Tuesday 9th November 2021

Bitmap Images

Pixels

A digital image is made up of many small areas of colour called pixels. Each pixel has its own colour. The more pixels in an image, the greater the quality of the picture. Pixel is short for “Picture Element”.

Image Size and Resolution

The size of an image is given as the width and hight, in pixels. For example, an image with a width of 15 and a height of 30 would have a size of (15 x 30) = 450 pixels.

Resolution is the number of pixels per square inch, when the image is displayed on a computer screen or printed onto paper. An image with a lower resolution would have a lower quality, especially when it is enlarged.

Colour Depth

The colour depth of a bitmap image in the number of bits used to store the colour of each pixel. The more bits used, the more colours the image can contain. However, this also increases the file size. To calculate colour depth, use 2 to the power of the number of bits – 2bits.

|  |  |
| --- | --- |
| Number of Bits | Number of Colours |
| 1 | 2 (21) |
| 8 | 256 (28) |
| 24 | 16,777,216 (224) |

Metadata

Metadata is original data which is stored with the image. It contains the height, width, colour depth, and colour palette. It may also contain the date and time, location, and settings when the image was taken.

Calculating image file size

The file size of an image depends on the image size and colour depth. The higher the image size or colour depth, the larger the file size. Large files can be a problem when being transferred electronically, or if storage space is limited.

**File Size = Width x Height x Colour Depth**

Practice Questions

Calculate the file size (in kB) for a 24-bit RGB image at a resolution of 400x250 pixels.

**File Size (bits) = Colour Depth x Image Size**

**File Size (kB) = (24 x 250 x 400) / (8 x 1024)**

State what is meant by a pixel.

**A pixel is the smallest part of a bitmap image. Pixel is short for “Picture Element”**

Calculate the size of a bitmap image with a 4-bit colour depth, a width of 300 pixels and a height of 100 pixels in bits

**File Size = (300 x 100) x 4 = 120,000 / 8 = 1,500 bytes**

An image is 300 by 200 pixels. Construct an expression to show the number of pixels needed to represent this image.

**Pixels = 200 x 300**

An image used 14-bit colour depth. Describe how 24-bits are used to represent colour in the file.

**All colours are a combination of Red, Green and Blue (RGB). The allocated colour depth is split between these three values. In this case, 8-bits is allocated for red, green, and blue. 24-bits is used to represent the colour of each pixel.**