Experiment 1 BMP File Format

Windows BMP file format is a very simple and widely used image storage format. It is primarily used to store uncompressed images, and can handle a variety of bit depths and color channels.

Problem Objective

Write C/C++ modular functions to read, diagonally flip, and then write BMP image files. All functions must support at least 24-bit RGB, and 8-bit grayscale image formats.

(a) ReadBMP:

- a. Input: Filename of input image
- b. Output: BMP header structure, Image pixel array loaded onto memory

(b) ConvertFlipGrayscale:

- a. Input: Image pixel array
- b. Output: Grayscale-converted and diagonally flipped (transposed) pixel array

(c) WriteBMP:

- a. Input: Filename of output (grayscale) image, BMP header structure, Image pixel array
- b. Output: BMP file written on disk

Use the above functions to read a 256 \times 256 24-bit RGB colored *Lena* image, and write it as an 8-bit grayscale onto a different file on the disk.

Note

- 1. Do not hardcode the filenames and/or image size into the code.
- 2. Take the input/output file names as command line arguments.
- 3. Image size should be read from the BMP file header and memory allocated dynamically.
- 4. Use proper code commenting and documentation.
- 5. Use self explanatory identifiers for variables/functions etc.

Suggested Exercise (Not Mandatory)

Do the above exercise on rectangular images (non-square, $M \times N$ Image, with $M \neq N$). Note that this suggested exercise is optional; interested students may give it a try.

References

[1] BMP file format wiki: http://en.wikipedia.org/wiki/BMP file format