プログラミング実習 II レポート課題第 5 回

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1　課題 5-1,5-2

1.1　source

```
#include <stdio.h> 標準のヘッダファイルは普通//pragma が書いてあるっぽい。once
#include <string.h>
#include "kadai5.h"
#define MAX_IMAGE_SIZE 512
#define debugA
#define debugB
#define debugC
#define debugE
#define debugF



int main(int argc, char *argv[]){

  int w, h, dummy; //for file access
  char header[3];
  FILE *fp1;

  int i, j; // for manipulating
  unsigned char rgb[3]; //r:0 g:1 b:2

  unsigned char buf1[1000];
  unsigned char buf2[1000];// for buffer.
  unsigned char colorBuf[500000];
  unsigned char grayBuf[200000];
  unsigned char sepiaBuf[500000];
  unsigned char negBuf[200000];
  unsigned char revBuf[200000];
  unsigned char mosaicBuf[200000];
  unsigned char b2yBuf[500000];

#ifdef debugA
  fp1 = fopen(argv[1], "rb");
  fscanf(fp1, "%s\n%d %d\n%d\n", header, &w, &h, &dummy);

  if(fp1 == NULL){
    printf("Error: file not found.\n");
    return -1;
  }

  printf("image size: %dx%d\n", w, h);

  if(header[1] == 0 || header[1] == 1 || header[1] == 2){
    for(i=0; i<h; i++){
      for(j=0; j<w; j++){
```

```
        fscanf(fp1, "%c %c %c", &rgb[0], &rgb[1], &rgb[2]);
        printf("(%d,%d) rgb = (%d, %d, %d)\n", j, i, (unsigned int)rgb[0], (unsigned int
            )rgb[1], (unsigned int)rgb[2]);
      }
    }
  }
  else{
    for(i=0; i<h; i++){
      for(j=0; j<w; j++){
        fread(rgb, sizeof(unsigned char), 3, fp1);
        printf("(%d,%d) rgb = (%d, %d, %d)\n", j, i, (int)rgb[0], (int)rgb[1], (int)rgb
            [2]);
      }
    }
  }
#endif

#ifdef debugB
  if(load_pgm("checker4x4_ascii.pgm", &w, &h, buf1) == 1){
    save_pgm("copyfile1.bin", w, h, buf1);
  }
  if(load_pgm("checker4x4_binary.pgm", &w, &h, buf2) == 1){
    save_pgm("copyfile2.bin", w, h, buf2);
  }
#endif

#ifdef debugC
  if(load_ppm("color4x4_ascii.ppm", &w, &h, buf1) == 1){
    save_ppm("copyfile3.bin", w, h, buf1);
  }
  if(load_ppm("color4x4_binary.ppm", &w, &h, buf2) == 1){
    save_ppm("copyfile4.bin", w, h, buf2);
  }
#endif

#ifdef debugE
  if(load_ppm("sutehage.ppm", &w, &h, colorBuf) == 1){
    color2gray(w, h, colorBuf, grayBuf);
    gray2sepia(w, h, grayBuf, sepiaBuf);
    gray_negapos(w, h, grayBuf, negBuf);
#ifdef debugF

    gray2reverse(w, h, grayBuf, revBuf);
    gray2mosaic(w, h, grayBuf, mosaicBuf);
    black2yellow(w, h, colorBuf, b2yBuf);
#endif
  }


#endif



#ifdef debugA
  fclose(fp1);
#endif
  return 0;
```

```
}
```

