



A new approach for image compression using normal matrices

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Abstract

In this paper, we present a method for image compression on the basis of eigenvalue decomposition of normal matrices. The proposed method is convenient and self-explanatory, requiring fewer and easier computations as compared to some existing methods. Through the proposed technique, the image is transformed to the space of normal matrices. Then, the properties of spectral decomposition are dealt with to obtain compressed images. Experimental results are provided to illustrate the validity of the method.

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1 Introduction

Nowadays, digital images and other multimedia files can become very large in size and, therefore, occupy a lot of storage space. In addition, owing to their size, it takes more time to move them from place to place and a larger bandwidth to download and upload them on the Internet. So, digital images may pose problems if we regard the storage space as well as file sharing. To tackle this problem, *image compression* which deals with reducing the size of an image (or any other multimedia) file can be used. Image compression actually refers to the reduction of the amount of image data (bits) required for representing a digital image without causing any major degradation of the image quality. By eliminating redundant data and efficiently optimizing the contents of a file image, provided that as much basic meaning as possible is preserved, image compression techniques, make image files smaller and more feasible to share and store.

The study of digital image compression has a long history and has received a great deal of attention especially with respect to its many important applications. References for theory and practice of this method are [5, 6], to name but a few.

With respect to the influences of singular values of A in compressing an image, and considering the important point that the singular values of A are the positive square roots of the eigenvalues of matrices A^*A and AA^* , the present study concerns itself with the eigenvalue of the normal matrices $A + A^*$ and $A - A^*$ on the purpose of establishing certain technique for image compression that is efficient, leads to desirable results and needs fewer calculations.

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