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 × 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 × N Image, with M ≠ 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