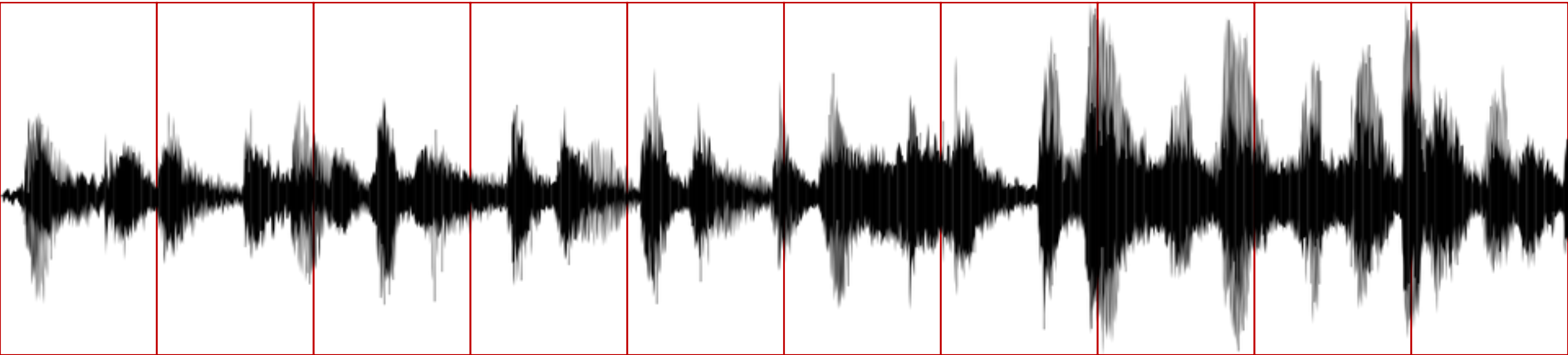


1.3 Text, sound and images

Lossy and lossless
compression methods

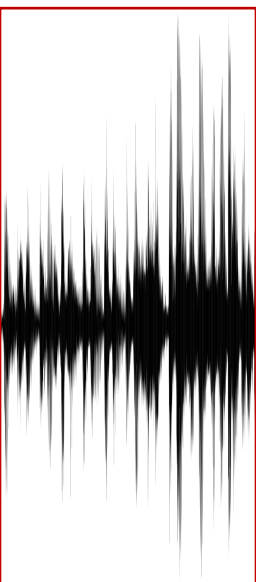
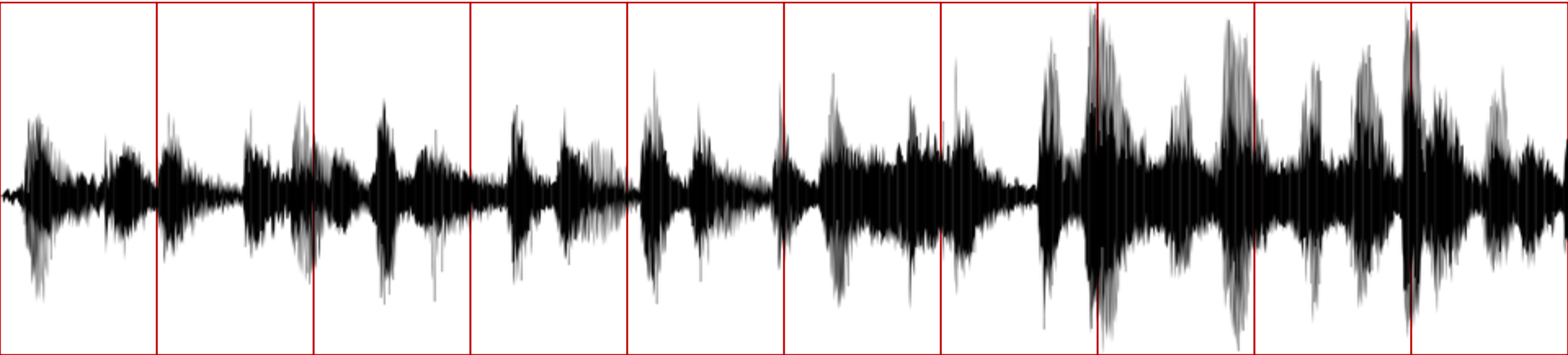


Lossy compression methods: MP3



MP3 files are commonly used for playing music on computers and mobile devices.

