Matlab instructions on how to generate the results of “Sparse image reconstruction for molecular imaging”

Software platform

The software was developed on MATLAB Version 7.1.0.183 (R14) Service Pack 3 in Linux.

Configuring Matlab

The suggested directory structure is as follows. *Assume* that the username is bar. First, create a new directory XYZ. Then, create subdirectory “src” in XYZ, and unzip src.tar.bz2 into it by running at the Linux prompt:

```
>bzcat src.tar.bz2|tar xvf -
```

Add all subdirectories in /home/bar/XYZ/src by running in Matlab:

```
>addpath( genpath( '/home/bar/XYZ/src' ), '-end' );
```

Create a subdirectory “f05” in XYZ, and copy the “icip06” and “threed” data subdirectories to f05. The directory structure of XYZ should look like:

```
XYZ
+--- src
+--- f05
        +--- icip06
        +--- threed
```

You should also add /home/bar/XYZ/f05/icip06 to Matlab's search path by running:

```
>addpath( '/home/bar/XYZ/f05/icip06', '-end' );
```

The instructions below assume that you are already in directory XYZ in Matlab. For example, in generating Table 1, step 1 is to change directory to:

```
~bar/XYZ/f05/icip06/binary/s1
```

Table 1

1. Change directory to ./f05/icip06/binary/s1
2. Type >tip_table1
3. The output is contained in the matrices tab{High,Low}Snr

Figure 3

1. Change directory to ./f05/icip06/binary/s1/snr2/t10
2. Type >load base
3. To get the following reconstructions:
   1. Fig. 3a, SBL. Run >sp_img_recon2
   2. Fig. 3b, STOMP (CFAR). Edit try_stomp, and ensure that the file location in SBL_PHI_FILE is valid. Then, run >try_stomp.
   3. Fig. 3c, MAP2 ($g^{*}=2^{-1/2}$). Edit sp_img_recon3, and ensure that SZ_M_METHOD in line 23 is set to 'map2'. Then, run >sp_img_recon3.
   4. Fig. 3d, lasso-SURE. Set SZ_LARS_FUNC='ll_small' and maxLarsIters=500 in test_ll.m, if not already set. In the same file, change the first entry of SBL_PHI_FILE to reflect the location of sbl_gaussian_psf.mat. This mat file should be in the data archive. Then, run >test_ll.
4. Assuming that the four outputs are stored in files 'sbl.mat', 'stomp_cfar.mat', 'map_revised.mat', and 'lars_v2.mat', the subfigures shown in Fig. 3 can be created by running >tip07_hilow_binary.

Table 2

1. Change directory to ./f05/icip06/js/s1
2. Type >tip_table2
3. The output is contained in the matrices tab{High,Low}Snr.

Figure 4

1. Change directory to ./f05/icip06/binary/s1

2. Type >tip_binary_s1
3. The plots (a)-(e) correspond to Matlab figures 1-5. Note that the vertical axis of the plots in the paper have been adjusted to log scale.

Figure 6, 8a

1. To generate the reconstruction, do the following:
    2. Change directory to ./f05/threed
    3. Type >load 103d_base
    4. Type >sp_img_recon4 (NB. this will take some time)
5. To plot the reconstruction, either follow steps (2)-(4), or load the final result by running >load 103d_landweb.
6. Then, type >my_cslice('A', sRestore.last, 'fig_vec', 1:3, 'b_hist_logy', 1);
7. Figure 6 is given in Matlab figure 3, and Figure 8a is given in Matlab figure 1. NB. To obtain Fig. 6 as in the paper, the image will have to be rotated.

Figure 7, 8b

1. To generate the reconstruction, do the following
    2. Change directory to ./f05/threed
    3. Type >load 103d_base
    4. Set SZ_LARS_FUNC='ll_big' and maxLarsIters=2e3 in test_ll.m, if not already set. Then, run >test_ll.
5. To plot the reconstruction, either follow steps (2)-(4), or load the final result by running >load lars_2e3
6. Then, type >my_cslice('A', reshape(sRestore.last, [128 128 32]), 'fig_vec', 1:3, 'b_hist_logy', 1);
7. Figure 7 is given in Matlab figure 3, and Figure 8b is given in Matlab figure 1. See comment above regarding rotating the image.

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