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An improved backtracking line search method for 2D projected gradient method. (Chinese. English summary) [Zbl 1449.94019]

Summary: Compared with one-dimensional compressive sensing (CS), two-dimensional (2D) CS can keep the structure of the images more precise, so the images reconstructed by 2D CS methods are much better. 2D projected gradient method is a 2D CS reconstruction method which combines $l_0$ norm minimization and total variation minimization method. It solves the total variation minimization problem by gradient descent algorithm with randomly selected step size. Backtracking line search method was used to choose the step size, in order to improve the quality of reconstructed images and computational speed. An improved backtracking line search method was also proposed for the gradient descent algorithm and used in the 2D projected gradient reconstruction method. The results of experiments show that after using the two step size choosing methods, the peak signal-to-noise ratio of the reconstructed images was improved, especially when the improved backtracking line search method was used.

MSC:
94A08 Image processing (compression, reconstruction, etc.) in information and communication theory
94A12 Signal theory (characterization, reconstruction, filtering, etc.)

Keywords:
total variation; backtracking line search; gradient descent algorithm; two-dimensional compressive sensing; image reconstruction

Full Text: DOI