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

ICIC International ©2010 ISSN 1349-4198
pp. **2657–2670**

MOTION VECTOR RE-ESTIMATION FOR VIDEO TRANSCODING WITH ARBITRARY VIDEO DOWNSIZING

Chih-Shan Liu[1], Nai-Chung Yang[1], Chung-Ming Kuo[1,*] and Wen-Li Wei[2]

[1]Department of Information Engineering
I-Shou University
No. 1, Sec. 1, Syuecheng Road, Dashu Township 840, Kaohsiung, Taiwan
{ d9403002; ncyang; kuocm }@isu.edu.tw
*Corresponding author

[2]Department of Information Engineering
National Cheng Kung University
No. 1, University Road, Tainan City 701, Taiwan
lilijinjin@gmail.com

Received January 2009; revised May 2009

Abstract. *How to convert the compressed information between delivery systems and the terminal devices becomes an important issue to be solved in order to be compatible with various resolutions of digital products. To solve this problem, video transcoding has become an important topic. When original motion vectors are available in the compressed domain, it becomes possible to save computational cost by utilizing the known information. Although many fast motion re-estimation approaches have been proposed, such as average approach (AA), area-weighted-average (AWA) and median approach (MA), they are not suitable to convert an existing video to various kinds of resolutions. On the other hand, these reuse schemes may introduce quality degradation due to the reconstruction errors. In this paper, we propose a method to address this problem. First, we introduce a distance-trimmed filter (DTF) that improves accuracy of estimated motion vectors (MVs). Then we embed Kalman filter, which considers the correlation of motion characteristics of neighbor blocks in temporal and spatial domain, to improve the accuracy of estimated MVs for fast downscaling algorithms. The experimental results indicate that the proposed method provides an effective improvement of performance for arbitrary video downscaling.*

Keywords: Arbitrary video downscaling, Distance-trimmed filter, Kalman filter

1. **Introduction.** The rapid development of multimedia communication, such as the third-generation (3G) mobile communication, is leading to an increasing demand of mobile multimedia services. Nowadays, many service providers investigate various multimedia applications such as news, sports, entertainments and other media contents to serve the users of mobile communication networks. Therefore, to develop effective techniques for image and video compression became more and more important due to their wide applications. Recently, many researchers aimed to develop novel image compression techniques [1-5], which achieve high compression ratio and visual quality simultaneously. Meanwhile, an effective video compression technique that applies to various bandwidth networks is also necessary. For video compression, many video coding standards [6], such as MPEG-x or H.26x, have been developed. As the number of video formats increase, to convert the compressed information between delivery systems and the terminal devices in the heterogeneous networks becomes an important research area. Therefore, the scalable video coding (SVC) technique [7-11] has been developed and become an important technique to