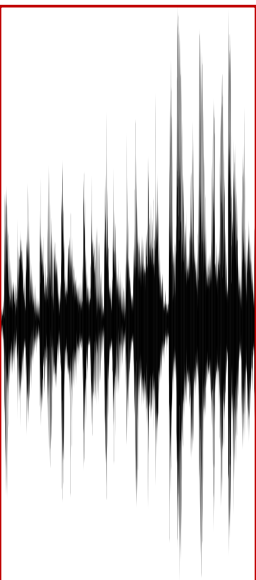
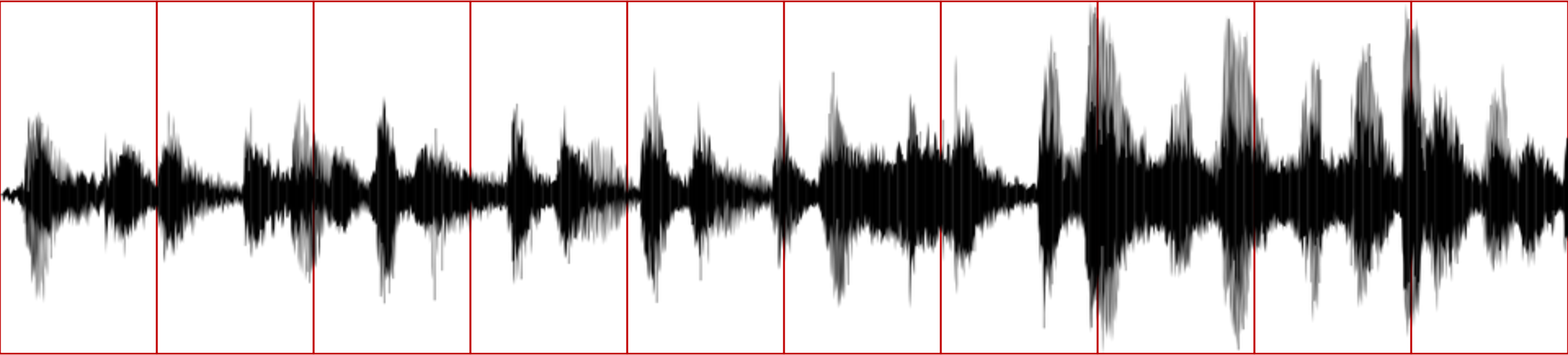
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MP3 is a compression technology that can reduce the size of a music file by as much as 90%.

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MP3 is a compression technology that can reduce the size of a music file by as much as 90%.

The algorithm removes sounds that the human ear can't hear properly:

- Removal of sounds outside the range of the human ear.
- If two sounds are played at the same time, only the louder sounds can be easily heard, so the quieter sound is removed (perceptual music shaping).

Lossy compression methods: JPEG

JPEG is a lossy compression algorithm used for bitmap images.

The JPEG compression algorithm is based on two key principles:

