Images Types

The digital image *I(r,c)* is represented as a two dimensional array of data , where each pixel value corresponds to the brightness of the image at the point *(r,c)*. In linear algebra terms, a two dimensional array like our image model *I(r,c)* is referred to as a matrix, and one row (or column) is called a vector. This image model is for monochrome (one color, this is what we normally refer to as black and white) image data, but we have other types of image data that require extensions or modifications to this model. Typically , these are multiband images (color, multispectral), and they can be modeled by a different *I(r,c)* function corresponding to each separate band of brightness information. The image types we will consider are ***1)****binary* ***2)*** *grayscale* ***3)****color.*

1. Binary Images

Binary images are the simplest type of images and can take on two values, typically black and white, or *'0'* and *'1'* . A binary image is referred to as a 1bit/pixel image because it take only 1 binary digit to represent each pixel. These types of images are most frequently used in computer vision applications where the only information required for the task is general shape, or outline information.



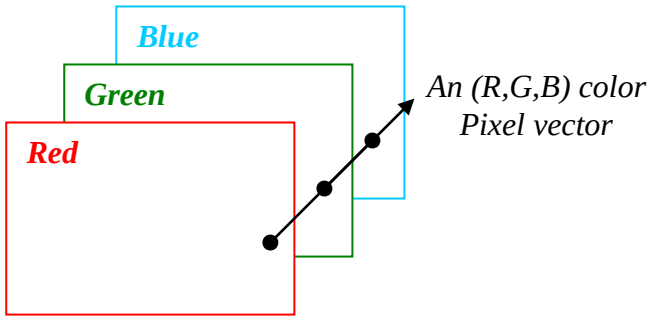
2. Gray Scale Images

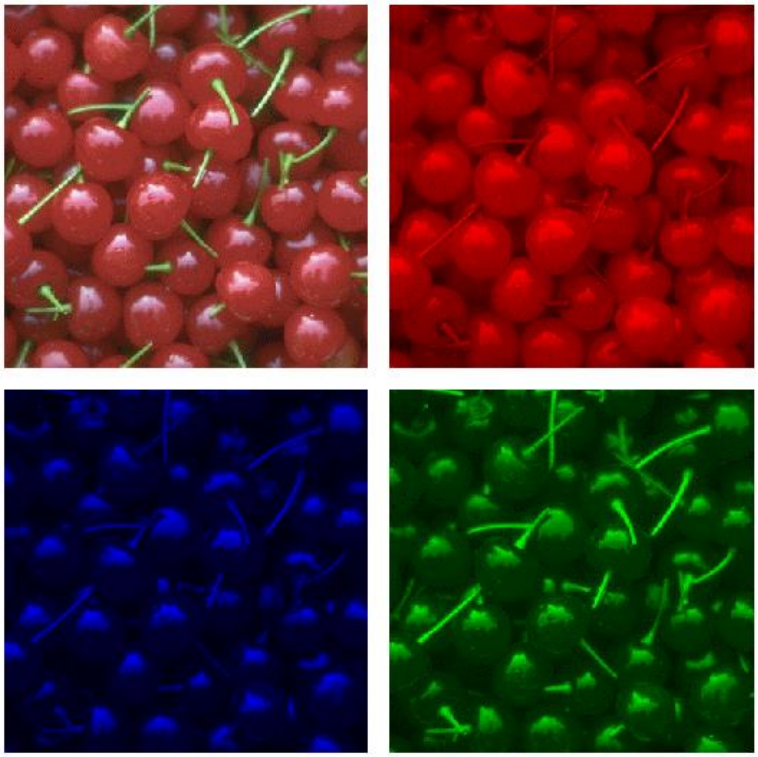
Grayscale images are referred to as monochrome or one-color images. They contain brightness information only, no color information. The number of bits used for each pixel determines the number of different brightness levels available. The typical image contains *8bits/pixel* data, which allows us to have *256(0-255)* different brightness levels. Additionally the *8-bit* representation is typical due to the fact that the byte, which corresponds to 8-bits of data, is the standard small unit in the world of digital computers.



