Computing unplugged – Compression

Do Now

1	**How can we make files smaller without sacrificing quality?**
2	**What are the benefits to reducing a file's size?**
3	**What is an advantage of compression?**

Engage

- *"Why doesn't Netflix send you the full original video file every time you press play?"*
- *"Would you rather download a large, perfect-quality file or a smaller file more quickly? Why?"*

Learn

Keyword

Compression is the process of reducing the size of a file or amount of data by removing redundancy or representing the same information more efficiently, while keeping it usable for storage or transmission.

Synonyms

- Compaction
- Reduction
- Condense

Why do we use compression?

We use compression because it makes data smaller and more efficient to store and send.

Key reasons:

- Saves storage space – Compressed files take up less space on hard drives, phones, and servers.
- Faster transmission – Smaller files upload, download, and stream more quickly over networks and the internet.
- Reduces bandwidth use – Less data needs to be sent, which is especially important for streaming and mobile data.
- Improves performance – Systems can load files (images, audio, video, web pages) more quickly.
- Makes large files practical – Without compression, high-quality images, music, and videos would be too large to use easily.

“Compression is used to reduce file size so data can be stored and transmitted more efficiently without unnecessary waste.”

Build

“the cat sat on the mat and the cat ate the fish and the cat slept” (65 characters)

How can we make this smaller?

Method 1 (Lossless compression)

- The=1, (6 characters)
- Cat=2, (6 characters)
- “1 2 sat on 1 mat and 1 2 ate 1 fish and 1 2 slept” (49 characters)
- 6+6+49=61 characters in total

Using this method of substitution we can reduce the number of characters and still recreate the original text exactly.

Instead of whole word substitution what if we used common combinations?

- the=1, (6 characters)
- at=2, (4 characters)
- “1 c2 s2 on 1 m2 and 1 c2 2e 1 fish and 1 c2 slept” = 49 characters
- 6+4+49 = 59 characters in total

Method 2 (Lossy compression)

“cat sat on mat and cat ate fish and cat slept” (45 characters)

Using this method characters are removed completely; the message comes across reasonably similar but not perfectly the same.

Summary

- Both methods of compression reduce the amount of data needed to store and transmit the message.
- Lossless reduces the amount of data a little by reducing repetition and can recreate the original exactly.
- Lossy reduces the amount of data a lot but can not recreate the original exactly.

Feature	**Lossless**	**Lossy**
File size	Larger	Smaller
Data lost?	No	Yes
Can retore original exactly	Yes	No
Used for	Text, programs	Images, audio, video

Apply

Scenario 1 – Text

Original: 657 characters	Fred the duck lived beside a quiet canal, convinced he was destined for greatness. While others quacked about breadcrumbs, Fred practiced dives, speeches, and heroic waddles. One misty morning, a bicycle slipped into the water. Without hesitation, Fred paddled hard, tugged a dangling strap, and guided it ashore. Applause echoed from surprised commuters. Embarrassed, Fred pretended it was nothing, then accepted a single pea as thanks. From that day, he still chased crumbs, but carried himself taller, knowing bravery can wear feathers and webbed feet. Sometimes heroes swim quietly, smiling, when nobody notices, except the rippling water at dawn daily.
Lossless: Characters	
Lossy Characters	

Review

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