Listing 2　5b.c

```
#include <stdio.h>
#include <string.h>

int load_pgm(const char *filename, int *w, int *h, unsigned char *buf){
  FILE *fpl;
  char header[3];
  int i, dummy, c;

  fpl = fopen(filename, "rb");


  if(fpl == NULL){
    printf("Error: original file missing.\n");
    return 0;
  }
  fscanf(fpl, "%s\n%d %d\n%d\n", header, w, h, &dummy);

  // printf("%s", header);

  if(strcmp(header, "P2") == 0){
    for(i=0; i<(*w)*(*h); i++){
        fscanf(fpl, "%d ", &c);//%hhp is also good.
        *(buf+i) = (unsigned char)c; なんで//intバイト(4)をバイトにできるんだ！？
            1WHY JAPANESE PEOPLE!?!??バイナリだとバイトで通りの表現ができるからアスキー表示よりも表現の場合の数が多くなるのはわかる。
//1256けどキャストはどっちに合わせたらええの！！！？！？！右辺にキャストを書く。
//->
    }

    //printf("%d %d", *w, *h);
    //printf("2");
  }
  else{
    fread(buf, sizeof(unsigned char), (*w)*(*h), fpl);
    //printf("3");
  }

  //printf("%d %d , ", sizeof(buf), count);

  fclose(fpl);
  return 1;
}


int save_pgm(const char *filename, int w, int h, unsigned char *buf){

  FILE *fps;


  fps = fopen(filename, "wb+");

  if(fps == NULL){
    printf("Error: copy file missing.\n");
    return 0;
```

```
  }

  fprintf(fps, "P5\n%d %d\n255\n", w, h);
  fwrite(buf, sizeof(unsigned char), w*h, fps);


  fclose(fps);
  return 1;
}
```

Listing 3　5c.c

```
#include <stdio.h>
#include <string.h>

int load_ppm(const char *filename, int *w, int *h, unsigned char *buf){
  FILE *fpl;
  char header[3];
  int i, dummy, c;

  fpl = fopen(filename, "rb");


  if(fpl == NULL){
    printf("Error: original file missing.\n");
    return 0;
  }
  fscanf(fpl, "%s\n%d %d\n%d\n", header, w, h, &dummy);

  if(strcmp(header, "P3") == 0){
    for(i=0; i<(*w)*(*h)*3; i++){
        fscanf(fpl, "%d ", &c);
        *(buf+i)= (unsigned char)c; キャストは普通右辺にするものっぽい！？！？！？//
    }

    //printf("%d %d", *w, *h);
    //printf("2");
  }
  else{
    fread(buf, sizeof(unsigned char), (*w)*(*h)*3, fpl);
    //printf("3");
  }

  //printf("%d %d , ", sizeof(buf), count);



  fclose(fpl);
  return 1;
}


int save_ppm(const char *filename, int w, int h, unsigned char *buf){

  FILE *fps;


  fps = fopen(filename, "wb+");
```

```
  if(fps == NULL){
    printf("Error: copy file missing.\n");
    return 0;
  }

  fprintf(fps, "P6\n%d %d\n255\n", w, h);
  fwrite(buf, sizeof(unsigned char), w*h*3, fps);


  fclose(fps);
  return 1;
}
```

Listing 4　5e.c

```
#include <stdio.h>
#include <string.h>
#include "kadai5.h"

void color2gray(int w, int h, unsigned char *colorBuf, unsigned char *grayBuf){

  int i, dummy=255, c;


    for(i=0; i<w*h; i++){
       c = 0.298912 * (double)(*(colorBuf+i*3)) + 0.586611 * (double)(*(colorBuf+i*3+1))
            + 0.114478 * (double)(*(colorBuf+i*3+2));
        if(c >= 255){
         c=255;
        }
        *(grayBuf+i) = (unsigned char)c;
    }

  save_pgm("sutehagegray.pgm", w, h, grayBuf);
}
void gray2sepia(int w, int h, unsigned char *grayBuf, unsigned char *sepiaBuf){
  int i, r, g, b;

  for(i=0; i<w*h; i++){
    r = (240.0/255.0)*(int)(*(grayBuf+i));
    g = (200.0/255.0)*(int)(*(grayBuf+i));
    b = (145.0/255.0)*(int)(*(grayBuf+i));

    *(sepiaBuf+3*i) = (unsigned char)r;
    *(sepiaBuf+3*i+1) = (unsigned char)g;
    *(sepiaBuf+3*i+2) = (unsigned char)b;
  }

  save_ppm("sutehagesepia.ppm", w, h, sepiaBuf);
}
void gray_negapos(int w, int h, unsigned char *posBuf, unsigned char *negBuf){
  int i;

  for(i=0; i<w*h; i++){
    *(negBuf+i) = 255 - (int)(*(posBuf+i));
  }
```

```
  save_pgm("sutehagenega.pgm", w, h, negBuf);
}
```

