Discuss the impact that file format, compression techniques, image resolution and colour depth have on file size and image quality

There are various different uses for images and as a result various levels of quality are required. The quality will depend on the file format, image resolution and the technique used to compress it. The file formats I will reference in this report include BMP, JPEG, PSD, GIF and TIF, I will comment on their file sizes and the reasons for the differences in size. The colour depth used will affect the quality of the final output file created however the deeper colours used the larger the output file will be.

Compression Techniques

Lossy and *Lossless* are two ways in which files can be compressed to make it smaller, each method affects images in different ways and I will explain the pros and cons of each.

Lossy compression is the first method of compression I will discuss, this method will negatively affect the quality of the image, and whilst compressing the image it loses some of the image data, as a result when zoomed pixilation of the image will be much clearer than before. The amount of data loss is often adjustable within the software being used. The higher the compression rate the smaller the output file but the quality will be of a poorer standard.

Lossless compression is the 2nd compression technique I shall discuss, when compressing images using this technique no image quality is lost. Its principal of reducing file size still remains as its purpose is to reduce file size on storage media; it also makes the process of uploading to much easier due to the reduced file size.
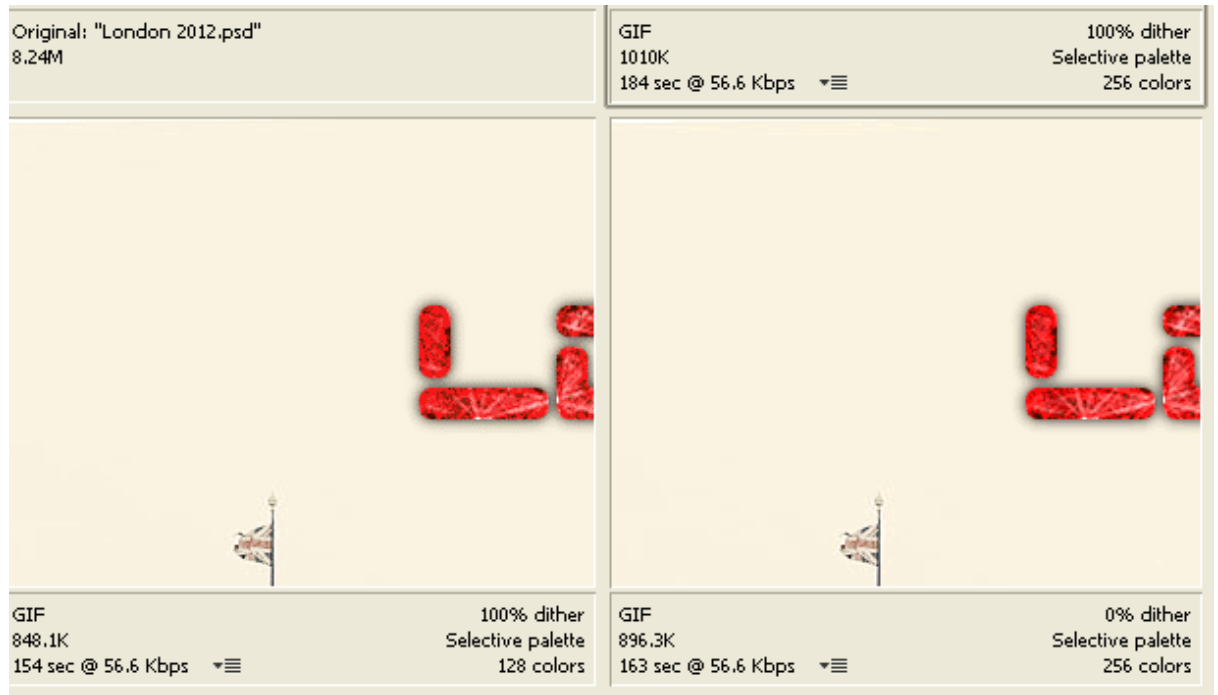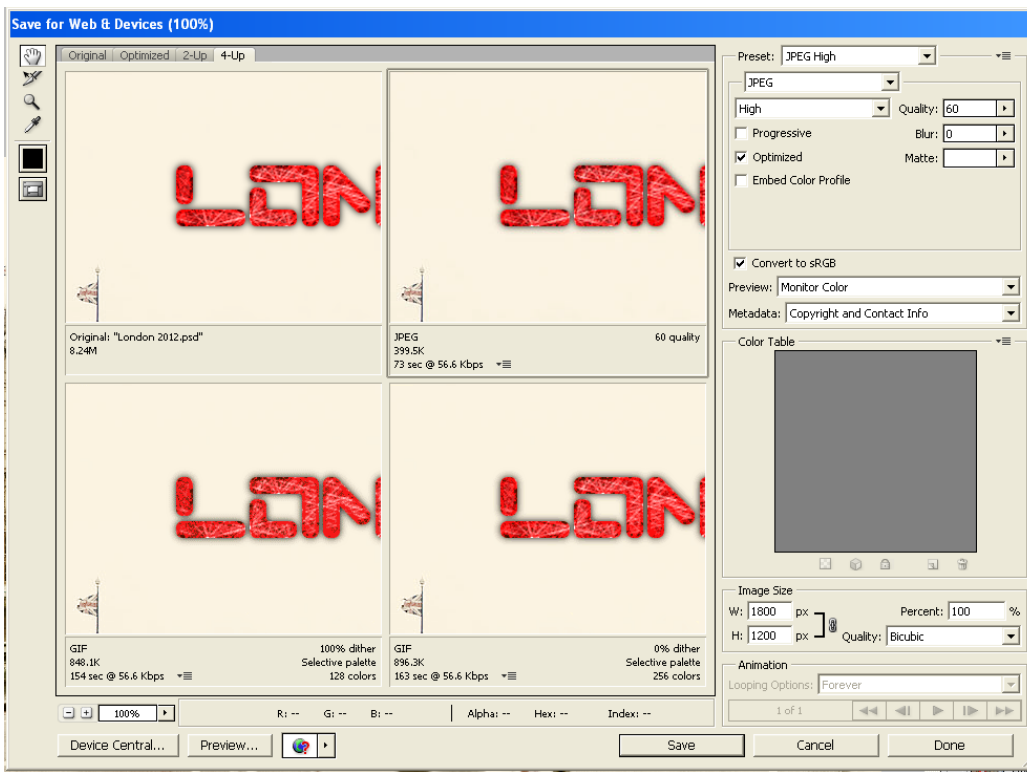
Saving the image in different file formats can have a huge impact on the file size.

