

### Project 5 IMAT

- 1- Recover an image from its random samples applying the IMAT and OMP reconstruction methods. Use sparsity assumption in the DCT domain. Investigate the effects of sampling rate, alpha, beta and lambda parameters on the performance.
- 2- Recover the previous image using the iterative method in the same scenarios considering the low pass assumption. Compare the performance of the two techniques.
- 3- Repeat parts 1 and 2 in cases of uniform and periodic non-uniform sampling and compare the results.

#### Extra Credit:

- 1- Assume the hybrid assumption for the image. Recover the low pass band using iterative method and the high frequency sparse band using the IMAT technique.
- 2- Apply other variations of IMAT (IMATI, IMATQ) to recover the image.
- 3- Modify the basic IMAT method to satisfy the Chebyshev Acceleration format. Can you also use the Conjugate Gradient technique? Why?

Your report should contain the following parts:

- i. An abstract of about 50 words
- ii. An introduction consisting of a statement of the problem, its relevance and history with references to previous works.
- iii. Solution and algorithms
- iv. Simulation results and discussions
- v. Conclusion
- vi. References
- vii. Appendix: Mathcad codes

## References

- 1- Marvasti, Farokh, et al. "A unified approach to sparse signal processing." *EURASIP journal on advances in signal processing* 2012.1 (2012): 44.
- 2- Azghani, Masoumeh, and Farokh Marvasti. "Iterative methods for random sampling and compressed sensing recovery." *Sampling Theory and Applications. Proceedings of 10th International Conference on Eurusip*. 2013.
- 3- Eghbali, R., et al. "Iterative method with adaptive thresholding for sparse signal reconstruction." *International Workshop on Sampling Theory and Applications (SampTA)*. 2011.