

1 | What is Data Compression?

⇒ Data Compression is a process of reducing the size of data or file to save the storage time.

Data Compression is used to reduce the size of any original data to save the space or time.

This process is used to represent the same information using less size than the original representation.

Data Compression can not change the original representation of data.

Data Compression provides faster data transmission, improves the performance of data and reduces the storage cost of data.

=> Difference Between Lossy and Lossless Compression.

Lossy Compression	Lossless Compression
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1	Data is loss of quality and data.	Data is not loss of quality and data.
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2	The Data does not restore in its original form of data.	The Data is always restore in its original form of data.
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3	Quality of data is low.	Quality of data is high.
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4	It is commonly used for multi-media data compression.	It is commonly used for text-based data compression.
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5	Data Reduction is higher.	Data Reduction is lower.
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6	It does reduce the file size as much as Lossless compression.	It does not reduce the file size as much as Lossy compression.
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2 Explain Data Compression = modeling + coding.

=> Data Compression algorithm can be divided into two parts.

ci) Modeling

cii) Coding

ci) Modeling :

In Data Compression, When we trying to extract information in any reduce form of data then we have to define ~~the~~ the model for compression. This is called the Modeling.

cii) Coding :

In Data Compression, Source and bit rate reduction is the process of encoding the information using reduce bits then the original bit representation. This is called the Coding.

3 Define the Terms:

ca) Data Compression: Data Compression is a process of reducing the size of data which save the data transmission time and save the storage space which is not loss the Original form of data.

b) Compression Ratio: Compression Ratio is defined as the ratio between the Uncompressed size of data and Compressed size of data.

Compression

$$\text{Ratio} = \frac{\text{Uncompressed Data size}}{\text{Compressed Data size}}$$

Compressed
Data size

(c) Lossy Compression: Lossy Compression is one type of data compression method in which data is lost the quality and data and does not restore in its original form of the data.

(d) Run Length Coding: Run Length Coding is a simple form of data compression which is commonly used for compressing data where sequences of the same value or pattern occur frequently.

(e) First Order Entropy: First-Order entropy is also known as simple Shannon entropy it is measure of the average information content

of a set of symbols based on their ~~en~~ probabilities.

$$\text{Entropy } (H_i) = \sum_i P(x_i) \cdot \log_2(P(x_i))$$

7) Mention Advantages and Disadvantages of Data Compression.

=> Advantages of Data Compression:

(a) Reduced Storage Space:

Data Compression allows for more efficient use of storage space by reducing the size of data.

(b) Faster Data Transmission:

Compressed data can be transmitted more quickly over the network.

(c) Improved Performance:

Compression can lead to improved system performance by reducing the amount of data that needs to be processed.

(d) Cost Savings:

Compression can reduce the

Storage requirements and improved the system performance.

(e) More Disk Space and More File storage options.

=> Disadvantages of Data Compression

(a) Loss of Information:

Some compression algorithms result can loss the information and reduce the quality of data.

(b) Processing Overhead:

Compression and Decompression processes require additional computational resources.

(c) Time:

Compression and Decompression can take time when we use complex algorithms.

(d) Complexity of Algorithm:

Some Compression algorithm are complex and require computational resources.

(e) Need to Decompress the Previous data.

10 What are the measures of data compression algorithm.

=> Data Compression Algorithm is a technique used to reduce the size of data for more efficient storage and transmission.

Every Data Compression algorithm gives a Compression ratio.

If the Compression ratio is high than we can save more space.

If the Compression ratio is low than we can not save the more storage space.

Data Compression ratio is defined as the ratio between the

uncompressed size and compressed size.

$$\text{Compression Ratio} = \frac{\text{Uncompressed Data size}}{\text{Compressed Data size.}}$$

For higher data compression, always compression ratio is high.

High Compression ratio provides algorithm is best for the Data compression.