

Learning Objectives

01

Understand the
need for
compression

02

Know the
difference
between lossy
and lossless.

03

Analyse when
lossy and lossless
would be used



What is compression?

- Compression algorithms **reduce the size of the file**
- Data compression is the process of encoding data so that it needs fewer bits/bytes to represent it.
- Compression is useful because it helps reduce the consumption of expensive resources, such as **hard disk space** or transmission **bandwidth over the internet**.



Lossless compression

- Lossless compression can compress data files **without** losing any of the information.

Advantage:

Lossless compression schemes are reversible so that the original data can be reconstructed.

Disadvantage

Reduces file sizes by around 50% compared with lossy that will reduce the file by 90%



Lossy compression

- Lossy compression compresses data files but does lose some of the information.
- It removes data that is usually not detectable by humans, either sound or image.

ADVANTAGE:

- Can produce smaller data files.

DISADVANTAGE:

- Not good if 100% accuracy required e.g. text files

Common lossy format include JPEG and MP3



Lossless compression algorithms

Lossless compression algorithms typically reduce file sizes by around 50 per cent. This is achieved by identifying and removing redundant data. In a page of text, for example, many words are used more than once. By creating a lookup table of recurring words, these can be removed from the text and replaced by tokens pointing to their position in the table. When the file is decompressed, the words can be put back into the text.



Lossy compression algorithm

Lossy compression is particularly suited for reducing the file size of images.

Digital images often comprise 4000 pixels or more, each with a 24-bit colour depth. However, many of the minute differences in colour are wasted on us humans. Our eyesight is not capable of distinguishing them.

A lossy compression algorithm analyses all of the data in the image and when it finds areas with minute differences it gives them the same colour values. It can then rewrite the file using fewer bits.

Similarly, much of the data in an audio file encodes tones and frequencies that our ears can't hear, and small differences in volume and frequency that we cannot distinguish. MP3 files use a lossy algorithm to remove this superfluous data.



Figure 2.3.2 Digitally compressing an image makes little difference to our eyes but gives huge savings in file size



1. File size is an important consideration.

a) Give **two** reasons for reducing file sizes. (2 marks)

2. One characteristic of lossy compression is that it makes files smaller.

Give **one** other characteristic of lossy compression. (1 mark)

