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A COMPREHENSIVE EXAMINATION OF MACHINE LEARNING IN IMAGE COMPRESSION TECHNIQUES

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Abstract—
The need for efficient data compression is growing quickly. The paper offers a comprehensive introduction to compression principles, compression types, and techniques for image compression. Image compression provides solutions for issues in virtual photo transmission. A significant amount of data is preserved for virtual visuals. Image compression finds application in various fields, including satellite-based remote sensing, television broadcasting, and long-range communication. Image storage is needed for satellite pictures, medical images, textual documents, and photographs. Machine learning concepts are pervasive and can be employed for image compression tasks. Some sample visuals have undergone compression resulting in diminished image quality. This paper aims to assist in ranking top-performing and widely adopted image compression algorithms while exploring the connection between image compression and machine learning methods.

Keywords—
Image compression technique, k-means clustering, Loss less and Lossy image compression. Machine Learning, Run Length Encoding, Transform Coding, DCT, DWT, Huffman Coding

I. INTRODUCTION

Digital images are made up of pixels, and each pixel addresses shade and color at a single point within the image. By estimating the hue or color of an image at any number of focused points, we can estimate the image under computer control. The pixels are arranged in a regular pattern of rows and columns in matrices, a digital image is represented by a 2D matrix. Digital image compression is used to reduce the redundancy of the image data in order to enable the storage or transmission of data with a minimum space or a maximum bandwidth as possible, while the resolution and thus the visual quality of the reconstructed image is kept as close as possible to the original image. The main focus in data compression is on reducing the amount of image data (bits) while retaining the information. Image data compression is an important part of camera design and digital imaging processes. [1-2].

Numerous applications need a huge number of images that can be used and stored for tackling the issues. This storing space(disk) of the image is significant because less memory space implies the image time has required to prepare the image. Hence, image compression is being needed that decreases the measure of information needed to address a computerized image. Image compression is the way toward encoding an image to decrease the number of bytes needed to store or communicate the image.

Object recognition, Speech recognition, pattern recognition character recognition, classification, Face recognition, computer vision, and other high-level image processing applications have been researched and applied in recent years as computing power has increased, Machine learning and deep learning techniques have become more diverse as technology has progressed. Image enhancement, machine translation, and other services are available. However, picture compression and low-level image processing have only recently become popular. In the literature, there are numerous review articles on compression and data compression. Compression occurs when one or more of the three key data redundancies are removed. (1) Pixel redundancy: nearby pixels in a picture are not statistically independent; this is due to inter-pixel redundancy; this sort of redundancy is also known as spatial redundancy. It may be investigated in a variety of methods, one of which is to anticipate a