CODE FOR SPARSE RECOVERY EXPERIMENTS

Introduction

This package contains the framework used to perform sparse recovery

experiments like those in papers BI08, BGIKS08, BIR08.

The base functions are:

gen\_matrix.m - generates a given type of measurement matrix

gen\_signal.m - generates a test signal

experiment.m - performs a sparse recovery experiment

A small demo of how to use these functions is shown in demo.m. (Note: you

might need to compile some of the mex files for your platform, see below; also

for the image part of the demo you need to have Matlab's Wavelet Toolbox

installed).

Important high level programs are:

sparse\_experiments.m -

Used to generate a probability of exact recovery plot. The range of

parameters (N, Ms, Ks, attempts) is set from inside this file.

sparse\_experiments\_distributed.m -

Matlab DCT cluster version of the above.

benchmark.m -

Performs a runtime benchmark of a set of algorithms.

sparse\_experiments\_plot.m, benchmark\_plot.m -

Generate plots from the experiment data.

There are also programs to perform image experiments; see load\_image.m,

image\_experiment.m, and image\_test.m .

All .m files contain documentation, which can be seen by viewing the

file or using the Matlab command help (e.g. "help benchmark").

Note: init.m adds relevant subdirectories to the Matlab path. It is ran

inside most programs, but it can also be called manually at the start of the

Matlab session for safety.

Installing solvers for LP experiments

To perform LP experiments, l1magic must be installed. Download the l1magic

archive from http://www.acm.caltech.edu/l1magic/ . Unpack the archive so that

the l1magic directory is at the root of the code installation (i.e. l1magic is a

directory along with Matrices, Util, etc.)

To use GPSR, the GPSR\_BB.m program must be placed in the root directory of the

code installation. The GPSR website is http://www.lx.it.pt/~mtf/GPSR/ .

Compiling the C programs (MEX)

The important (bottleneck) parts are implemented as C programs which Matlab

calls as MEX files. These files are in Util. Compiled binaries are included for

Windows (32-bit Matlab) and Linux (64-bit). For other platforms, one needs to

compile them by running "mex <file.c>". The mex script comes with Matlab (it

should be in the run path). The Util directory contains compile.bat and

compile.sh scripts to call mex on all the c files there.

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References

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''MIT-CSAIL Technical Report'', 2008.

BGIKS08 R. Berinde, A. Gilbert, P. Indyk, H. Karloff, and M. Strauss. Combining

geometry and combinatorics: a unified approach to sparse signal

recovery, ''Allerton'', 2008.

BIR08 R. Berinde, P.Indyk, and M. Ru瀒c. Practical Near-optimal Sparse Recovery

in the L1 Norm, ''Allerton'', 2008