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Design of an improved lossless halftone image compression codec

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Abstract

The popularity of high-resolution digital printers and the growing computational requirements of new applications such as printing-on-demand and personalized printing have increased the need for fast and efficient lossless halftone image compression. In a previous paper, we have shown that the compression performance can be improved significantly by adapting the context template to the halftone parameters. Unfortunately, this variability in data dependency makes the modeling stage more complex and slows down the overall compression scheme. In this paper, we describe the design of an improved block-based software and hardware implementation. The software implementation uses complementary line-shifting to by-pass the adaptivity of the template. The hardware implementation is based on the automated construction of a microcoded program from a given template. Experimental results show that our improved implementation achieves approximately the same processing speed as when the fixed context template is applied. The proposed implementation is also of importance for the emerging JBIG2 standard which uses up to four adaptive template pixels.

Keywords: Halftone image compression; Bilevel image compression; JBIG; JBIG2; Compression hardware

1. Introduction

Halftoning is the last stage in the prepress workflow before a document can be printed [16]. It transforms grayscale or color images into bilevel images which can be reproduced on a printing device. This is necessary because a printer is a binary medium: either there is ink or there is no ink. As a result, large bilevel images arise which put heavy constraints on the storage and transmission media.

New applications in the digitized prepress industry like telepublishing and printing-on-demand show a need for intermediate storage and fast transmission of the halftones. Therefore, halftone image compression will easily improve the flexibility and total cost of the workflow. Tasks that will benefit from compression are: temporary

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