Research Article

IMAGE CLASSIFICATION FOR JPEG COMPRESSION

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ABSTRACT

We analyse storage problems of digital images in accordance with image quality and image compression efficiency. Storage problems are relevant for Cloud storage and file hosting services, online file storage providers, social networks, etc. In this paper, an approach is proposed to process a group of images with a JPEG algorithm that all the processed images satisfy the minimum threshold of quality with the automatic selection of the quality factor (QF). The experimental investigation reveals advantages of the compression efficiency of the proposed approach over the traditional JPEG algorithm. The proposed approach enables saving storage spaces while maintaining the desirable image quality.

Keywords: Image quality, image classification, JPEG algorithm, storage of images, quality prediction, SSIM, PSNR.

INTRODUCTION

Nowadays, problems of digital data storage, processing, and information presentation are especially relevant. Image storage techniques analysed in the paper can be used for different host and Cloud services, online file storage providers, social networks, etc. In this paper, we investigate various digital images captured by digital cameras and an efficient storage of these images. We aim to design a more efficient (than the existing) approach to store images in JPEG format. For this purpose, we use the image classification considering to image properties in order to maintain the set quality of the images.

JPEG image compression standard and its basic principles were proposed many years ago [16], however, currently, the standard is widely used and remains the most popular algorithm for image compression. A quality factor (QF) is the main parameter influencing the image quality after JPEG compression, which determines the compression ratio. This parameter is an integer number between 0 and 100, used to parameterize a quantization matrix. The greater this number is, the less information is lost. The problem is that the QF value can influence the each image quality differently when the quality is assessed by Full-Reference measures [2, 8]. The paper [15] shows that when compressing different images by JPEG algorithm with the same compression factor, a different compression efficiency is obtained. In the paper [13] it was showed that the image quality after processing by JPEG algorithm depends on the image content. The image quality was assessed by the following measures: Compression Ratio (CR), Signal to Noise Ratio (SNR), Peak Signal to Noise Ratio (PSNR) and Mean Square Error (MSE) [11] and the Structural similarity (SSIM) index method [17].

One of the most popular approaches of image storage is based on the repetitive quality assessment of each compressed image and/or repetitive transcoding operations. Here, compression algorithm is applied several times for each image, the quality of the compressed images are assessed