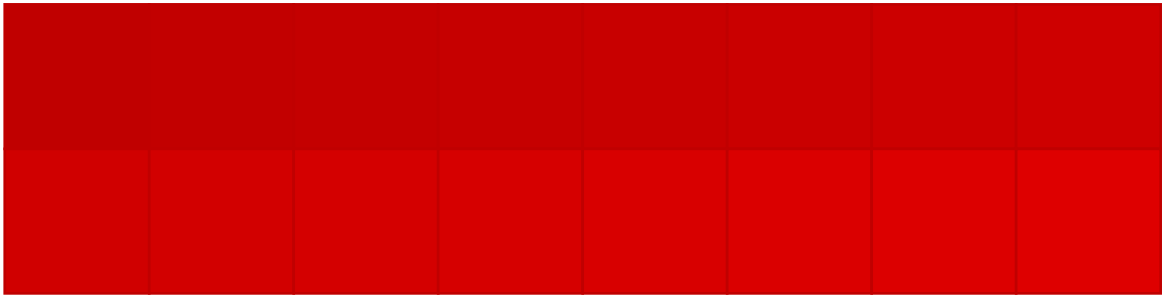
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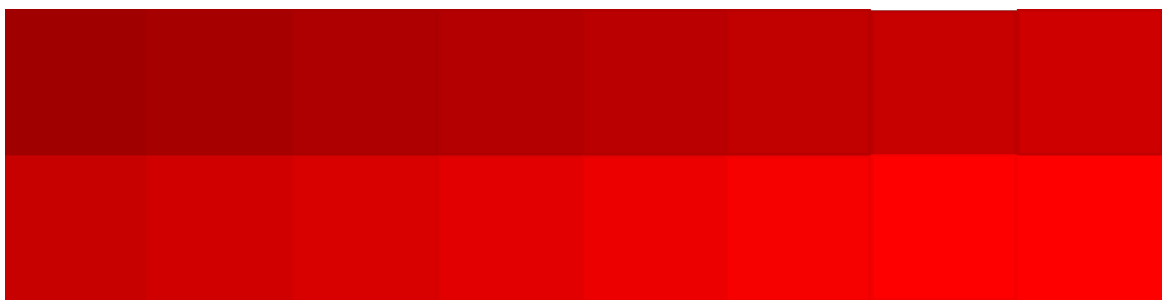
The JPEG compression algorithm is based on two key principles:

- 1. The human eye can't detect differences in colour shades as well as it can detect differences in image brightness.

