Zou, Jing; **Gilbert, Anna**; **Strauss, Martin**; **Daubechies, Ingrid**

Theoretical and experimental analysis of a randomized algorithm for sparse Fourier transform analysis. (English) Zbl 1085.65128

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This excellent paper greatly improves the previous randomized algorithm for sparse Fourier analysis proposed by *A. C. Gilbert, S. Guha, P. Indyk, S. Muthukrishnan* and *M. Strauss*, Near-optimal sparse Fourier representations via sampling, Proc. Thirty-Fourth Annual ACM Symp. on Theory of Computing, 152–161 (2002)]. Several novel ideas and techniques to speed up the algorithm, as well as rigorous and heuristic arguments for choosing parameters, are presented. The approach to higher dimensional cases is also introduced and demonstrated. Various experiments, even with different levels of noise are given in details. The time and spatial complexity are analyzed. Almost all the results given here outperform than previous results, thus a wide range of applications can be expected, based on the important progress proposed in this paper.

Reviewer: Qiao Wang (Nanjing)

MSC:

65T50 Numerical methods for discrete and fast Fourier transforms
65T40 Numerical methods for trigonometric approximation and interpolation
68W20 Randomized algorithms
42A10 Trigonometric approximation

Keywords:

sparse Fourier representation; Fast Fourier transform; sublinear algorithm; randomized algorithm; numerical examples; complexity

Software:

FFTW

Full Text: DOI

References:

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paper as accurately as possible without claiming the completeness or perfect precision of the matching.