NOTES

Bachelor of Science (Third Year)
CSD-106-Multimedia Techniques
Title of the Unit : Computer Graphics
Module Name : Raster graphics : file formats, manipulation
Module Number : 11

The five basic file formats are the Graphics Interchange Format or the GIF with a file extension .gif, the Joint Photographic Experts Group or the JPEG for mat with an entension .jpg or .jpeg, the Portable Network Graphics or the PNG with an extension .png, the Bitmap Image File, BMP with an extension .bmp and the Tagged Image File Format or the TIFF with an extension .tiff. Let us look at each one of them in detail.

Beginning with the GIFs, the Graphic interchange format was devised by the UNISYS Corporation and Compuserve, initially for transmitting graphical images over phone lines via modems. The GIF standard is limited to 8-bit (256) color images only. GIFs can be Animated, can save transparency. GIFs use lossless compression technique. GIFs are typically small is size and are very portable. GIFs are well-suited for simpler images and animated graphics like banner ads, email images and social media memes. As GIFs are a set of images, they do not contain sound.

The JPEG created and named by the Joint Photographic Experts Group supports eight-bit grayscale images and 24-bit color images (eight bits each for red, green, blue). A JPG file cannot contain any transparent areas - each pixel must contain a color, nor supports animation. JPEG is a lossy raster format.JPEG images have a sliding scale of compression that decreases file size tremendously, but increases artifacts or pixelation the more the image is compressed. We can choose amount of compression when saving in image editing programs like Adobe Photoshop or GIMP. JPEG is the most widely used formats online, for photos, email graphics, large web images like banner ads and a popular format for digital cameras - making it ideal for web use and non-professional prints.

The Portable Network was created as a free, open-source alternative to GIF. The PNG file format supports eight-bit paletted images (with optional transparency for all palette colors) and 24-bit truecolor (16 million colors) or 48-bit truecolor. PNG has built-in transparency, but can also display higher color depths, which can translate into 16 million colors. PNG is a lossless image format and has more advanced compression schemes than GIF. PNG works well in online viewing applications like web browsers and can be fully streamed with a progressive display option. PNG is robust, providing both full file integrity checking and simple detection of common transmission errors. PNG does not support animation. Animated formats derived from PNG are MNG and APNG, which is backwards compatible with PNG and supported by most browsers.

BMP is a format developed by Microsoft for Windows. It is is capable of storing two-dimensional digital images both monochrome and color, in various color depths, and optionally with data compression, alpha channels, and color profiles.There is no compression or information loss with BMP files which allow images to have very high quality, but also very large file sizes. Advantage of BMP is their simple structure and wide acceptance in Windows programs. Used best for high quality scans, archival copies.

The TIFF was developed by the Aldus Corporation in the 1980s, was later supported by Microsoft. TIFF is a flexible, adaptable file format for handling images and data within a single file, by including the header tags (size, definition, image-data arrangement, applied image compression) defining the image's geometry. TIFF is lossless or no compression results in very high-quality images. The TIFF format is widely supported by scanning, faxing, word processing, optical character recognition, image manipulation, desktop publishing and page layout applications. TIFF is best suited for high quality prints, professional publications, archival copies.

A bitmapped image explicitly stores a value for every pixel. We can alter the value of any pixel or group of pixels to change the image. The sheer number of pixels in most images means that editing them individually is both time-consuming and confusing .In order for image editing to be convenient, it is necessary that operations be provided at a higher level than that of altering a single pixel.Two broad reasons for image manipulation include correcting deficiencies in an image, caused by poor equipment or technique used in its creation or digitization,eg. removal of 'red- eye', the red glow apparently emanating from the eyes of a person whose portrait has been taken face-on with a camera using a flash set too close to the lens and creating images that are difficult or impossible to make naturally, eg. special effects, such as creating a glow around an object.

A bitmapped image is just an array of pixels.The identity of a shape is not part of the information that is explicitly available to the image manipulation program.Thus to select parts of an image when it is being manipulated you are not drawing,but you are defining an area within the image.The simplest selection tools are the rectangular and elliptical marquee tools, which let you select an area by dragging out a rectangle or ellipse, just as you would draw these shapes in a drawing program. To accommodate irregular shapes, thinly disguised versions of the other standard drawing tools may be used: eg the **lasso tool**. These tools allow selections to be outlined with considerable precision and flexibility, although their use can be laborious. The **magic wand** is used to select areas on the basis of their colour. With this tool selected, clicking on the image causes all pixels adjacent to the cursor which are similar in colour to the pixel under the cursor to be selected.

A mask is the area in the image that is not selected, which is protected from any changes. Image manipulation programs allow you to store one or more masks with an image, so that a selection can be remembered and used for more than one operation.Thus, the mask is itself an array of pixels, and we can think of it as being another image. By analogy with photographic masks, the white parts of the image are considered transparent, the black ones opaque.By using more than one bit, so that the mask becomes a greyscale image, we can specify different degrees of transparency.a greyscale mask of this sort is often called an alpha channel.

An alpha channel is like a stencil made out of a material that can allow varying amounts of paint to pass through it, depending on the transparency value at each point. One use for such a stencil would be to produce a soft edge around a cut out shape. The edge of a selection can be 'feathered', which means that the hard transition from black to white in the alpha channel is replaced by a gradient, passing through intermediate grey values, which correspond to partial masking. Any effects that are applied will fade over this transitional

zone, instead of stopping abruptly at the boundary. Applying anti-aliasing to the edge of a mask, reduces the jagged effect.