# Data compression：Analysis at present and prospect of the future

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Abstract

Data compression is a basic technology in computer science and information technology.It aims to decrease the size of data so that we can store and transfer it more conveniently.This paper talks about the introduction of data compression, analysis at present and prospect of the future.

It is the process of encoding information using fewer bits than the original representation.(Mahdi, O.A.; Mohammed, M.A.; Mohamed, A.J.2012).With the crazy increase of digital data.It is more and more important to compress data in order to store and transmit better.We can divide data compression into two categories, lossless compression and lossy compression.

Lossless compression involves Huffman Coding, LZW and RLE.Huffman Coding uses variable length coding tables to encode source symbols.It assigns short code for high frequency characters and long code for low frequency characters.LZW is also a very common compression technique. This algorithm is typically used in GIF and optionally in PDF and TIFF.(Rahul Awati,2023)RLE is a compression technique with a brute-force simplicity. It reduces the amount of data by recording the number of consecutive identical elements and the value of that element, and is suitable for simple images or data streams. Lossy compression usually includes JPEG, MP3 and H.264. JPEG stands for Joint Photographic Experts Group, is an image file format that allows adjusting the size and quality of the image to implement compression.MP3 is digital audio encoding and lossy compression

format that  is designed to reduce the amount of the audio data to achieve the purpose of data compression. Because the discarded part is not that important for hearing or hard to identify by humans , the experience effect of users  has not decreased much.H.264 is the most common video compression standard in use. It can encode high quality video at lower bit rates than older compression standards.(Bitmovin,2019) It supports a maximum resolution of 8K UKD.

Through the introduction about data compression, we can roughly know that data compression plays an important role in internet data transmission, cloud storage, data analysis .what attracts more to me is machine learning.These years, machine learning for AI has being more and more popular in data compression.through learning about the characteristics and some patterns of the data, machine learning can develop some more efficient compression algorithms like autoencoder. An autoencoder is a type of neural network architecture designed to efficiently compress (encode) input data down to its essential features, then reconstruct (decode) the original input from this compressed representation.(Dave Bergmann, Cole Stryker,2023) And GANs

Looking to the future, data compression will influence deeply in several respects:quantum computing, edge computing and processing of real-time data.Quantum computing is a multidisciplinary field comprising aspects of computer science, physics, and mathematics that utilizes quantum mechanics to solve complex problems faster than on classical computers.(AWS,n.d.)This kind of algorithm may change traditional  data compression algorithms for more efficient compression.Edge computing is a distributed computing model that brings computation and data storage closer to the sources of data.As its become increasingly widespread,edge computing will require more efficient data compression to reduce transmission latency and bandwidth consumption.Real-time data processing will also promote the development of data compression technology to meet the needs of low latency.

In my opinion,data compression has been becoming more and more important nowadays.As the needs of data compression increase, people focus on advanced data compression algorithm more.Through more and more innovations and improvements,advanced data compression technology will provides more efficient solutions to face the challenges in the future.

## Citations


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