Altering shade by two gradations each time



Altering brightness by two gradations each time



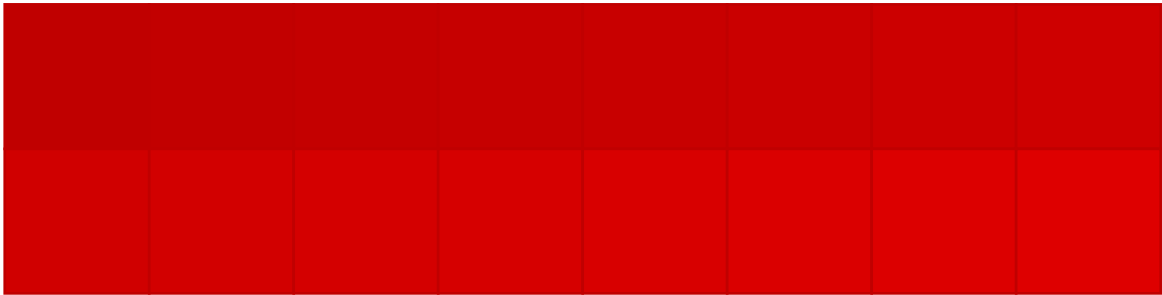
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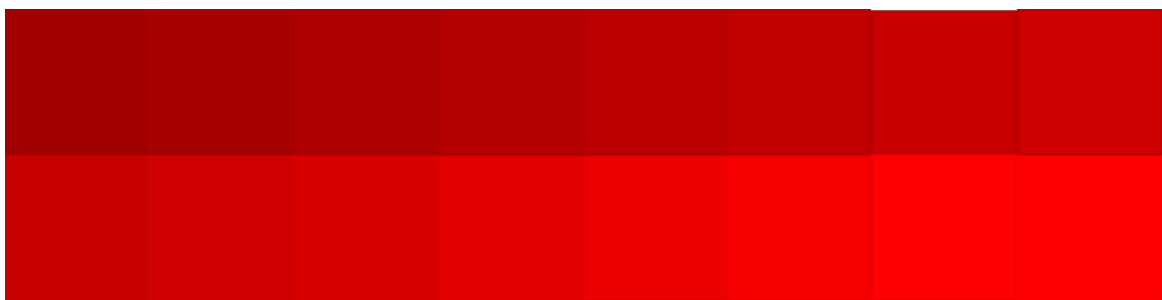
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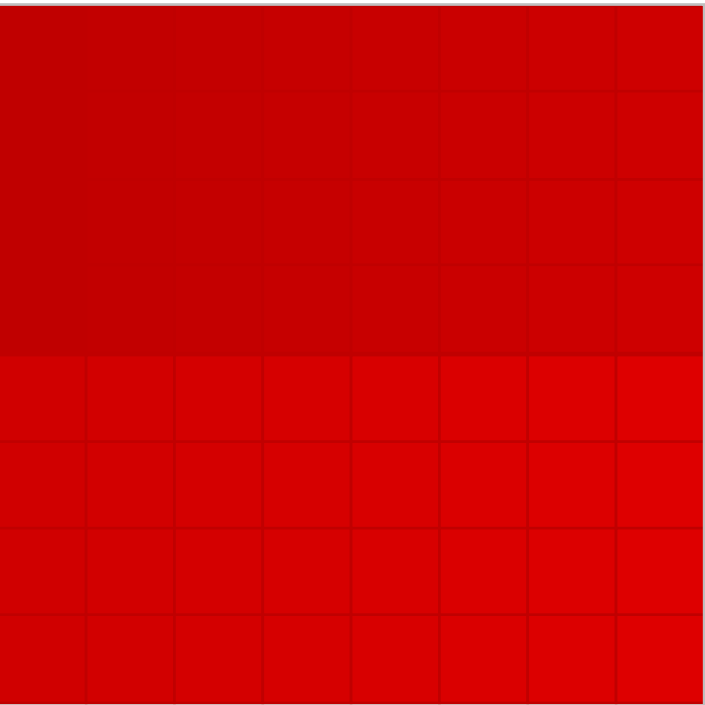
Altering shade by two gradations each time



Altering brightness by two gradations each time



2. By separating pixel colour from brightness, an image can be split into blocks (e.g., 8 x 8 pixels). Certain information can then be discarded from the image without causing a noticeable deterioration in quality.



