

1. Debugging

- (a) mem now points to the location of hello, instead of putting hello in the allocated memory.
- (b) Optional.
- (c)
 - i.
 - ii.
 - iii.
 - iv. Memory corruption. Overflows into next buffer.
 - v. *** buffer overflow detected ***: ./a.out terminated.

Line 11: Allocates to little memory.

Line 11: Memory should be initialized to remove garbage. F. ex. use calloc.

Line 11: Why use unsigned char?

Line 12: lastChar should possibly be initialized.

2. Optimization

- (a)
- (b) Own system. CPU: AMD A10-7870K Radeon R7. Compiler: gcc 4.9.2. 686.8 task-clock (msec).
- (c) Fredripi 5.56 (s) 17.32 (j) 96.30 (js).
- (d) Forgot to do this one.
- (e) I got a few (<100) pixel errors. All resulting from using float instead of double.
- (f) My program adds the pixel value for a color exactly once per pixel in the image, stores it in another image and adds all of the new pixels once, regardless of size. So just for imageIn it's 1920*1200.
- (g)
 - i. Using float instead of double.
 - ii. Uses the fact that box blur is equivalent to horizontal and vertical blur.
 - iii. Keeps intermediate value of the sum in the two passes so that for a the next pixels you only need to add pixel at index plus size and subtract at other end.
 - iv. transforms intermediate matrix to reduce cache usage. Results in doing two horizontal passes which matches the data structure better in regards to the cache lines that are pulled.
 - v. Reduced some branches.
 - vi. Reduced number of divisions.