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REVIEW ARTICLE

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Various approaches of colored image compression using Pollination Based Optimization

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Abstract- *Image compression reduces the storage space required for an Image to store and the bandwidth wanted when streaming that image across a network. In this paper various techniques or approaches defined. Many researcherspurposed techniques studied and how to reduce with compression.*

Keywords-*PBO,DCT,DWT,JPEG, PSNR, MSE.*

INTRODUCTION

1.1 Image compression

Image compression is minimizing the size in bytes of a graphics file without degrading the quality of the image to an unacceptable level. The reduction in file size allows more images to be stored in a given amount of disk or memory space. It also reduces the time required for images to be sent over the Internet or downloaded from Web pages. There are several different ways in which image files can be compressed. For Internet use, the two most common compressed graphic image formats are the JPEG format and theGIF format. The JPEG method is more often used for photographs, while the GIF method is commonly used for line art and other images in which geometric shapes are relatively simple.

1.2 Need of Compression

In a raw state image can occupy a large amount of memory both in RAM and in storage memory. Image compression reduces the storage space required for an Image to store and the bandwidth wanted when streaming that image across a network.

1.3 Benefits of Compression

- It give a potential cost savings linked with sending less data over switched phone network where charge of call is really usually based upon its time.
- It reduces storage size and also on the whole execution time.
- It reduces the probability of transmission errors as lesser bits are transferred.
- It provides high level of safety against illegal monitoring.

1.4 Image Compression Techniques

The image compression techniques are generally classified into two categories depending on whether an exact duplicate of the original image can be reconstructed by means of the compressed image or not. These image compression techniques are:

1. Lossless technique

2. Lossy technique

In Lossless technique, the reconstructed image, after compression, is same to the original image.

1. Run Length Encoding: Run length encoding is one of the simplest image compression techniques. It consists of replacing a sequence of the same symbols by a pair containing the symbol and run length.
2. Huffman Encoding: Huffman coding is based on the frequency of amount of data items. This principle is used to lower the number of bits for encoding the data that occurs more frequently and these codes are stored in code book. This may be constructed for an image or for number of images. In all cases the generated code book and encoded data is transmitted to allow decoding.
3. Arithmetic coding: In this technique in place of coding each symbol individually whole image sequence is coded with a single code. Thus the correlation on adjacent pixels is exploited.
4. LZW coding: LZW algorithm is based on the occurrence of variety character sequences in the string which are to be encoded. Its principal consists of substituting patterns with an index code by increasingly building a dictionary. The dictionary is started with 256 values of the ASCII table. The file to be compacted is split into strings of bytes each of these strings are compared with the dictionary and is added if not found there. In encoding process the algorithm go over the stream of data to ensure if coding a string is not minor than the longest word in the dictionary then it is transmitted. In decoding procedure the algorithm rebuilds the dictionary in the opposite direction and does not need to be stored.
5. Predictive coding: Predictive coding technique another example of examination of inter pixel redundancy, in which the fundamental idea to encode only the new information in each pixel. This new information is usually definite as the difference between the actual and the imaginary value of the pixel. The predictor's output is rounded to the nearest integer and compared with the real pixel value: the difference between the two is called prediction errors.

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2 REVIEW OF LITERATURE

John in this research the JPEG image compression algorithm is one of the most common technique of signifying graphical information in a digital form for spatially cases the colour components of an image as red, green and blue. These digitized samples can be placed in a long sequence for the reason of storage and transmission. For any sensibly detailed image this string of example can become very long. As a result various methods are employed to transform this representation into a compact form. A particular approach for image compression is known as the JPEG algorithm which is examined at this time.

Sonal in this research study Sonal addresses the area of image compression as it is related to various fields of image processing. On the basis of assessment and analysis of the current image compression technique this paper presents the principal parts analysis approach which is applied to image compression. PCA approach can be implemented in two different ways PCA statistical approach and PCA neural network approach. It have many benefits of using image compression techniques.

Hamedin this research the smart water drops algorithm is a nature enthused swarm based optimization algorithm. A usual river often finds good path among lots of likely paths in its way from source to end. This optimal path is obtained by act and reaction that occur among the water drops and the water drops with the riverbeds. The intelligent water drop algorithm is a new swarm based optimization algorithm enthused from watching of natural water drops which flows in river. In this paper the IWD algorithm is tested to find solution of then queen puzzle with a simple local heuristic. The travelling salesman trouble is also solved with a customized IWD algorithm. Furthermore the IWD algorithm is tested with numerous knapsack problem in which near optimal or optimal solution is obtained.

Mohsen in this research efficient JPEG 2000 image compression system for multi hop wireless network is used by means of wireless sensor network for real time data transmission and during which some vital points are measured. Restricted computational power, reduced memory, narrow bandwidth and energy supplied present strong limits in sensor nodes. So maximizing network lifetime and minimizing energy utilization are always optimization goals. To overcome the computation and energy check of individual sensor nodes during image transmission an energy resourceful image transport scheme was proposed. JPEG 2000 provides a practical set of variety which was not accessible in the previous standards.

