

Accepted Manuscript

Signal and Image Compression Using Quantum Discrete Cosine Transform

Chao-Yang Pang, Ri-Gui Zhou, Ben-Qiong Hu, WenWen Hu, Ahmed El-Rafei

PII: S0020-0255(16)31097-0
DOI: <https://doi.org/10.1016/j.ins.2018.08.067>
Reference: INS 13911



To appear in: *Information Sciences*

Received date: 28 September 2016
Revised date: 28 August 2018
Accepted date: 30 August 2018

Please cite this article as: Chao-Yang Pang, Ri-Gui Zhou, Ben-Qiong Hu, WenWen Hu, Ahmed El-Rafei, Signal and Image Compression Using Quantum Discrete Cosine Transform, *Information Sciences* (2018), doi: <https://doi.org/10.1016/j.ins.2018.08.067>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Signal and Image Compression Using Quantum Discrete Cosine Transform

Chao-Yang Pang^{a,1}, Ri-Gui Zhou^{b,2,*}, Ben-Qiong Hu^{c,3}, WenWen Hu^{b,4},
Ahmed El-Rafei^{d,5}

^aCollege of Computer Science, Sichuan Normal University, Chengdu 610101, China

^bCollege of Information Engineering, Shanghai Maritime University, Shanghai 201306,
China

^cCollege of Management Science, Chengdu University of Technology, Chengdu 610059,
China

^dEngineering Physics and Mathematics Department, Faculty of Engineering, Ain Shams
University, Cairo, Egypt

Abstract

The discrete cosine transform (DCT) is widely used in image and video compression standard formats. This is due to its ability to represent signals and images using a limited number of significant coefficients without noticeable loss of visual clarity. The classical one-dimensional discrete cosine transform (1D-DCT) and two-dimensional discrete cosine transform (2D-DCT) have computational complexities of $O(N \log_2 N)$ and $O(N^2 \log_2 N)$, respectively. Thus, as the images grow in size, the runtime of the DCT highly increases which could limit its usability in real-time applications. This paper presents a quantum DCT algorithm (QDCT) that is more efficient than its classical counterpart in terms of complexity. Furthermore, the proposed QDCT is used to develop and realize a quantum image compression technique. The developed compression technique performs a search to determine the most

*Corresponding author

Email addresses: cyp_900@hotmail.com (Chao-Yang Pang), rgzhou@shmtu.edu.cn (Ri-Gui Zhou), vienvinhu@gmail.com (WenWen Hu), ahmed.elrafei@eng.asu.edu.eg (Ahmed El-Rafei)

¹The first author

²The second author

³The third author

⁴The fourth author

⁵The fifth author

Download English Version:

<https://daneshyari.com/en/article/10225719>

Download Persian Version:

<https://daneshyari.com/article/10225719>

[Daneshyari.com](https://daneshyari.com)