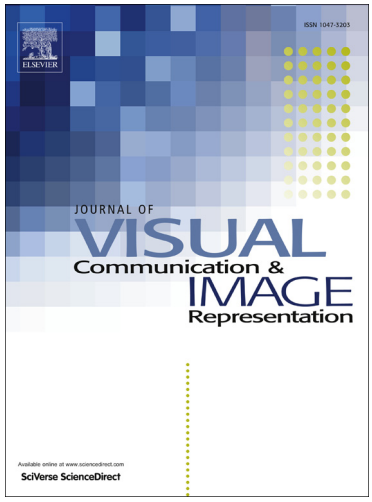

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Subjective Quality Evaluation of Compressed Digital Compound Images

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Abstract

Visual quality evaluation of compressed *Digital Compound Images* (DCIs) becomes important in many multi-device communication systems. In this paper, we study subjective quality evaluation for compressed DCIs and investigate whether existing *Image Quality Assessment* (IQA) metrics are effective to evaluate the visual quality of compressed DCIs. A new *Compound Image Quality Assessment Database* (*CIQAD*) is therefore constructed, including 24 reference and 576 compressed DCIs. The subjective scores of these DCIs are obtained via visual judgement of 62 subjects using *Paired Comparison* (PC) in which the Hodgerank decomposition is adopted to generate uncompleted but near balanced pairs. Fourteen state-of-the-art IQA metrics are adopted to assess quality of images in *CIQAD*, and experimental results indicate that the existing IQA methods are limited in evaluating visual quality of DCIs. Compression results of five coding methods are thus compared with respect to different quality metrics to illustrate the limitation.

Keywords: Digital compound image, quality assessment, subjective test, image compression.

1. Introduction

Inspired by various Internet related applications, such as remote computing platforms [1], virtualized screen sharing systems [2], multi-client communication systems [3], increasing visual contents are shared between different digital devices (i.e., computers, mobile phones, tablets, etc). In these applications, visual contents (e.g., web pages, PowerPoint and PDF files, and computer screen images) are represented in the form of *Digital Compound Images* (DCIs). For efficient transmission among different devices, transmission systems should be deployed in a platform-free manners (without consideration of different protocols of different systems) and DCIs have to be highly compressed. For this requirement, cloud computing systems provide a strategy to share DCIs from the cloud to thin-clients; such systems render visual contents as DCIs in the cloud and then transmit them after compression to clients [4]. Many other computer generated compound images, such as promotional posters and microblogs, are also represented and stored in the form of DCIs.

Existing studies have demonstrated that traditional compression algorithms (such as JPEG, JPEG2000 and H.264 intra coding) cannot encode DCIs efficiently due to the high frequency components in textual regions [5, 6]. To address this problem, many studies [4, 5, 6, 7, 8] propose segmentation techniques to decompose DCIs into textual and

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