3. *Color Images*

Color images can be modeled as three-band monochrome image data, where each band of data corresponds to a different color. The actual information stored in the digital image data is the brightness information in each spectral band. When the image is displayed the corresponding brightness information is displayed on the screen by picture elements that emit light energy corresponding to that particular color. Typical color images are represented as red, green, and blue or *RGB* images. Using the 8-bit monochrome standard as a model the corresponding color image world have *24 bits/pixel*. *8bits* for each of the three color bands (red, green, and blue). In the following figure we see a representation of a typical *RGB* color image.





Typical RGB color image can be thought as three separate images

Examples of color Image



4. Multispectral Images

A multispectral image is one that captures image data within specific wavelength ranges across the electromagnetic spectrum. The wavelengths may be separated by filters or by the use of instruments that are sensitive to particular wavelengths, including light from frequencies beyond the visible light range, i.e. infrared and ultra-violet. Spectral imaging can allow extraction of additional information the human eye fails to capture with its receptors for red, green and blue. It was originally developed for space-based imaging.

multispectral Image

Image file formats

There are a number of file formats in which one may store the images in files and retrieve them from files. These are known as image file format standards. Here we will present some of the most popularly used Image file format standards.

Tagged Image Format *(.tif , .tiff)* The .tif format is a very broad format, which can handle anything from bitmaps to compressed color palette images. The tiff format supports several compression schemes, but is often used for uncompressed images as well. This format is popular, relatively simple, and allows color.

Portable Network Graphics *(.png)* This is an extensible file format that provides lossless, well compressed storage of raster images. This simple format covers the major functionalities of .tiff . Grayscale, color palette and full color(true color) images are supported by this file format.

Joint Photographic Experts Group JPEG *(.jpg)* It is the most widely used standard for transmission of pictorial information and includes a variable lossy encoding as part of the standard.

Motion Photographic Experts Group MPEG *(.mpg)* This format is extensively used throughout the web and is used only for motion images and it uses compression.

Graphics Interchange Format *.gif* This format supports 8-bit color palette images and is not very popular among the image processing researchers.

RGB *.rgb* This is an image file standard for color images.

RAS *.ras* This is an uncompressed scan out of three color bands for sun Raster images.

Postscript *.ps .eps .epsf* This image format is mainly used while introducing images or figures in a book or note and for printing. In postscript format, graylevel images are represented by decimal or hex numerals encoded in ASCII.

Portable Image File Formats: some of the most commonly used image file formats are portable Image Formats, which include portable Bitmap, portable Graymap, portable pixmap, and portable network map. The default suffixes for these formats are *.pbm .pgm .ppm* and *.pnm* These formats are a convenient method of saving and reading the image data. These are some of the image formats which support all kinds of images of increasing complexity from bits to graylevels to color pixmaps of various sorts.
PPM: A PPM file consists of two parts, a header and the image data. The header consists of at least three parts. The first part is a magic PPM identifier. The PPM identifier can be either *P3* (for ASCII format image data) or *P6* (data in binary format). The next part consists of the width and height of the image as ASCII numbers. The last part of the header gives the maximum value of the color components for the pixels. In addition to the above, a comment can be placed anywhere with a # character; the comment extends to the end of the line.
PGM: This format is identical to the above except it stores gray scale information, that is, one value per pixel instead of three (r, g, b). The only difference in the header section is the magic identifiers which are *P2* and *P5;* these correspond to the ASCII and binary form of the data respectively.
PBM: PBM stores single-bit pixel image as a series of ASCII 0 or 1's. Traditionally 0 refers to white while 1 refers to black. The header is identical to

PPM and PGM format except there is no third header line (the maximum pixel value doesn't have any meaning). The magic identifier for PBM is *P1*.

.PSD Adobe photo Shop
.PIC
.BMP bitmap
.ICO Icon resources
.PCX windows paintbrush
.CUR Cursor resources *. XWP Xwindows Dump*