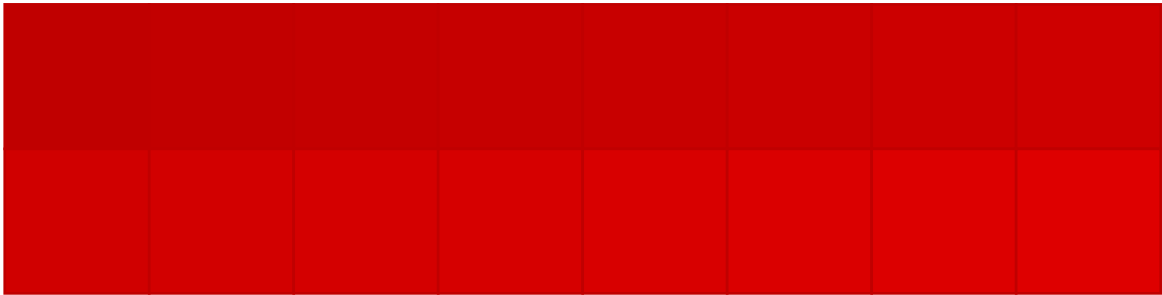
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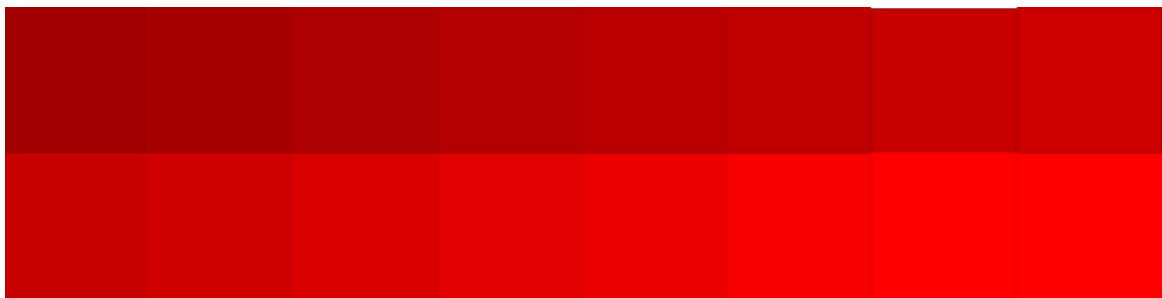
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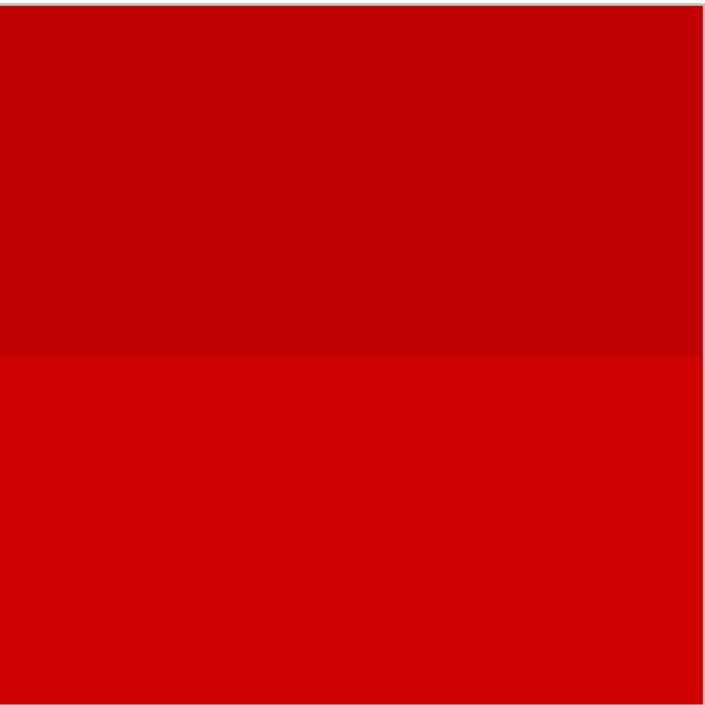
Altering shade by two gradations each time



Altering brightness by two gradations each time



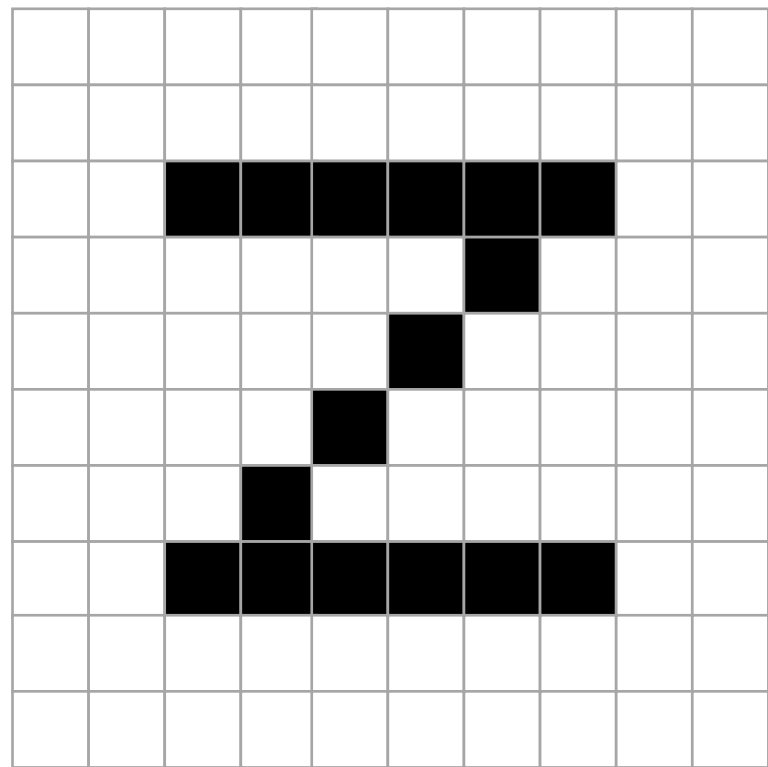
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Lossless compression methods: Run-length encoding (RLE)

