

Assignment 3 IMAGE PROCESSING

Deadline: 4 PM on 29 November 2019

Submission procedure: Submit only one file labelled 'a3.cpp' through the TurnItIn portal on blackboard.

Specification

Write a C++ program that opens a PNG image file, loads it into a data structure, and converts it into 3 new PNG image files.

User interface. Ask the user for a single PNG file name.

```
Image Processing Software
```

```
Specify the name of a PNG file that you would like to process.
>
```

Read the PNG header file and store its information in your program.

Read the PNG image data and store it into a 3-dimensional array. The first two dimensions should refer to the pixel's row and column. The last dimension represent a red, green, and blue value.

Save 3 new PNG image files as the file. Images 1, 2, and 3 should be the red, green, and blue channels of the image, respectively.

PNG data format

The details of the PNG data format are standardised and can be found at:

<https://www.w3.org/TR/2003/REC-PNG-20031110/>

Assume that all the data you are working with has a bit depth of 8-bit, is in true colour, has no compression, no filter, and no interlacing.

Hint 1: IDAT – data inflate (uncompression)

You may use `puff.c` and `puff.h` to decompress the imaging data located in the IDAT chunk.

<https://github.com/madler/zlib/tree/master/contrib/puff>

To use `puff`, add `puff.c` and `puff.h` to your root directory. Add `#include "puff.h"` to the top of your code and compile your code using the command:

```
g++ a3.cpp puff.c -std=c++11
```

Hint 2: IDAT – data deflate (compression)

You do not need to compress your data for it to be viewable.

Example Output

Image Processing Software

Specify the name of a PNG file that you would like to process.
>brainbow

Loading brainbow.png

```
IHDR 13 2347309341                                // chunk type, length, crc value
width:      1170
height:     737
bitdepth:   8
colortype:  2
comp method: 0
filt method: 0
intl method: 0
```

pHYs 9 10132504

cHRM 32 2455749958

IDAT 2588008 1640281716

puff() succeeded uncompressing 2587607 bytes.

```
Corner 5x5:  25 0 4 21 0 0 3 0 0 0 6 0 0 11 3
             21 0 0 21 0 0 4 0 0 0 9 0 0 12 4
             0 0 2  1 1 3  3 4 0 5 1 0 5 0 0
             1 1 3  3 3 5  1 2 0 3 0 0 4 0 0
             0 5 5  0 5 5  1 0 0 7 0 0 13 0 0
```

IEND 0 2923585666

IEND 0 2923585666

Example File Output

brainbow_r.png, brainbow_g.png, brainbow_b.png

