Software to accompany the paper:

I. Selesnick, 'Sparse Regularization via Convex Analysis'
IEEE Transactions on Signal Processing, 2017.

The purpose of this software is to find sparse approximate solutions to linear equations. A classical method for this problem is L1-norm regularized least squares, but this often underestimates the amplitudes of the true solution values. As an alternative to the L1 norm, this software uses the generalized minimax-concave (GMC) penalty which maintains the convexity of the least squares cost function to be minimized. The GMC penalty is defined in terms of the generalized Huber function. The algorithm in this software minimizes the GMC sparse-regularized least squares cost function using a proximal algorithm comprising simple computations.

Program listing (MATLAB and Python)

srls_GMC
        Sparse-regularized least squares (srls) using
        the proposed GMC penalty.
srls_L1
        Sparse-regularized least squares (srls) using
        the L1 norm
GMC_demo
        Demonstration (example from paper) of signal
        denoising based on frequency-domain sparsity

huber_1d_demo
        Shows one-dimensional Huber function and MC penalty
huber_2d_demo
        Shows generalized Huber function and generalized MC
        penalty in two-dimensions
huber_2d
        Calculates two-dimensional generalized Huber function

Ivan Selesnick
Department of Electrical and Computer Engineering
Tandon School of Engineering
New York University
web: http://eeweb.poly.edu/iselesni/
email: selesi@nyu.edu

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