

Kemnal Technology College – Computer Science Kemnal Key – Year 9 Term 3

Representing Images—Black and White

Images also need to be converted into binary in order for a computer to process them so that they can be seen on our screen. Digital images are made up of pixels. Each pixel in an image is made up of binary numbers. If we say that 1 is black (or on) and 0 is white (or off), then a simple black and white picture can be created using binary.

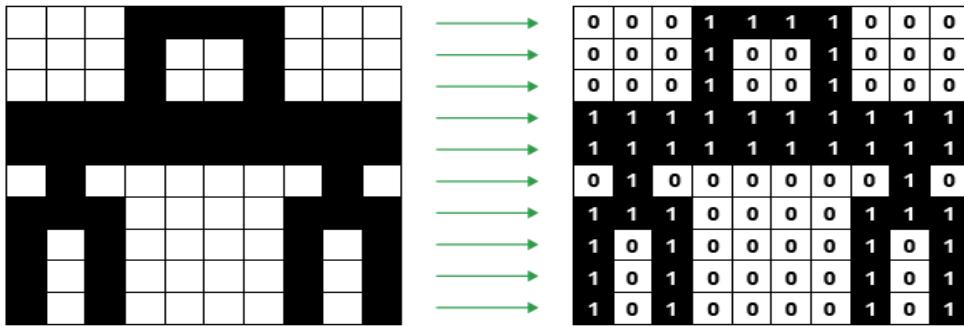


Image Quality

Image quality is affected by the resolution of the image. The resolution of an image is a way of describing how tightly packed the pixels are. In a low-resolution image, the pixels are larger so fewer are needed to fill the space. This results in images that look blocky or pixelated. An image with a high resolution has more pixels, so it looks a lot better when you zoom in or stretch it. The downside of having more pixels is that the file size will be bigger.

Representing Data

All data inside a computer is transmitted as a series of electrical signals that are either **on** or **off**. Therefore, in order for a computer to be able to process any kind of data, including text, images and sound, they must be converted into **binary** form. If the data is not converted into binary – a series of 1s and 0s – the computer will simply not understand it or be able to process it.

Representing Text

A code where each number represents a character can be used to convert text into binary. One code we can use for this is called ASCII. ASCII code can only store 128 characters, which is enough for most words in English but not enough for other languages. If you want to use accents in European languages or larger alphabets such as Cyrillic (the Russian alphabet) and Chinese Mandarin, then more characters are needed. Therefore, another code, called Unicode, was created. This meant that computers could be used by people using different languages.

Representing Images—Colour

Adding another binary digit will double the number of colours that are available:

- 1 bit per pixel (0 or 1): two possible colours
- 2 bits per pixel (00 to 11): four possible colours
- 3 bits per pixel (000 to 111): eight possible colours
- 4 bits per pixel (0000 – 1111): 16 possible colours
- ... 16 bits per pixel (0000 0000 0000 0000 – 1111 1111 1111 1111): over 65 000 possible colours

The number of bits used to store each pixel is called the colour depth. Images with more colours need more pixels to store each available colour. This means that images that use lots of colours are stored in larger files.

KEMNAL KEY QUESTIONS

1. What form must data be in for a computer to be able to process it?
2. What code can be used to convert text into binary?
3. Why would an image be compressed?
4. What does lossy compression do?
5. What does lossless compression do?

Lossless compression

Lossless compression doesn't reduce the quality of the file at all. No data is lost, so lossless compression allows a file to be recreated exactly as it was when originally created.

Lossy compression

Lossy compression removes some of a file's original data in order to reduce the file size. This might mean reducing the numbers of colours in an image or reducing the number of samples in a sound file. This can result in a small loss of quality of an image or sound file.

Representing Sound

Sound needs to be converted into binary for computers to be able to process it. To do this, sound is captured - usually by a microphone - and then converted into a digital signal. An analogue to digital converter will sample a sound wave at regular time intervals.

