INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Department of Electronics & Electrical Communication Engineering
M.Tech. First Year

Vision and Intelligent Systems
(VIS)
EC69211– Image Processing Laboratory

Experiment No.1

BMP File Format

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Contents

Problem statement:

To write a C/C++ modular functions to read, perform operations, and write BMP image files. All functions must support 24-bit RGB and 8-bit grayscale image formats.
A. Operations on the Image: a) Input: Image pixel array b) Output: Scale the images with different scale factors along with x and y axis with–
1. Scaling factor greater than 1
2. Scaling factor less than 1

B .Operation on the image a) Input: Image pixel array b) Output: 45-degree and 90-degree rotation of both color and grayscale images and perform interpolation (using nearest neighbor and bilinear)

Introduction:

Bitmap or BMP files are quite old file format used by ”Windows” operating system. BMP images can range from 1 bit per pixel (thus a black and white image) to 24 bits per pixel (providing 1.67 million colours). In the experiment we used an 8 bits per pixel (Grayscale image) and 12 bits per pixel (RGB color image) formats for operating upon. A bitmap is a type of memory organization or image file format usedto store digital images. The term bitmap comes from the computer programming terminology, meaning just a map of bits, a spatially mapped array of bits. Now, along with pixmap, it commonly refers tothe similar concept of a spatially mapped array of pixels. Raster images in general may be referred to as bitmaps or pixmaps, whether synthetic or photographic, in files or memory.

The BMP extension represents Bitmap Image file. BMP file contains raster graphics data which are independent of display devices. That means a BMP image file can be viewed without a graphics adapter.

BMP images are generally uncompressed or compressed with a lossless compression method. The files can store two-dimensional digital images with both monochrome and colour. Various Colour Depths, alpha channels, colour profiles and optional data compression are supported in this format. The BMP image format is largely used on Microsoft windows platform.

Algorithm:

- Read BMP File:

  Followed the data format table given in the experiment resources. Read the data using an input file stream object and read the header, info header values according to their corresponding data size.

- Flip through diagonal:

  while finding the transpose of the image we have to make sure dimensions are changed and measures to be taken to avoid overflow while in code.

- Rotate 90 degrees:

  First row of pixel data when rotated to 90 degrees clockwise it becomes last column, similarly the rows were matched using matrix calculations.

- Scaling:

  Used nearest neighbour interpolation and bilinear interpolation is used to scale the image both less than and more than 1.

- Write to file:

  All the headers, info header and image data already exists inthe class, the only argument required is filename. The same data format to write the file.

Results:

Input Image:

Output images:

FlipDiagonal

Rotate90

Rotate45

Scaling

Input Image:

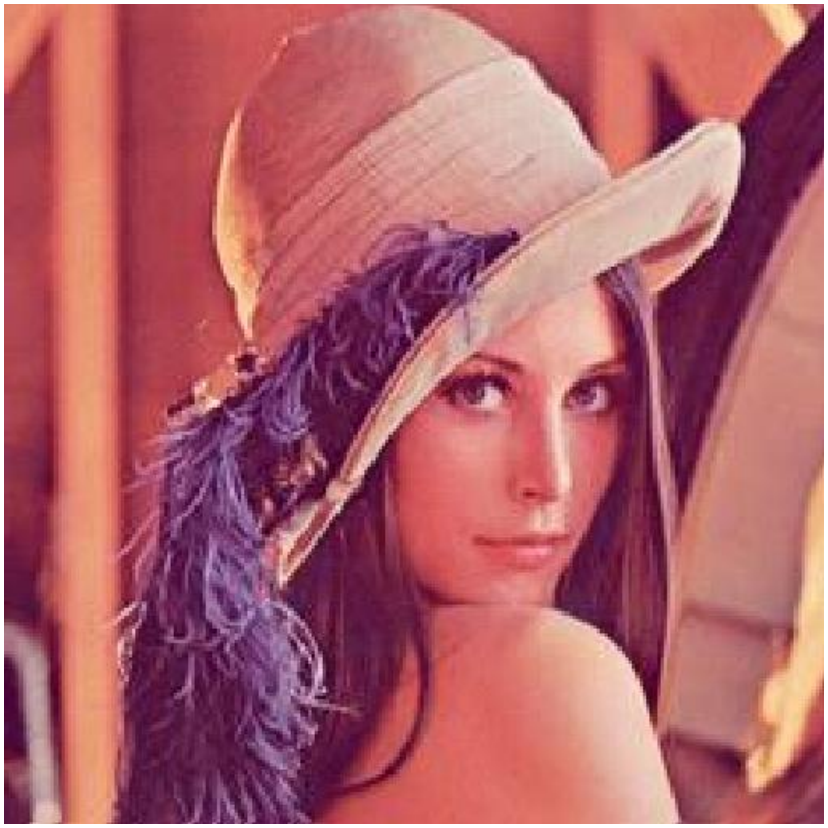
Output Image:

Flip Diagonal

Rotate 90 degrees

Rotate 45 degrees

Scaling



Biliniar Interpolation

Discussions:

- BMP file format is well defined, the file format consists of file header, information header, and the pixel array. BMP file headergives important information such as height, width, size, offset and number of bits per pixel.

- While reading the image pixels it has to be read from bottom totop i.e, last row pixels are the first bytes in image pixels data.

- Avoid overflow while handling operations liketranspose, rotation and Interpolation.

- Bilinear Interpolation makes image based on the nearby 4 image pixel.