

Image processing Hw2

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1 Introduction

Image compression plays a crucial role in reducing the size of digital images while maintaining acceptable visual quality. PNG (Portable Network Graphics) is one of the most widely used image compression techniques. In this report, we will explore the features of PNG and discuss its effectiveness as an image compression format.

1.1 What is PNG

PNG is a lossless image compression format that was developed as an alternative to the GIF (Graphics Interchange Format). It supports both 8-bit and 24-bit color images, and its primary goal is to provide high-quality compression without significant loss of image data. PNG achieves this through various compression and filtering techniques.

2 Compression Techniques

PNG employs two main compression techniques: deflate compression and adaptive filtering.

2.1 Deflate Compression

Deflate compression is a widely used algorithm for lossless data compression. It combines the LZ77 algorithm for string matching and the Huffman coding technique for entropy coding. LZ77 replaces repeated occurrences of data with references to a single copy, while Huffman coding assigns shorter codes to more frequently occurring data. Together, they reduce the overall size of the image data without losing any information.

2.2 Adaptive Filtering

PNG uses adaptive filtering to reduce redundancy in image data. This technique exploits the correlation between neighboring pixels in an image. By predicting the value of each pixel based on its neighbors, PNG can represent the image more efficiently. The filtered image data is then compressed using deflate compression.

3 Advantages of PNG

PNG offers several advantages as an image compression format:

3.1 Lossless Compression

Unlike other popular formats such as JPEG, PNG uses lossless compression, meaning it does not sacrifice image quality. It preserves all the original image data, making it ideal for images that require pixel-level accuracy, such as diagrams, logos, and text-based graphics.

3.2 Transparency Support

PNG supports alpha channel transparency, allowing images to have transparent backgrounds or partially transparent pixels. This feature is particularly useful for web designers and graphic artists who need to overlay images on different backgrounds.

3.3 Wide Browser Support

PNG is widely supported by modern web browsers and image editing software. It has become a standard format for displaying images on the internet, ensuring compatibility across various platforms and devices.

4 Conclusion

PNG is a powerful image compression technique that provides high-quality compression without sacrificing image data. With its lossless compression, transparency support, and widespread browser compatibility, PNG has become a popular choice for a wide range of applications. It is especially suitable for graphics that require precise details and transparency effects. By leveraging deflate compression and adaptive filtering, PNG achieves efficient compression while preserving image integrity.