Jilani in this research JPEG image compression by means of FPGA with artificial neural network image and video compression is one of the main component used in video telephony, video conferencing and multimedia related applications where digital pixel information can compromise significantly large amount of data. Organization of this data can involve overhead in computational complexity and data processing. Compression allows well-organized utilization of channels bandwidth and storage space. Naturally access speed for storage medium is inversely proportional to capacity. Execution of this work is done with JPEG algorithm and with artificial neural networks.

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3 APPROACHES USED

3.1 Flate/deflate compression:

Deflate is a smart algorithm that adapts the way it compresses data to the actual data themselves. There are three modes of compression that the compressor has available:

1. Not compressed at all. This is an intelligent choice for, say, data that's already been compressed. Data stored in this mode will expand slightly, but not by as much as it would if it were already compressed and one of the other compression methods was tried upon it.
2. Compression, first with LZ77 and then with a slightly modified version of Huffman coding. The trees that are used to compress in this mode are defined by the Deflate specification itself, and so no extra space needs to be taken to store those trees.
3. Compression, first with LZ77 and then with a slightly modified version of Huffman coding with trees that the compressor creates and stores along with the data.

The data is broken up in "blocks," and each block uses a single mode of compression. If the compressor wants to switch from non-compressed storage to compression with the trees defined by the specification, or to compression with specified Huffman trees, or to compression with a different pair of Huffman trees, the current block must be ended and a new one begun.

3.2 JPEG Compression:

JPEG, which stands for Joint Photographic Experts Group (the name of the committee that created the JPEG standard) is a lossy compression algorithm for images. A lossy compression scheme is a way to inexactly represent the data in the image, such that less memory is used yet the data appears to be very similar. This is why JPEG images will look almost the same as the original images they were derived from most of the time, unless the quality is reduced significantly, in which case there will be visible differences. The JPEG algorithm takes advantage of the fact that humans can't see colors at high frequencies. These high frequencies are the data points in the image that are eliminated during the compression. JPEG compression also works best on images with smooth color transitions, which will make sense when I explain below how the algorithm works.

JPEG Algorithm

The algorithm behind JPEG is relatively straightforward and can be explained through the following steps:

1. Take an image and divide it up into 8-pixel by 8-pixel blocks. If the image cannot be divided into 8-by-8 blocks, then you can add in empty pixels around the edges, essentially zero-padding the image.

2. For each 8-by-8 block, get image data such that you have values to represent the color at each pixel. 3. Take the Discrete Cosine Transform (DCT) of each 8-by-8 block.

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4. After taking the DCT of a block, matrix multiply the block by a mask that will zero out certain values from the DCT matrix.
5. Finally, to get the data for the compressed image, take the inverse DCT of each block. All these blocks are combined back into an image of the same size as the original.

As it may be unclear why these steps result in a compressed image, I'll now explain the mathematics and the logic behind the algorithm.

3.3 Hu–man Codes

Huffman codes give an efficient encoding for a list of symbols to be transmitted, when we know their probabilities of occurrence in the messages to be encoded. We'll use the intuition developed in the previous chapter: more likely symbols should have shorter encodings; less likely symbols should have longer encodings. If we draw the variable-length code of tree, we'll get some insight into how the encoding algorithm should work: To encode a symbol using the tree, start at the root and traverse the tree until you reach the symbol to be encoded the encoding is the concatenation of the branch labels in the order the branches were visited.

3.4 LZW compression:

LZW is named after Abraham Lempel, JakobZiv and Terry Welch, the scientists who developed this compression algorithm. It is a lossless 'dictionary based' compression algorithm. Dictionary based algorithms scan a file for sequences of data that occur more than once. These sequences are then stored in a dictionary and within the compressed file, references are put where-ever repetitive data occurred.

Lempel and Ziv published a series of papers describing various compression algorithms. Their first algorithm was published in 1977, hence its name: LZ77. This compression algorithm maintains its dictionary within the data themselves.

Sr. No.	Approach Name	Advantage	Disadvantages
1	Flate/deflate compression	It compresses the data within modes. The data is broken up in "blocks," and each block uses a single mode of compression	It always creates a new block If the compressor wants to switch from non-compressed storage to compression.
2	JPEG Compression	This technique is lossy technique. A lossy compression	This technique has high frequency that humans can't see colors at high frequencies.
		scheme is a way to inexactly represent the data in the image, such that less memory is used yet the data appears to be very similar.	
3	Huffman Codes	The output from Huffman's algorithm can be viewed as a variable-length code table for encoding a source symbol	This is lossless data compression approach.
4	LZW compression	LZW compression is the best technique for reducing the size of files containing more repetitive data. LZW compression is fast and simple to apply.	This avoids insertion of large string translation table with the compression data.

CONCLUSION

Image compression is minimizing the size in bytes of a graphics file without degrading the quality of the image to an unacceptable level. The reduction in file size allows more images to be stored in a given amount of disk or memory space. We studied about various approaches i.eFlate/deflate compression, JPEG, Huffman Codes ETC. Our first problem is to study the JPEG image compression and need to compare the results in terms of Compression Ratio with the implementation of JPEG Compression using Pollination Based Optimization (PBO). PBO based JPEG Compression is a new technique and we expect the results of compression to be far better in comparison to the JPEG Compression. The purpose of work is to enhance the results for the lossy image and to compare the values of the previous implemented results with the new implemented technique. Out of these approaches we conclude that our system gives us better results

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