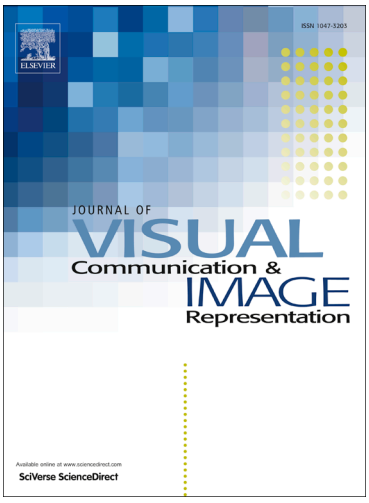

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Low-Complexity Direct Computation Algorithm for Cubic-Spline Interpolation Scheme

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Abstract

Cubic-spline interpolation (CSI) scheme is known to be designed to resample the discrete image data based on the least-square method in conjunction with the cubic convolution interpolation (CCI) function. It is superior in performance and can be used together with the discrete cosine transform (DCT)-based image or video codec to improve the coding performance for a variety of high compression ratios. In this paper, we firstly make some comments on the direct computation algorithm for CSI scheme developed by Lin et al. Moreover, a low-complexity direct computation algorithm for CSI scheme is developed to further improve the computational efficiency. The mathematical derivations and simulation results indicate that such simplified CSI scheme using the proposed low-complexity direct computation algorithm can achieve almost the same objective and subjective performance with much fewer arithmetic operations in comparison with the CSI scheme using the direct computation algorithm.

Keywords: Cubic-spline interpolation, direct computation algorithm, fast Fourier transform, low-complexity direct computation algorithm

1. Introduction

The interpolation that estimates the intermediate values of a set of discrete samples has been widely used in the applications of signal and medical image processing [1]-[6]. There have been a great variety of interpolation functions,

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