Project 4
Reconstruction of 1-D and 2-D Signals with Missing Samples Using Time Varying (TV), Iterative (IT), Lagrange (LI), Matrix, SDFT and RS Methods

You can generate nonuniform samples by over-sampling a band-limited signal and then drop some of the samples randomly. Over-sampling is done by inserting zeros in the DFT domain or FIR/IIR filtering. Perfect reconstruction of a signal with missing samples can be achieved by the Lagrange, Matrix and the Reed Solomon (RS) methods.

1- Simulate the reconstruction of a band-limited signal with missing samples using the TV, IT, Lagrange, matrix and the RS methods. Compare your results.
2- Repeat the IT with the TV (or other methods) for the distortion operator.

3- Repeat part 1 for the case of a bursty loss and then compare the above methods to the SDFT method. Try to vary the p and see the optimum values for p where the kernel for SDFT is $\exp(\frac{j2\pi p}{N})$.

4- Repeat part 1 for an image using only the TV and IT methods.

5- Extra Credit: Can you use SDFT for an image when a big block of pixels are lost?

* Your report can be concise this time! You do not need to use abstracts, introductions, etc just the statement of the problem, simulation results and comparison among various methods.

References
1- F Marvasti, A Unified Approach to Zero-Crossings and Nonuniform Sampling of Single and Multidimensional Signals and Systems, Nonuniform Publication, 1987.
2- F Marvasti, Nonuniform Sampling: Theory and Practice, Kluwer, 2001.
3- The papers given to you in the class.