

PNG vs JPEG Image Compression

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Abstract—JPEG and PNG are the two image file formats that prevail over other formats. One format is not better than the other, rather both have their own uses. In this project, we will show how PNG(lossless) compression is done using the LZW(Lempel-Ziv-Welch) method and JPEG(lossy) compression using the DCT(Discrete Cosine Transform) method and discuss their advantages and disadvantages as well.

Index Terms—Image compression, JPEG, PNG, DCT, LZW, lossy, lossless

I. INTRODUCTION

IN today's world images or pictures are the new modes of storing data thus, every single moment millions of images are generated, recorded, transmitted, and stored in numerous ways. A digital image is stored in the form of a 2-D array of pixel values. Nowadays because of the generation of high loads of data, we need to reduce the load of data trafficking for smoother networking. We use image compression for reducing data from the image.

Image compression can be either lossless or lossy. Lossy compression gives almost visually negligible difference and also less storage. Lossless compression on the other hand focuses on retaining the quality of the image. The most commonly used lossy compression method is DCT which is used in JPACk compression formats. For lossless compression, LZW is the most widely used method which is used in PNG compression.

II. BACKGROUND

Image Compression is mainly done using lossy image compression and lossless image compression. Lossy image compression leads to the loss of some information. In lossless image compression, the recreated image is similar to the original image. The main aim of lossy image compression is to reduce image size without any noise which leads to the loss of some data. Lossless compression is aimed at no loss of information but it is affected by noise. Generally, a JPEG image is compressed by lossy compression and a PNG image is compressed by lossless compression. DCT and LWZ are the most commonly used image compression methods. The lossy compression process includes lossy predictive coding and transforms coding. Fourier related transforms such as DCT is mainly used for lossy compression. Since lossless compression requires no loss of information, the LZW provides that feature by using methods and algorithms of linear algebra. LZW is a dictionary-based lossless compression technique. In this method, the data is stored in the form of a dictionary and references are given to the repeated data.

III. MOTIVATION

In today's world, data storage is a problem found in every field. Image compression allows us to balance quality and storage as per our requirements. JPEG and PNG are the best image compression formats. At times we need high-quality images and on the other side at someplace, even if the quality is reduced but less storage is more preferable. JPEG is a lossy format, which means the compression ratio is high but the quality of the image will be reduced. But it will give a good combination of good quality and compression. The biggest motivation to use this format is that it is available on almost every device and is also storage-friendly. Some cons of using this format are that it supports only 1-3 colours and image quality will be reduced after encoding. PNG is a lossless format so that the quality of the image will not be reduced. There are also some cons of PNG format that due to no compromise with the quality it has less compression ratio and the image storage is not reduced.

IV. LITERATURE REVIEW

Image compression is an important field of research because there is a massive flow of images on the internet and an uncompressed image requires more space and transmission bandwidth. It is also important to develop a system that compresses the image while taking the critical image/video information into consideration. Some popular transformation techniques are Singular Value Decomposition (SVD), Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT). Image compression can be improved by using a bit plane slicing and adaptive Huffman with LZW dictionary. LZW compression has a limitation of the type of image and the number of colours. This limitation can be reduced by using bit plane slicing and the compression ratio is also much better as compared to the standard LWZ method.

While comparing the two methods of image compression: lossy and lossless, researchers found that the quality of the image made using lossless compression is better than that made after compression using lossy compression. But while comparing the compression ratio they found lossy compression is performing better than lossless compression.

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