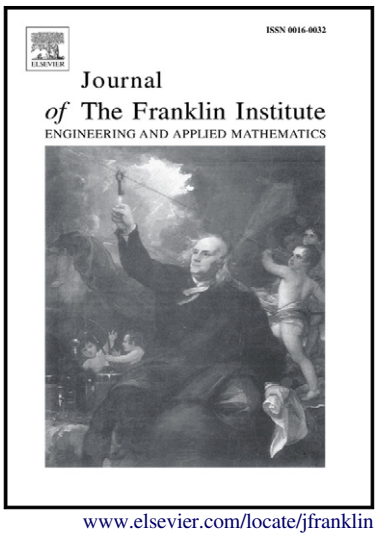

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Independently updating the DCT and DST for shifting windowed data

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Abstract

When processing a signal or an image using the Discrete Cosine Transform (DCT) or Discrete Sine Transform (DST), a typical approach is to extract a portion of the signal by windowing and then form the DCT or DST of the window contents. By shifting the window point by point over the signal, the entire signal may be processed. In this paper we develop algorithms to "update" the DCT and DST to reflect the modified window contents using less computation than by directly evaluating the modified transform via standard Fast Transform algorithms. Our algorithms constitute an improvement over previous DCT/ DST update algorithms because our approach establishes independence between the DCT and the DST: the algorithm for DCT makes use only of DCT terms, and similarly for DST. Algorithms are derived for use without windowing and with split-triangular, Hanning, Hamming and Blackman windows.

Key words: Discrete cosine transform, Fast transform, Window

1. Introduction

Since its introduction in 1974 [3] the Discrete Cosine Transform (DCT) has found widespread application in image processing for the purposes of pattern recognition, data compression, communication and several other areas. The reason for this success is the ability of the DCT to decorrelate signal data; specifically, the DCT has been shown to provide a close approximation to the ideal Karhunen-Loéve Transform (KLT) for data

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