Huffman coding is often used to compressed text-based data.

Meanwhile, run-length encoding is typically used to compress bitmap images.

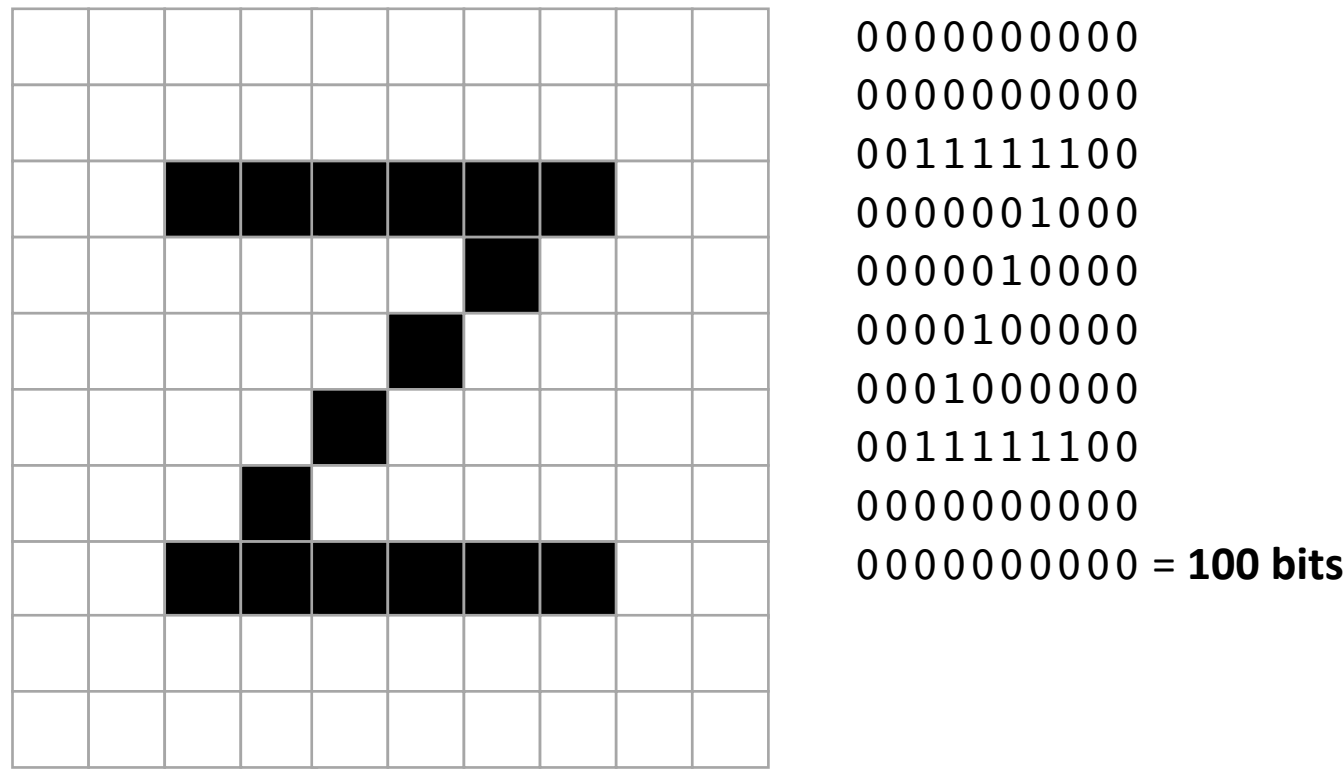


With just two colours, we can encode an image with a colour depth of 1 bit (0 = white, 1 = black).

