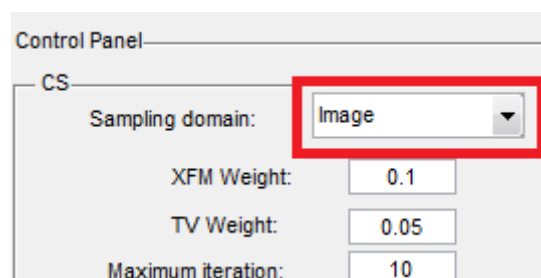


2. Click "File\load MAT file..." and choose the exampled data. Click "Open"

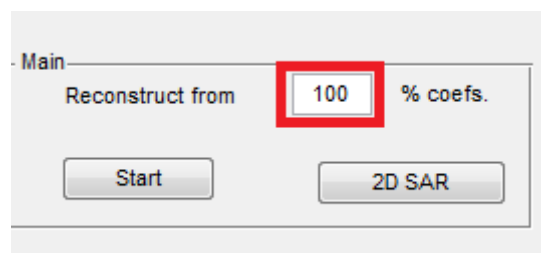




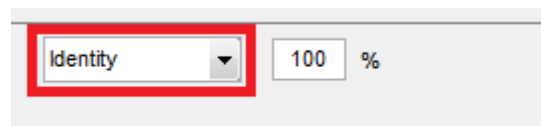
3. Choose the sampling domain. (Default is image: image domain). For SAR measurement, select Fourier.



4. Choose the under-sampling-rate. (Default is 100.)



5. Choose the Sparse domain. (Default is Identity, Wavelet and DCT)

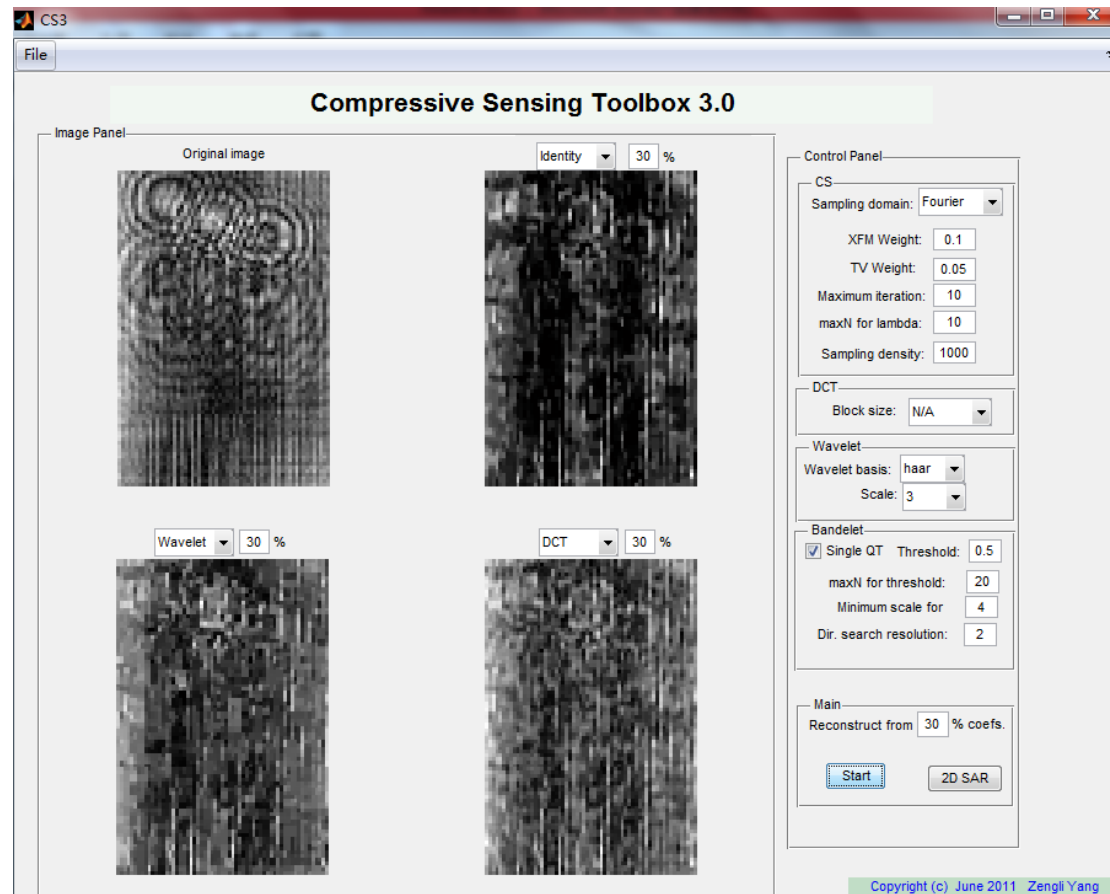


6. Adjust other parameters on the right in reconstruction.

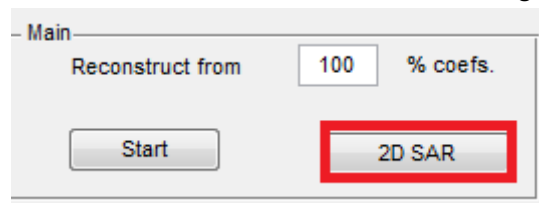
7. Click "Start" and wait the Compressed Sensing reconstruction.



The GUI appears as follows:



8. Click "2D SAR" to obtain the reconstruction at image domain.



9. The final results of example data:

Main parameters value(s) and define(s)

Sampling domain: image;

Sparse transformation: Identity; Wavelet and FFT

Sampling rate: 30%

The GUI appears as follows:

