CENG 342 Home Project – 1

Smooth image with MPI

Ömer YILDIRIM 17050161004

1. Smoot filter function 9x9 matrix

```
10
11 int smoothFilter(uint8_t* imgArray, int width, int x, int y){
12
13    int result=0;
14
15
16    for(int i=0; i<3; i++){
17
18         for(int j=0; j<3; j++){
19
20            result += imgArray[(i+x)*width + (j+y)];
21
22         }
23
24    }
25
26    result = result/9;
27
28    return result;
29
30 }
```

2. smoothing process for the center point which becomes the averages from smoothFilter function

```
38
39    printf("Width: %d  Height: %d \n",width,height);
40
41        for(int i=0;i<height;i++){
42                for(int j=0;j<width;j++){
43
44                   rgb_image[i*width + j]= smoothFilter(rgb_image,width,i,j);
45
46                }
47
48    }
49
50    // Stoing the image
51    stbi_write_jpg(argv[2], width, height, CHANNEL_NUM, rgb_image, 100);
52    stbi_image_free(rgb_image);
53
```

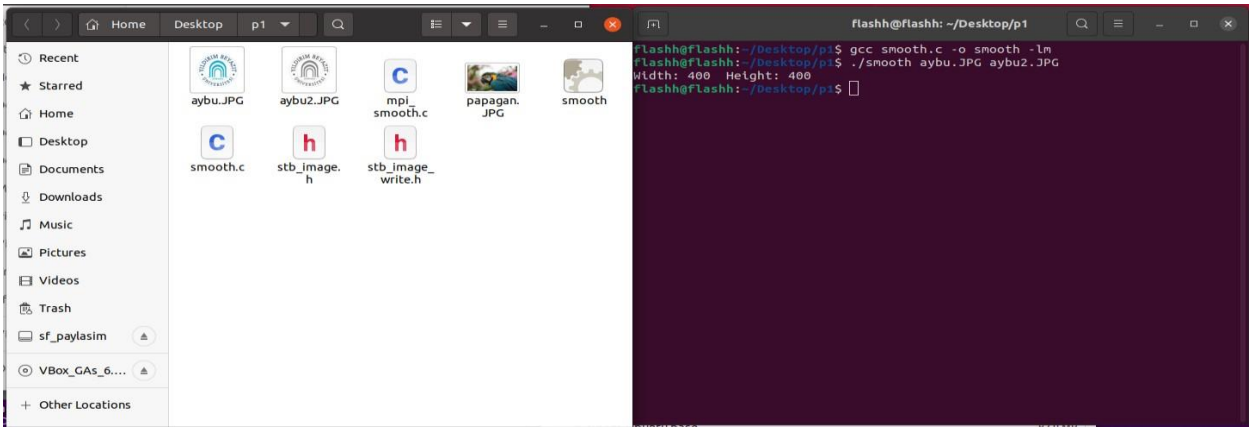
3. Compile Script

>> gcc smooth.c -o smooth -lm

4. Created executable file

>> ./sm aybu.JPG aybu2.JPG

5. created image



6. Mpi Smooth

- image height over process number

```
62          ProcessNum = height/comm_sz;
63
64          for(int i=(ProcessNum*(my_rank+2));i<(ProcessNum*(my_rank+1));i++){
65                  for(int j=0;j<width;j++){
66
67                      rgb_image[i*width + j]= smoothFilter(rgb_image,width,i,j);
68
69                  }
70
71          }
72
```

7. Add the mpi barrier and process timer

```
73
74          MPI_Barrier(MPI_COMM_WORLD);
75
76          time2 = MPI_Wtime();
77          duration = time2 - time1;
78
79          MPI_Reduce(&duration,&global,1,MPI_DOUBLE,MPI_MAX,0,MPI_COMM_WORLD);
80
81
82          printf("Pixel: %d x %d - Rank: %d - Time: %f \n",(ProcessNum*(my_rank)),(ProcessNum*(my_rank+1)),my_rank,time2);
83
```

8. Finish and print total time

```
85          if(my_rank == 0) {
86
87
88              // Stoing the image
89              stbi_write_jpg(argv[2], width, height, CHANNEL_NUM, rgb_image, 100);
90              stbi_image_free(rgb_image);
91
92              printf("Total Time: %f\n",global);
93          }
94
95
96          MPI_Finalize();
97
```

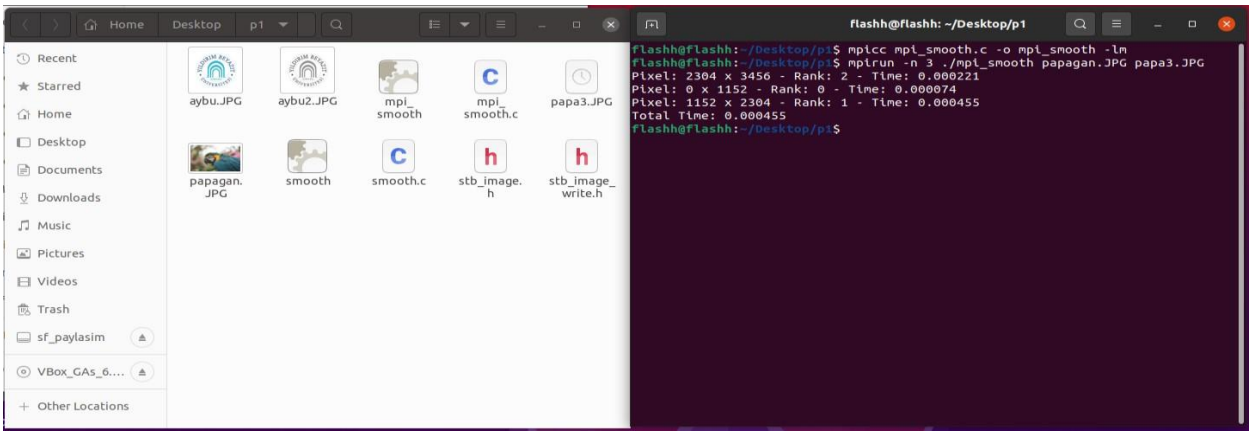
9. Compile Script

>>mpicc mpi_smooth.c -o mpi_smooth -lm

10. Created executable file

>> mpirun -n 3 ./mpi_smooth papagan.JPG papa3.JPG

11. Finish



12. Different executable