Polynomial Annihilation

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This review is based on the paper 'Image Reconstruction from Undersampled Fourier Data Using the Polynomial Annihilation Transform' by R.Archibald, A.Gelb and R.B.Platte (2015).

September 17, 2015

Outline

Precusor

Recall 1: Final project of image processing class:

$$\min_f \|D_1 f\|_1 + \|D_2 f\|_1 + \frac{\mu}{2}\|MFf - \hat{f}\|_2^2$$

Where $\hat{f}$ is measured Fourier data (incomplete). Mask M is given.
Recall 2: Given 3 point uniformly distributed, say x_1, x_2 and x_3, the corresponding function value $f(\cdot)$. What's the 'best' polynomial approximation to $f(x)$?

Model

Polynomial annihilation model:

$$\min_f \|L_x^m f\|_1 + \|L_y^m f\|_1 + \frac{\mu}{2}\|MFf - \hat{f}^k\|_2^2$$

where L_x^m and L_y^m are the polynomial fitting matrices, or differential matrices.
Split Bregman algorithm is used. Matlab file 'PA.m' is in dropbox, under 'Yue/Image recon underSampled Fourier data'.
Pros? Cons?
Discussion: 3 operator splitting?