Listing 5　kadai5.h

```
#ifndef __COUNTER_H__
#define __COUNTER_H__

extern int load_pgm(const char *filename, int *w, int *h, unsigned char *buf);
extern int save_pgm(const char *filename, int w, int h, unsigned char *buf);
extern int load_ppm(const char *filename, int *w, int *h, unsigned char *buf);
extern int save_ppm(const char *filename, int w, int h, unsigned char *buf);

void color2gray(int w, int h, unsigned char *colorBuf, unsigned char *grayBuf);
void gray2sepia(int w, int h, unsigned char *grayBuf, unsigned char *sepiaBuf);
void gray_negapos(int w, int h, unsigned char *posBuf, unsigned char *negBuf);

void gray2reverse(int w, int h, unsigned char *grayBuf, unsigned char *revBuf);
void gray2mosaic(int w, int h, unsigned char *grayBuf, unsigned char *mosaicBuf);
void black2yellow(int w, int h, unsigned char *colorBuf, unsigned char *b2yBuf);
#endif
```

Listing 6　Makefile

```
.c.o:   # サフィックスルール。拡張子 .c から拡張子 .o のファイルを作るためのルール。
        cc -c $<

ppm_dump.o: ppm_dump.c kadai5.h
        cc -c ppm_dump.c kadai5.h

ppm_dump: ppm_dump.o 5b.o 5c.o 5e.o 5f.o
        cc -o ppm_dump ppm_dump.o 5b.o 5c.o 5e.o 5f.o

runb: ppm_dump
        ./ppm_dump color4x4_binary.ppm

runa: ppm_dump
        ./ppm_dump color4x4_ascii.ppm


clean:
        rm -f *.o
```

Listing 7　5f.c

```
#include <stdio.h>
#include "kadai5.h"

void gray2reverse(int w, int h, unsigned char *grayBuf, unsigned char *revBuf){
  int i;

  for(i=0; i<w*h; i++){
    *(revBuf+i) = (*(grayBuf+w*h-i));
  }

  save_pgm("sutehagereverse.pgm", w, h, revBuf);
}
```

```
void gray2mosaic(int w, int h, unsigned char *grayBuf, unsigned char *mosaicBuf){
  int i, j, k, l, c;

  for(i=0; i<h; i=i+10){
    for(j=0; j<w; j++){
      for(k=0; k<10; k++){
        for(l=0; l<10; l++){
          c+=(int)(*(grayBuf+j+l+k*w+i*w));
        }

      }
      c=c/100;
      for(k=0; k<10;k++){
        for(l=0; l<10; l++){
          *(mosaicBuf+j+w*k+l+i*w) = (unsigned char)c;
        }
      }
    }
    // をとかで割ると、がを超えるものが出てきて面白いことになる。（金属光沢みたいな感じになる）c25c255もしカラーでやるとすると単純に
    //要素をそれぞれ相加平均とったらRGBOK
  }

  save_pgm("sutehagemosaic.pgm", w, h, mosaicBuf);
}

void black2yellow(int w, int h, unsigned char *colorBuf, unsigned char *b2yBuf){
  int i;

  for(i=0; i<w*h; i++){
    if(*(colorBuf+i*3) < 20 && *(colorBuf+i*3+1) < 20 && *(colorBuf+i*3+2) <20){
       *(b2yBuf+i*3) = 255;
       *(b2yBuf+i*3+1) = 216;
       *(b2yBuf+i*3+2) = 0;
    }
    else{
      *(b2yBuf+i*3) = (*(colorBuf+i*3));
      *(b2yBuf+i*3+1) = (*(colorBuf+i*3+1));
      *(b2yBuf+i*3+2) = (*(colorBuf+i*3+2));
    }
   }
  save_ppm("sutehageb2y.ppm", w, h, b2yBuf);

  //become Saiyan
}
```