Colour depth

The maximum amount of colour used within an image is described as its colour depth, the larger the colour depth the more realistic the image will look. The more realistic the image is in terms of colour depth comes at the cost of disk space, as the more detail within an image the more disk space it will require. There are a range of different colour depths, the most simple form is referred to as monochrome which simply on or off between black and white. Below are three common colour depths from smallest to largest:

- 16 Bit Colour – this format uses two Bytes to store the information, one Byte for the colour and one Byte for the shade of the colour. So 65,536 colours (256×256).

- **24 Bit Colour** – This format stores the Red, Green and Blue for each pixel. So 256 values for each colour so giving a total of 16,777,216 colours (256x256x256). Having 16 million colours allows the quality of the image to be realistic and good quality however as the colour depth is higher and there are more colours that means that the storage space will also be higher
- **32 Bit Colour (True Colour)** – This colour depth is known as "True Colour", this format uses the same format as above for the Red, Green and Blue colours but also stores transparency information for each pixel. So it allows each of the 256 pixels to be fully opaque to fully transparent which is very important when it comes to having a good quality image, however it does mean the image size will be even larger.[1]

In conclusion colour depth is an important factor when it comes to having a high quality image; the depth of colour directly affects file size with the better colour depth resulting in a larger file size but it will consist of much more detail and appear much more realistic.

<u>Image quality & resolution</u>

The amount of points that make up an image is its resolution; the amount can depend on the camera used or what the intended use of the image is. The more points used to create an image the more quality and detail of the image will contain.

When it comes to image quality it is often true that, more is better in terms of file size. Often a larger file size indicates an image with better resolution and an image with a small file size indicating lower resolution. Sometimes it is necessary to balance file size and resolution for the images intended use. For example maximum resolution is required if an image is to be scaled up to be used on a billboard, in this situation file size is much less important that image quality is.

<u>Bitmap File</u>

Bitmap digital images are stored in the BMP format. These images are built up of multiple small squares arranged in certain ways to create an image in a similar way to photographs are. The file size is directly affected by the resolution of the image, the higher the resolution the larger the file size. The main disadvantage of this file format is when enlarged the quality and sharpness of the image reduces significantly causing pixilation.

<u>JPEG File</u>

JPEG is an acronym for Joint Photographic Experts Group format; it is a raster file that is very popular file type down to its wide range of compatibility, its high quality capabilities and file size. This file type doesn't take up much space on storage media yet provides a crisp image, it's very popular as it can be opened and edited by a wide host of programs and supports CMYK, RGB, and Grayscale colour modes. Just like BMP files when scaled up pixilation may occur.

<u>PSD</u>

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[1] Information sourced from example D2 report

PSD files are for use within Adobe Photoshop and the software will automatically save into this format unless other preferences have been selected. This format supports layering along with a host of other Photoshop editing tools. Other programs are not fully compatible with PSD files at the moment which is a limiting factor, the PSD format is very large file size so it is worth considering this when editing multiple images simultaneously.

GIF

The Graphics Interchange Format (GIF) is a bitmap image format that makes a relatively small file size footprint on storage media. A reason behind this small file size could be down to the fact it only supports RGB and greyscale colours, as a result it isn't the preferred format for high quality images yet is a popular choice as it fast to upload to Webpages. This file format supports transparency which makes it great for creating small simple cartoon images it also works well for logo's that contain solid areas of colour.

TIF

The Tagged Image File format is owned by Adobe and is widely supported by image-manipulation applications, by publishing and page layout applications, by scanning, faxing, word processing, optical character recognition and other applications. It is very popular among graphic artists, amateur and professional photographers and the publishing industry.

In conclusion it is clear that depending on the situation some file formats are better than others for example certain formats are better for web use due to file size. Each file format has different characteristics such as compatibility, file size, image quality, colour depth etc. Knowing the appropriate compression technique to use is also useful as using the wrong technique could cause irreversible reduction in image quality When dealing with image resolution and colour depth, it is essential to know the affect changing it has on the image. By increasing the resolution, the size of the file will also increase but it will improve the quality of the and at the other end reducing the resolution of the image will reduce the file size but will reduce the quality of the image at the same time. It is similar with colour depth, the better the colour depth the better the quality but higher the size. In summary it is very important to know exactly what effect changing variables of an image has on the final product.

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