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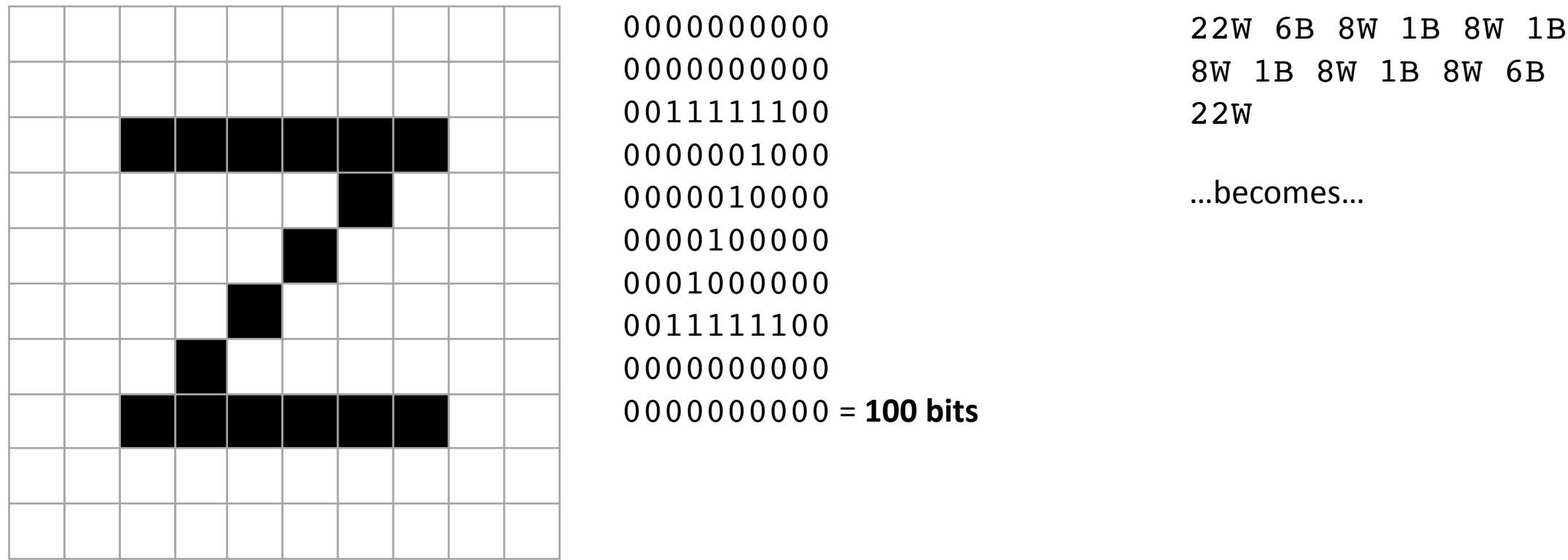


