Fast and Stable Algorithms for Discrete Sine Transformations having Orthogonal Factors

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Abstract

In this chapter we derive fast, recursive, and numerically stable radix-2 algorithms for discrete sine transformations (DST) having sparse and orthogonal factors. These real radix-2 stable algorithms are completely recursive, fast, and based on the simple orthogonal factors. Comparing to the known bulky and mostly unstable DST algorithms, our algorithms are easy to implement and use only permutations, scaling by constants, butterfly operations, and plane rotations/rotation-reflections.

For a given vector $\mathbf{x}$, we also analyze error bounds of computing $\mathbf{y} = S\mathbf{x}$ for the presented DST algorithms: S. Finally a classification of these real radix-2 DST algorithms enables us to establish the excellent forward and backward stability based on the sparse and orthogonal factors.

Keywords

Discrete Fourier Transform Error Bound Usual Multiplication Recursive Algorithm Permutation Matrix
These keywords were added by machine and not by the authors. This process is experimental and the keywords may be updated as the learning algorithm improves.

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