1.2 result

```
  s1811433@7C202-P006:~/prog2/05/05kadai$ make runa
  cc -c ppm_dump.c kadai5.h
  cc -c 5b.c
  cc -c 5c.c
  cc -c 5e.c
  cc -c 5f.c
  cc -o ppm_dump ppm_dump.o 5b.o 5c.o 5e.o 5f.o
```

```
./ppm_dump color4x4_ascii.ppm
image size: 4x4
(0,0) rgb = (50, 53, 53)
(1,0) rgb = (32, 48, 32)
(2,0) rgb = (48, 32, 50)
(3,0) rgb = (53, 53, 32)
(0,1) rgb = (48, 32, 48)
(1,1) rgb = (32, 50, 53)
(2,1) rgb = (53, 32, 50)
(3,1) rgb = (53, 53, 32)
(0,2) rgb = (50, 53, 53)
(1,2) rgb = (32, 50, 53)
(2,2) rgb = (53, 32, 50)
(3,2) rgb = (53, 53, 32)
(0,3) rgb = (50, 53, 53)
(1,3) rgb = (32, 50, 53)
(2,3) rgb = (53, 32, 48)
(3,3) rgb = (32, 48, 32)
s1811433@7C202-P006:~/prog2/05/05kadai$ make runb
./ppm_dump color4x4_binary.ppm
image size: 4x4
(0,0) rgb = (255, 0, 0)
(1,0) rgb = (255, 0, 0)
(2,0) rgb = (255, 255, 255)
(3,0) rgb = (255, 255, 255)
(0,1) rgb = (255, 0, 0)
(1,1) rgb = (255, 0, 0)
(2,1) rgb = (255, 255, 255)
(3,1) rgb = (255, 255, 255)
(0,2) rgb = (0, 255, 0)
(1,2) rgb = (0, 255, 0)
(2,2) rgb = (0, 0, 255)
(3,2) rgb = (0, 0, 255)
(0,3) rgb = (0, 255, 0)
(1,3) rgb = (0, 255, 0)
(2,3) rgb = (0, 0, 255)
(3,3) rgb = (0, 0, 255)
s1811433@7C202-P006:~/prog2/05/05kadai$ hexdump -C checker4x4_binary.pgm
00000000  50 35 0a 34 20 34 0a 32  35 35 0a 00 00 ff ff 00  |P5.4 4.255......|
00000010  00 ff ff ff ff 00 00 ff  ff 00 00                 |...........|
0000001b
s1811433@7C202-P006:~/prog2/05/05kadai$ hexdump -C copyfile1.bin
00000000  50 35 0a 34 20 34 0a 32  35 35 0a 00 00 ff ff 00  |P5.4 4.255......|
00000010  00 ff ff ff ff 00 00 ff  ff 00 00                 |...........|
0000001b
s1811433@7C202-P006:~/prog2/05/05kadai$ hexdump -C copyfile2.bin
00000000  50 35 0a 34 20 34 0a 32  35 35 0a 00 00 ff ff 00  |P5.4 4.255......|
00000010  00 ff ff ff ff 00 00 ff  ff 00 00                 |...........|
0000001b
s1811433@7C202-P006:~/prog2/05/05kadai$ hexdump -C color4x4_binary.ppm
00000000  50 36 0a 34 20 34 0a 32  35 35 0a ff 00 00 ff 00  |P6.4 4.255......|
00000010  00 ff ff ff ff ff ff ff  00 00 ff 00 00 ff ff ff  |................|
00000020  ff ff ff 00 ff 00 00 ff  00 00 00 ff 00 00 ff 00  |................|
00000030  ff 00 00 ff 00 00 00 ff  00 00 ff                 |...........|
0000003b
s1811433@7C202-P006:~/prog2/05/05kadai$ hexdump -C copyfile3.bin
00000000  50 36 0a 34 20 34 0a 32  35 35 0a ff 00 00 ff 00  |P6.4 4.255......|
```

```
00000010  00 ff ff ff ff ff ff ff  00 00 ff 00 00 ff ff ff  |................|
00000020  ff ff ff 00 ff 00 00 ff  00 00 00 ff 00 00 ff 00  |................|
00000030  ff 00 00 ff 00 00 00 ff  00 00 ff                 |...........|
0000003b
s1811433@7C202-P006:~/prog2/05/05kadai$ hexdump -C copyfile4.bin
00000000  50 36 0a 34 20 34 0a 32  35 35 0a ff 00 00 ff 00  |P6.4 4.255......|
00000010  00 ff ff ff ff ff ff ff  00 00 ff 00 00 ff ff ff  |................|
00000020  ff ff ff 00 ff 00 00 ff  00 00 00 ff 00 00 ff 00  |................|
00000030  ff 00 00 ff 00 00 00 ff  00 00 ff                 |...........|
0000003b
s1811433@7C202-P006:~/prog2/05/05kadai$
```