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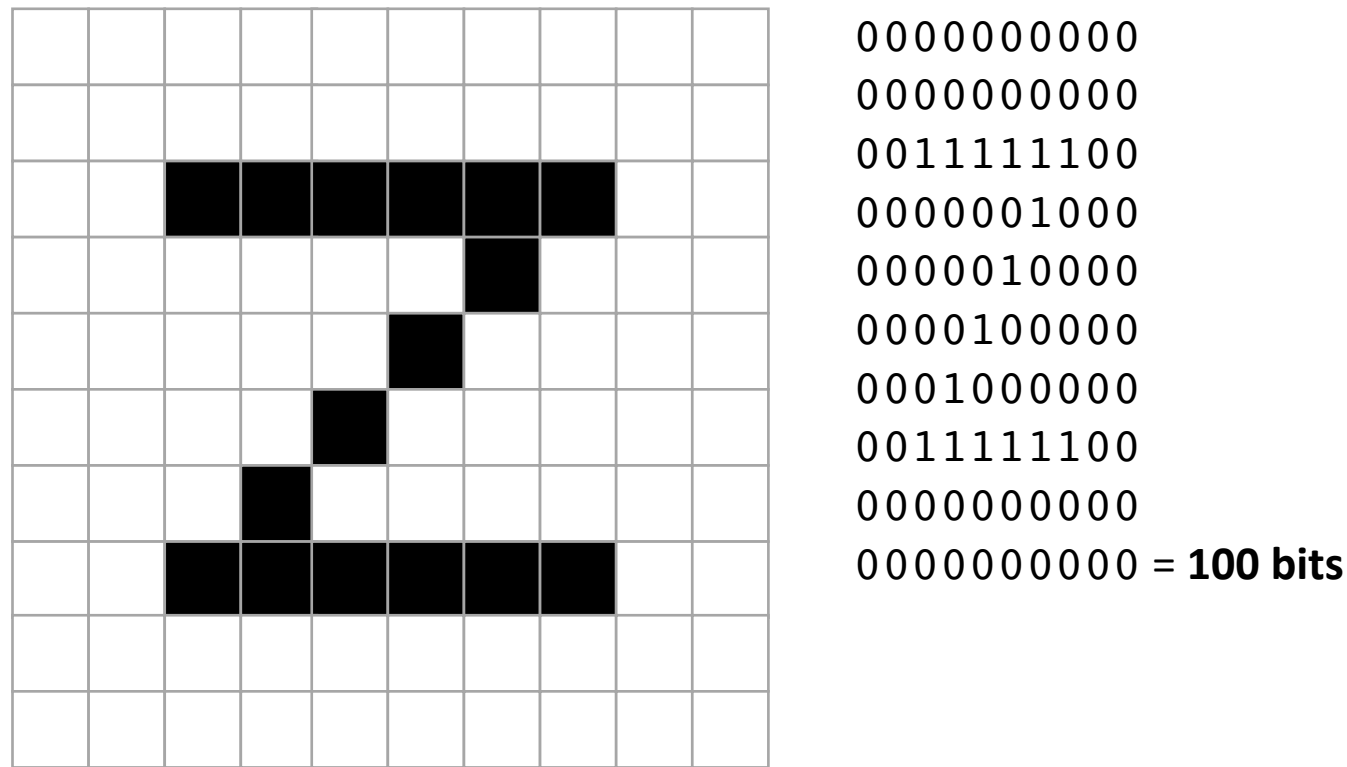
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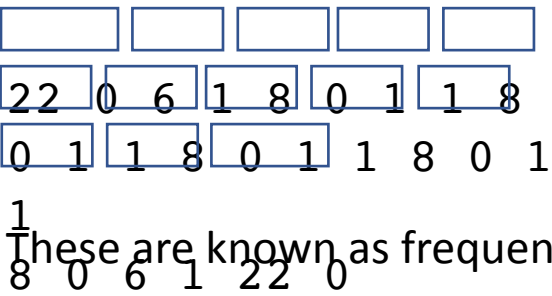
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22W 6B 8W 1B 8W 1B
8W 1B 8W 1B 8W 6B
22W

...becomes...



With just two colours, we can encode an image with a colour depth of 1 bit (0 = white, 1 = black).



Lossy compression

Compression algorithm eliminates unnecessary data from the file

The original file cannot be reconstructed once it has been compressed

Information discarding
Perceptual music shaping

JPEG, MP3, MP4, WMV, MPG

Lossless compression

All the data from the original uncompressed file can be reconstructed

Important for files where any loss of data would be an issue

Run-length encoding (RLE)
Huffman coding

TIF, PDF, GIF, PNG, ZIP

