

# Image Compression Techniques: A Review

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**Abstract** - Aim of this paper is to review the various image compression techniques. Images are used in almost every application and its very supreme part of the data. But various applications cannot use or upload the image directly because of its large image size. We use various image compression techniques to reduce the size of the images[1]. In this paper we will review various image compression techniques such as Lossless and lossy compressions. Lossless algorithms eliminate redundant information on the other hand lossy compression eliminates both redundant as well as irrelevant information.

**Key Words:** Lossless, Lossy, Image Compression, Compression Ratio, Image Quality.

## 1. INTRODUCTION

Image compression is one of the most useful technologies which are used to reduce the amount of data needed to represent an image respectively. There are lots of images compressed and decompressed themselves which is virtually not known or visible to the users. Digital images are used in modern applications such as advanced communication systems and multimedia applications [2]. If digital images are without compression then it would need high range of bandwidth for transmission and also need large storage capacity. Data compression is used to reduce the size of the data. We use various effective image compression techniques for reducing the total number of bits required to make an image. Various Compression techniques have been developed in the last two decades. Image compression techniques are broadly classified into two types of algorithms such as Lossless and Lossy compression [1].

### 1.1 Compression Ratio

Compression ratio is the ratio of bits uncompressed to bits compressed.

$$\text{Compression Ratio} = \frac{\text{Uncompressed Size}}{\text{Compressed Size}}$$

## 2. Types of Images

### 2.1 TIFF

The TIFF stands for Tagged Image File Format. This format is used for both lossless and lossy Compression. TIF files require large size there it is not suitable for the web transmission.

### 2.2 GIF

GIF stands for Graphics Interchange Format (GIF) and it is used in Loss Less compression. It is used to store Logos and cartoon images etc.

### 2.3 RAW

RAW file are those formats which includes those images that are directly taken from Digital cameras. RAW used both lossless or lossy compression method require manufacture's software to view the images.

### 2.4 PNG

The PNG stands for portable Network Graphics file format that supports 8 bit, 24 bit, 48 bit true color. With the help of PNG format we can reduce the size to 10% to 30% more compressed than the GIF format.

## 3. Types of Compression

There are two types of compression algorithms such as Lossy compression and Lossless compression respectively.

### 3.1 Lossy compression

Lossy compression is also known as irreversible compression. Files produced by lossy method are very compact or small in size which meets the requirement of the specification. Usually the images compressed by this method are reduced to 1/10<sup>th</sup> of their original size. But if we do the closer inspection of the image produced by this method, we notice kind of quality loss. Lossy methods only generate an approximation of images. Lossy compression has great reduction in the size of image or file by simplifying the complexity of the data and by removing some of the data [5]. One of the best examples of the lossy compression is the videoconferences where in order to deliver the image in real time, there is a frame loss in an acceptable amount. In the video-conferences, people while movements could be jerky but still we can have grasp of what is happening in the real? In the lossy compression file may be as good as original or it may sound acceptable but it will be a degraded copy.

Lossy includes following File:

1. Lossy Audio- AAC,MP3,VORBIS etc
2. Lossy video- M2V,H.264
3. Lossy graphics- Jpeg

Usually in the lossy compression there are three steps algorithm involved. In the very first step, to make the information effective there is elimination of the inter-pixel redundancy. In the second step, to make the image more compressed, quantizer is used to reduce or eliminate the psycho-visuals redundancy. In the last step, the output of the quantizer such as quantized bits is encoded more effective so that we can get more compression.

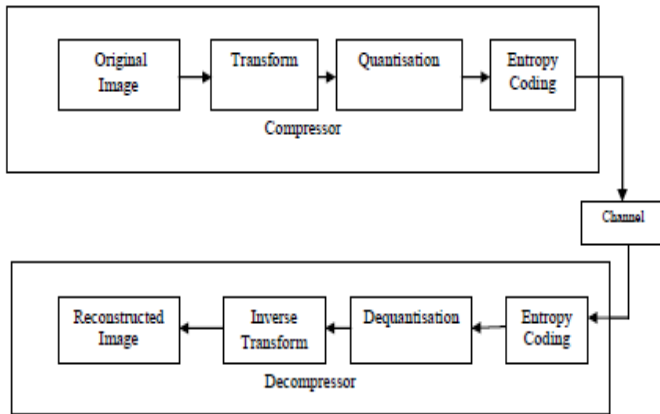


Fig -1: Represents lossy compression

### 3.2 Lossless Compression

Computer program will not run correctly if the line of code is missing. These programs must use lossless compression. We know that compression ratio is very lower in lossless compression therefore we exact original data is recovered from compressed data. An example of lossless compression is the PKZIP compression technology. One of the major advantages of lossless compression is that the files are reproduced exactly and with higher resolution.

Two step algorithms are generally used in lossless compression. In the first step of algorithm, original image is transformed into some other format to reduce the inter-pixel redundancy[11]. In the second step, entropy is used to reduce a coding redundancy. The output is exactly similar to the original image. The schematic figure of lossless compression is given below:

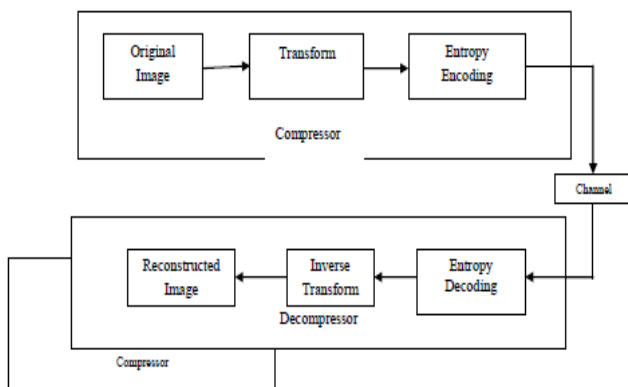


Fig -2: Represents lossless compression

There are various techniques used in lossless compression but one of them is Run Length Coding which is explained below:

#### 3.2.1 Run Length Coding

In this compression technique, two or more than two same characters or we can say repeated symbols in a string are replaced by a symbol followed by the original character. For example

aaabbccccaaaabbbbbbb by a3b2c4a5b6

### 4. Difference between Lossless and lossy compression

Under data compression methods, Lossy compression and Lossless compression are the two key terms which are broadly classified [7]. The key difference between Lossy compression and Lossless compression is that lossy compression techniques produces data after decompression that is near match of the data whereas lossless compression techniques produces exact original data[8][10]. Fig. 3 represents the schematic image difference between Lossless and lossy Compression.



Fig -3: Represents the image difference between Lossless and Lossy compression

### 5. CONCLUSION

From the above discussion we have concluded that Lossy compression is most widely used because of its high compression ratio. This paper has concluded that still there are various issues in image compression techniques. It is reviewed clearly that, the techniques of image compression have high scope and interest to researchers in the coming days

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## BIOGRAPHIES



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