図 1　入力画像

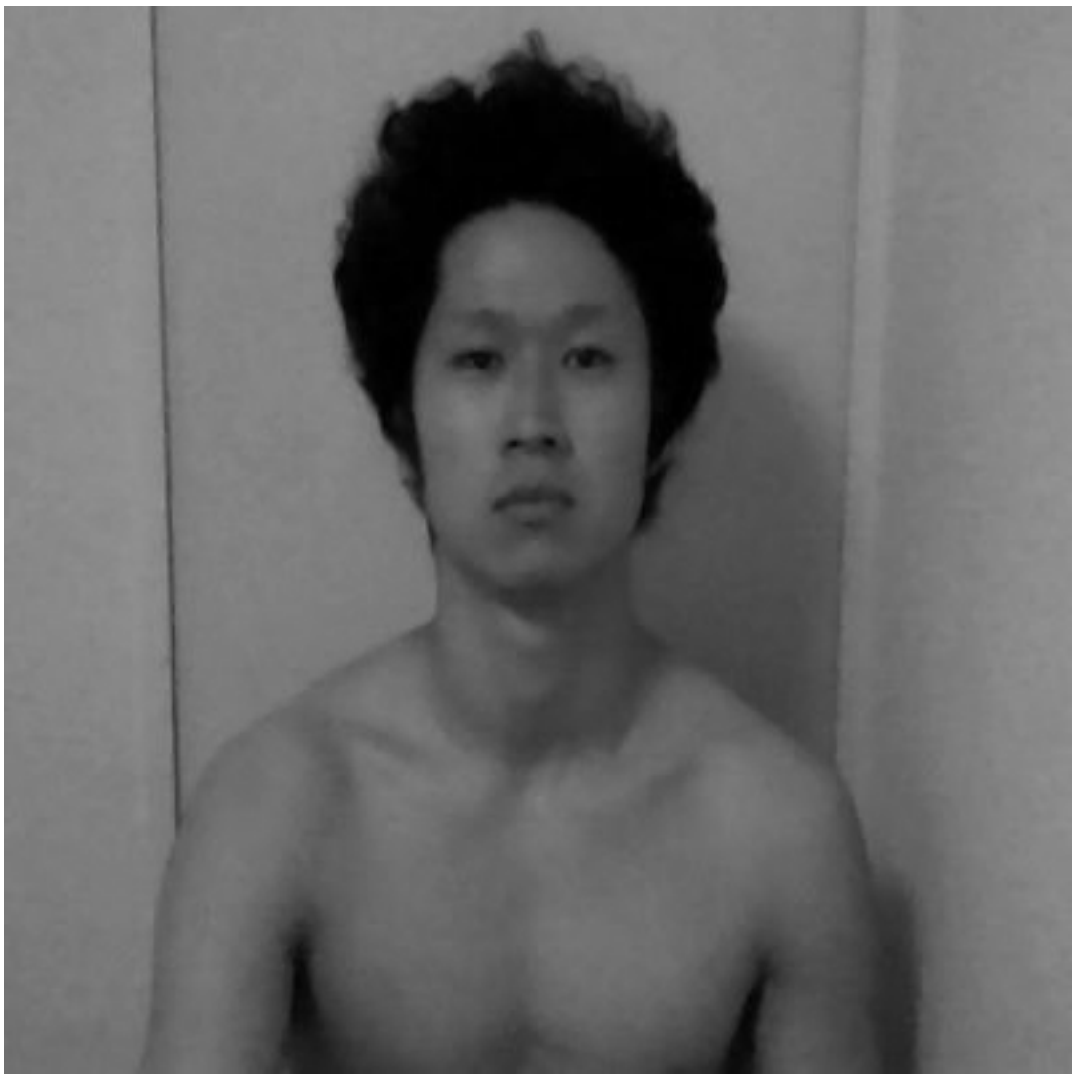

図 2　グレースケール画像

図 3　セピア

図 4　ネガ

