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PII: S0923-5965(16)30118-7
DOI: <http://dx.doi.org/10.1016/j.image.2016.09.002>
Reference: IMAGE15130

To appear in: *Signal Processing : Image Communication*

Received date: 10 October 2015
Revised date: 2 September 2016
Accepted date: 4 September 2016

Cite this article as: Deepak Singh and Sukadev Meher, Direction-Adaptive Fixed Length Discrete Cosine Transform Framework for Efficient H.264/AVC Video Coding, *Signal Processing : Image Communication*, <http://dx.doi.org/10.1016/j.image.2016.09.002>

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Direction-Adaptive Fixed Length Discrete Cosine Transform Framework for Efficient H.264/AVC Video Coding

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Abstract

The 2D-discrete cosine transform (2D-DCT) is one of the popular transformation for video coding. Yet, 2D-DCT may not be able to efficiently represent video data with fewer coefficients for oblique featured blocks. To further improve the compression gain for such oblique featured video data, this paper presents a directional transform framework based on direction-adaptive fixed length discrete cosine transform (DAFL-DCT) for intra-, and inter-frame. The proposed framework selects the best suitable transform mode from eight proposed directional transform modes for each block, and modified zigzag scanning pattern rearranges these transformed coefficients into a 1D-array, suitable for entropy encoding. The proposed scheme is analysed on JM **18.6** of H.264/AVC platform. Performance comparisons have been made with respect to rate-distortion (RD), Bjontegaard metrics, encoding time etc. The proposed transform scheme outperforms the conventional 2D-DCT and other state-of-art techniques in terms of compression gain and subjective quality.

Keywords: Discrete cosine transform, Direction adaptive transform, Directional transform framework, Video coding, Video compression

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