International Journal of Innovative
Computing, Information and Control
Volume **6**, Number **5**, May **2010**

 ISSN 1349-4198
pp. 2331–2340

SUCCESSIVE ACCUMULATING PARTIAL DISTORTION SEARCH ALGORITHM FOR MOTION ESTIMATION

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Received December 2008; revised April 2009

Abstract. *This work presents a modified partial distortion search algorithm that considers the property of successive accumulation for motion estimation. In the normalized partial distortion search algorithm, the partial distortion is calculated by regularly selecting a certain number of pixels from every sub-macroblock for early termination. The proposed method calculates the partial distortion by successively accumulating the distortion of each partial sub-macroblock. In addition to increasing the probability of the rejection of invalid motion vectors without additional computations, the proposed method has a markedly lower computational complexity than conventional algorithms, but slightly poorer objective quality of motion compensated images.*
Keywords: Normalized partial distortion search, Motion estimation, Block-matching distortion, Sum of absolution difference, Sub-macroblock partial distortion

1. **Introduction.** Video coding standards, including H.26X [1,2] and MPEG-X [3,4], have been developed for storage and transmission purposes and lead to popular consumer products such as VCD, DVD, etc. Motion estimation, a method that removes the temporal redundancy of the interframes, is the common characteristic of these coding standards [5]. The block-matching algorithm (BMA) [6] is as a mean of finding motion vectors (MVs). The full search (FS) algorithm is the most straightforward BMA, which provides an optimal solution by matching all possible blocks within a restricted search area, called the search window, in the reference frame to determine the block with the minimum block-matching distortion (BMD). BMD could be called as the sum of absolution difference (SAD). The FS algorithm, however, needs large amount of computation for the calculation of BMD and the development of fast motion estimation algorithm is highly desired for video coding.

Motion estimation is one of the key components in video coding. Fast and accurate motion estimation method is highly desirable for achieving high compression ratio with good reconstructed visual quality. Besides video coding, efficient ways to estimate motion cover fields as divers as remote sensing, virtual reality, and content-based analysis and representation. Motion estimation also can be applied to GPS positioning [7] for the