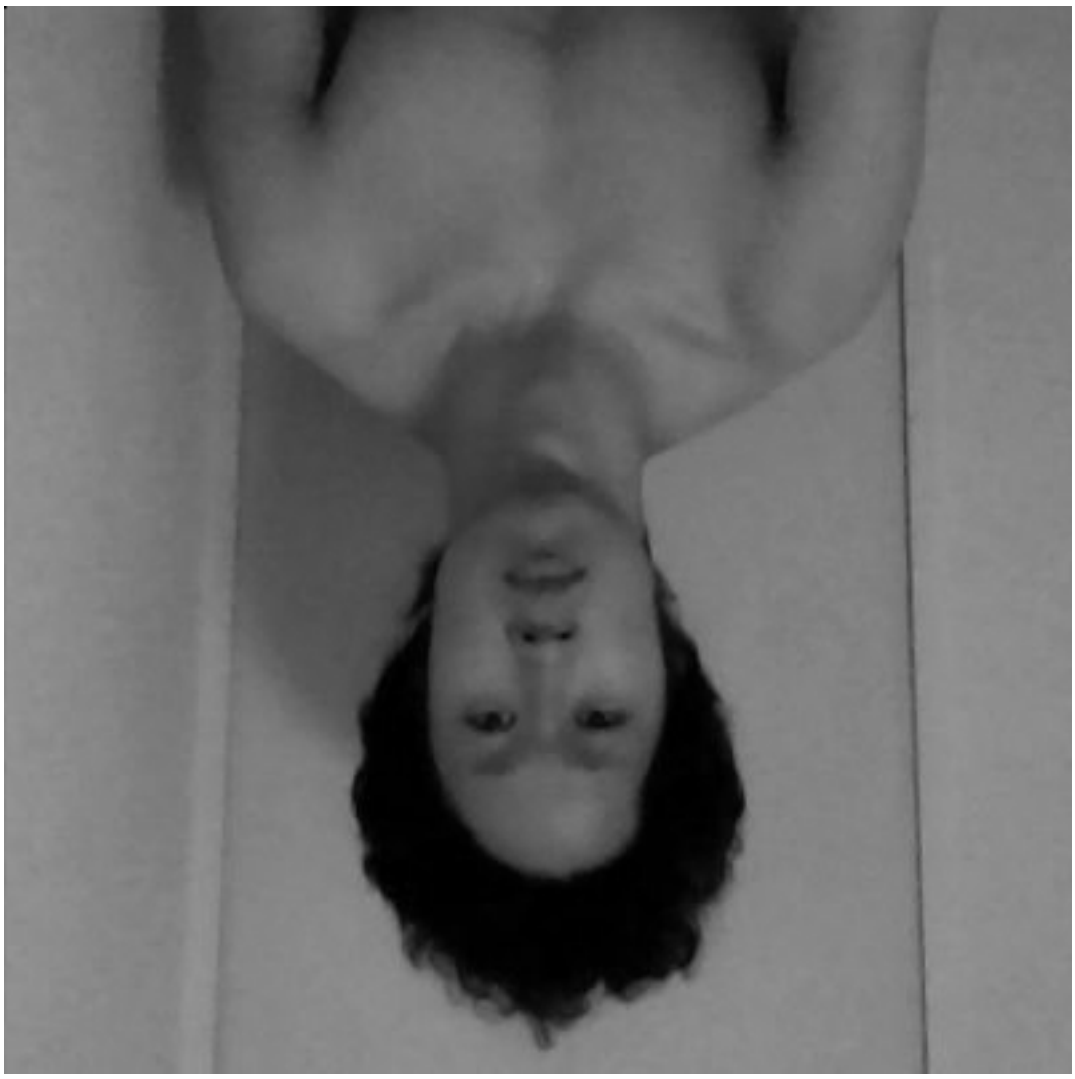

図 5　上下左右反転

図 6　グレースケールモザイク画像

図 7　サイヤ人