

Al-Mustaqbal University
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Medical Imaging Processing

General Image Formats: Image Array Indexing

By

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Digital Image File Format

Image file formats are standardized means of organizing and storing digital images. Image files are composed of digital data in one of these formats that can be rasterized for use on a computer display or printer. An image file format may store data in uncompressed, compressed, or vector formats. Once rasterized, an image becomes a grid of pixels, each of which has a number of bits to designate its color equal to the color depth of the device displaying it.

Why do we need so many different types of image file format?

- The short answer is that there are many different types of images and application with varying requirements.
- A more complete answer, also considers market share proprietary information, and a lack of coordination within the imaging industry.

Many image types can be converted to one of other type by easily available image conversion software. Field related to computer imaging is that computer graphics.

Most the type of file format fall into category of bitmap images. In general, these types of images contain both header information and the raw pixel data. The header information contain information regarding

1. The number of rows(height)
2. The number of columns(Width)

3. The number of bands.
4. The number of bit per pixel.
5. the file type
6. Additionally, with some of the more complex file formats, the header may contain information about the type of compression used and other necessary parameters to create the image, $I(r,c)$.

Image File Format :

1. BMP format (Bitmap image File Format)

The **BMP file format**, also known as **bitmap image file** or **device independent bitmap (DIB) file format** or simply a **bitmap**, is a raster graphics image file format used to store bitmap digital images, independently of the display device (such as a graphics adapter), especially on Microsoft Windows and OS/2 operating systems.

The BMP file format is capable of storing 2D digital images of arbitrary width, height, and resolution, both monochrome and color, in various color depths, and optionally with data compression, alpha channels, and color profiles. A BMP file consists of either 3 or 4 parts as shown in figure (3.1). The first part is a header, this is followed by an information section, if the image is indexed colour then the palette follows, and last of all is the pixel data. Information such as the image width and height, the type of compression, the number of colours is contained in the information header.

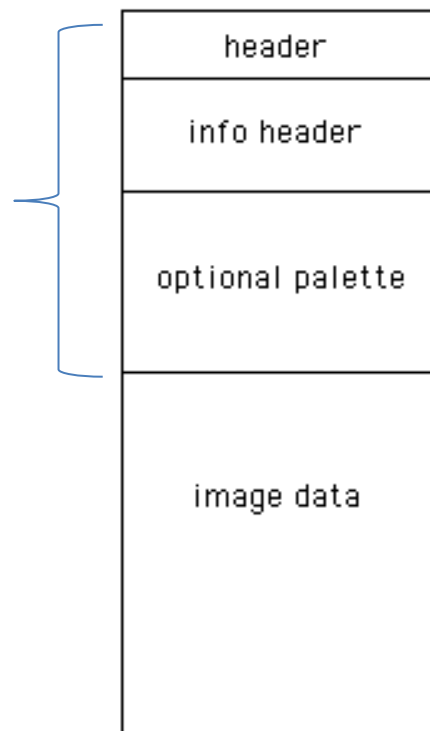


Fig. 1.3. Structure of BMP File Images.

2. TIFF (Tagged Image File Format)

Tagged Image File Format is one of the most popular and flexible of the current public domain raster file formats. They are used on World Wide Web (WWW). **GIF files** are limited to a maximum of 8 bits/pixel and allows for a type of **compression** called LZW. The GIF image header is 13 byte long & contains basic information.

3. JPEG (Joint Photo Graphic Experts Group)

This is the right format for those photo images which must be very small files, for example, for web sites or for email. JPG is often used on digital camera memory cards. The JPG file is wonderfully small, often

compressed to perhaps only 1/10 of the size of the original data, which is a good thing when modems are involved. However, this fantastic compression efficiency comes with a high price. JPG uses lossy compression (lossy meaning "with losses to quality"). Lossy means that some image quality is lost when the JPG data is compressed and saved, and this quality can never be recovered. JPEG images compression is being used extensively on the WWW. It's, flexible, so it can create large files with excellent image equality.

4. VIP(visualization in image processing)formats:

It is developed for the CVIP tools software, when performing temporary images are created that use floating point representation, which is beyond the standard 8-bit/pixel. To represent this type of data the remapping is used, which is the process of taking original image and adding an equation to translate it to the rang (0-225).

Bubble Sheet Questions

Q1 .What is the primary reason for the existence of multiple image file formats?

- a. To confuse users
- b. To standardize image storage
- c. To limit image compatibility
- d. To cater to diverse image types and applications

Answer: d. To cater to diverse image types and applications

Q2 .Which file format is commonly used for storing bitmap digital images on Microsoft Windows and OS/2 operating systems?

- a. GIF
- b. JPEG

- c. TIFF
- d. BMP

Answer: d. BMP (Bitmap image File Format)

Q3 .Which image file format is known for its flexibility and is often used on the World Wide Web (WWW)?

- a. BMP
- b. GIF
- c. TIFF
- d. JPEG

Answer: b. GIF (Graphics Interchange Format)

Q4 .What type of compression does the JPEG (Joint Photo Graphic Experts Group) file format use?

- a. Lossless compression
- b. No compression
- c. Lossy compression
- d. Huffman compression

Answer: c. Lossy compression

Q5 .What is the purpose of VIP (Visualization in Image Processing) formats?

- a. To store high-resolution images
- b. To support lossless compression
- c. To create large image files with excellent quality
- d. To handle floating-point representation beyond 8-bit/pixel

Answer: d. To handle floating-point representation beyond 8-bit/pixel