

# Sequential Image Recovery from Noisy and Under-sampled Fourier Data

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*Abstract*

A new algorithm is developed to jointly recover a temporal sequence of images from noisy and under-sampled Fourier data. Specifically we consider the case where each data set is missing vital information that prevents its (individual) accurate recovery. Our new method is designed to restore the missing information in each individual image by “borrowing” it from the other images in the sequence. As a result, *all* of the individual reconstructions yield improved accuracy. The use of high resolution Fourier edge detection methods is essential to our algorithm. In particular, edge information is obtained directly from the Fourier data which leads to an accurate coupling term between data sets. Moreover, data loss is largely avoided as coarse reconstructions are not required to process inter- and intra-image information. Numerical examples are provided to demonstrate the accuracy, efficiency and robustness of our new method.