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Compression and denoise of an image by LU and QR Decompoition

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Abstract

Image data postulates to a greater extend space for storage, bandwidth while transmission in communication system is demand huge computational power. Every format of data contains much information. Hence it is necessary to decomposition the image data, there are many image decomposition techniques used to utilize storage and bandwidth in communication system, and these are basically spatial domain and frequency domain. Spatial domain is operates the image on gray scale values. Aim of the paper is analysis using LU decomposition and QR decomposition, also comparison between the decomposition. Calculate the condition number for measures how change in input image is propagated to change in output image.

KEYWORDS: LU decomposition, QR decomposition, condition number

INTRODUTION

Data for an image need more space for storage. More redundant information contains each and every format of data. Thus the image compression has been continues to be crucial to the development of computing[1],[2]. It plays a vital role of document and medical imaging. Compression of data is very essential ingredient in any data storage. Large transmission bandwidth and transmission time for an image[3]. Lossless compression is the original data can be recovered from the compressed data. Lossy compression techniques involve some loss of information and the compressed image has more noise added to the data[5],[6]. Principle of

most images is that the neighbouring pixel is correlated and existing redundant information[4]. Spatial is the redundancy between the neighbouring pixel values. All types of an image compression having a common nature to alter the representation of information contain of in an image[7].

LU DECOMPOSITION

A m×n matrix is said to have a LU-decomposition if there exists matrices L and U with the following properties:

(i) L is a m×n lower triangular matrix with all diagonal entries being 1.

(ii) U is a m×n matrix in some echelon form.

(iii) $A = LU$.

LU decomposition step: [A] is factored or "decomposed" into lower [L] and upper [U] triangular matrices.

Substitution step: [L] and [U] are used to determine a solution {X} for a right hand side {B}. which can be solved by back substitution for {X} .

Suppose to solve m x n system AX=b solved by forward or backword substitution

QR DECOMPOSITION

A matrix $Q \in R$ m X m is called orthogonal if the columns q_i, 1<i<m of Q form an orthonormal basis of Rm

if A is m × n and left-invertible then it can be factored as A = QR

• R is n × n and upper triangular with $r_{ii} > 0$

• Q is m × n and orthogonal ($Q^TQ = I$) can be computed in 2mn2 flops.

EXPERIMENTAL ANALYSIS

In this paper we have applied the LU decomposition method .This decomposition method decomposes the image into two parts L and U, represents the Lower and Upper elements of the given image respectively. The original image can be obtained by multiplying L*U, where the minor difference can be obtained due to round-off values. QR decomposition method .It is

decomposes the image into two parts Q and R and the original image can be obtained by multiplying Q*R, where the min The difference can be obtained due to round-off values for different images with JPG file format. The condition number also presented in the following tables.

Table :1

IMAGE	SIZE OF THE ORIGINAL IMAGE IN KB	SIZE OF THE GRAY SCALE IMAGE (KB)	SIZE OF THE RECONSTRUCTED IMAGE (kb)	SIZE OF THE DECOMPOSED IMAGE (LU) KB	SIZE OF THE DECOMPOSED IMAGE (QR) KB	COMPRESSION RATIO (%)
Image 1.JPG	31.7	28.2	5.12	4.76	3.70	14.13
Image2.JPG	46.3	43.9	4.84	5.48	3.66	5.96
Image3.JPG	92.8	88.4	7.18	5.48	3.83	3.64
Image 4.JPG	37.9	36.9	4.98	4.74	3.83	13.17
Image 5.JPG	58.7	55.1	6.37	5.39	3.76	9.39
Image 6.JPG	118	106	5.63	5.26	3.83	4.88

data compression and normally providing a compression ratio of 2 to 10 and they are equally applicable to both binary to gray scale images The above results reveals that we have applied LU decomposition method for different images with jpg file format and noted the size of U and L, and calculated the compression ratio, and we are getting the original image by multiplying L*U, where the minor difference can be obtained due to round-off values. Through this LU decomposition technique we have achieved compression ratio less than 20 and the above results reveals that we have applied QR decomposition method for different images with jpg file format and noted the size of Q and R, and calculated the compression ratio, and we are getting the original image by multiplying Q*R, where the minor difference can be obtained due to round-off values. Through this QR decomposition technique we have achieved compression ratio less than 20.

CONCLUSION

The above results shows that QR decomposition is better compression method to compare with LU decomposition. QR decomposition method gives the exact compression of the image and numerical stability of QR factorization method is better .There are many techniques for image data compressions like Variable length coding, Huffman coding, Predictive coding are the most commonly used coding techniques for data compression and normally providing a compression ratio of 2 to 10 and they are equally applicable to both binary to gray scale images . In this paper we have applied LU decomposition and QR decomposition method for different images with JPG file .Multiplying L*U and Q * R where the minor difference can be obtained due to round-off values. Condition number is greater than one it is bad images. According to our results it shows that less than one only .It means the accuracy of the propagated out put images.

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