CS5310_assignment3

Chenxi Qu

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1 basic point, line, ellipse and circle

Here are the RESULTS of all the test case, ellipse and circles I used the given template.

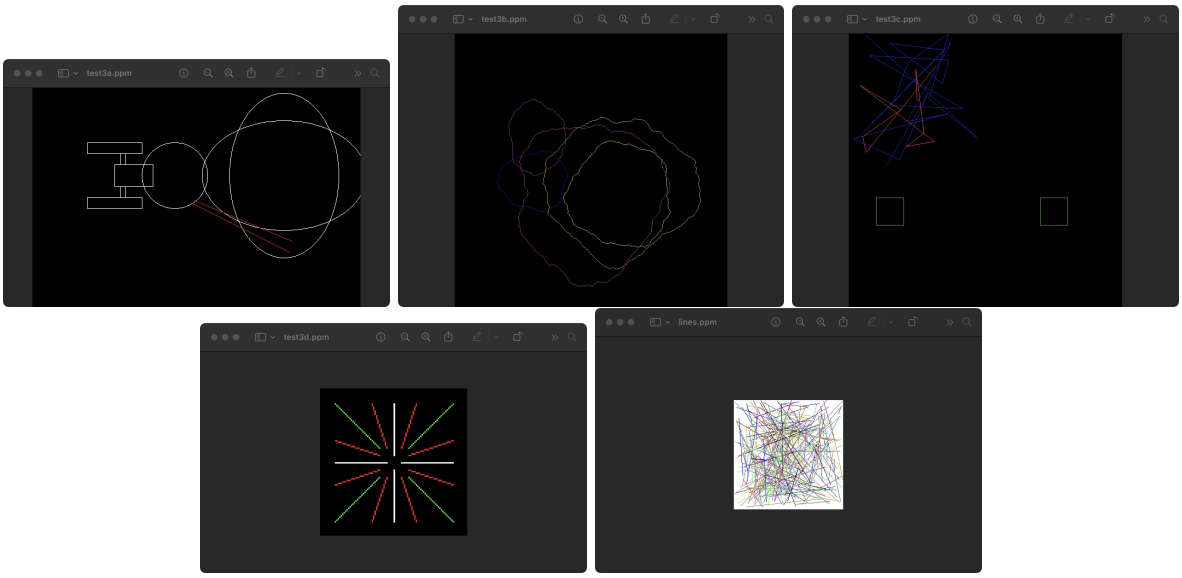

Figure 1: all given test result

2 anti-alias: SSAA

I try to implement a anti-alias method: SSAA. Here is the meaning of all the graph.

1. Because our data of ppm is integer 2D array in Image.h. So I try to implement SSAA at integer base, which mean use a filter get random points around the target point, calculate the result. The result is not what I want, so I change the method to float base.
2. Float base SSAA means random up and down 1 to sample. If the random result is $x = x + 0.1$ 0.1 is the random SSAA, which means $dx = x + 1$. the result as below use 2X SSAA.
3. This image is interesting, I randomized the rgb separately, so it produced the effect below, then I set the random seed of the rgb to one and it didn't produce this error.
4. The rest 3 image is different level of SSAA sample rate.

3 draw a sphere

3.1 vertex of sphere

build the vertex of sphere by formula.

3.2 triangles of sphere

I added a triangle on top of the original line, point, circles... connect each three point to a triangle and result got below.

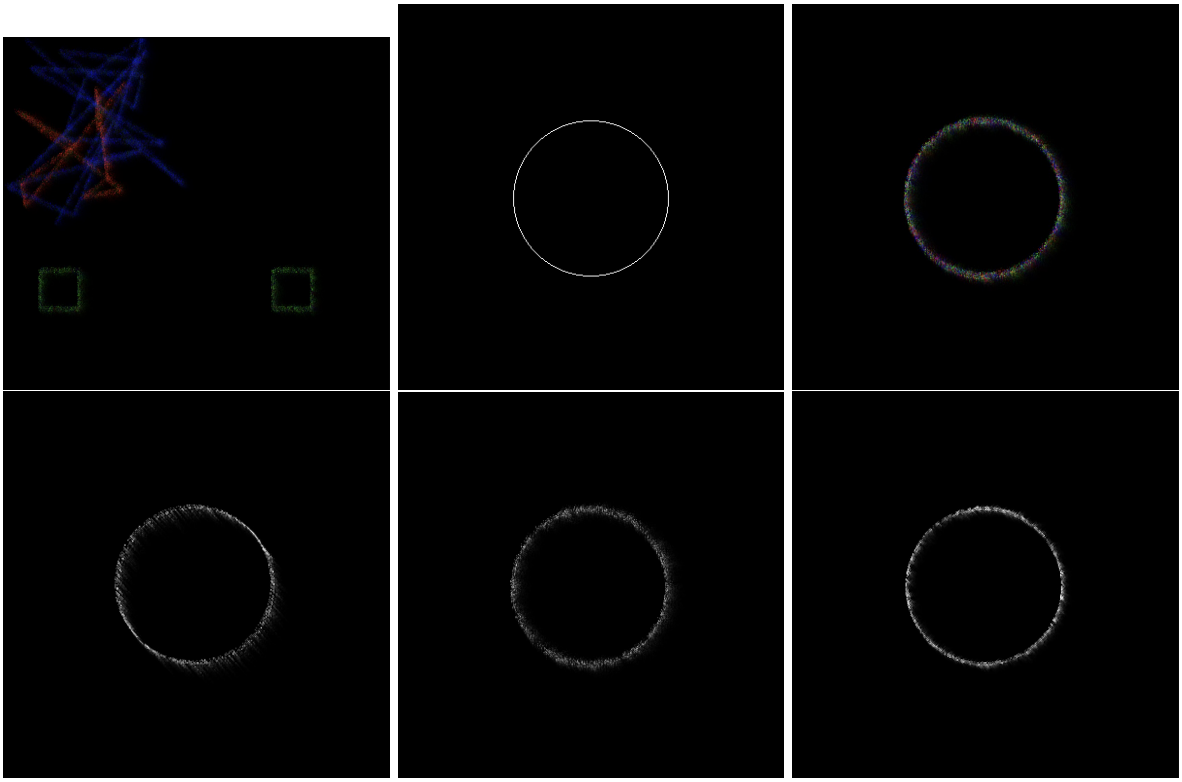

Figure 2: my output of SSAA

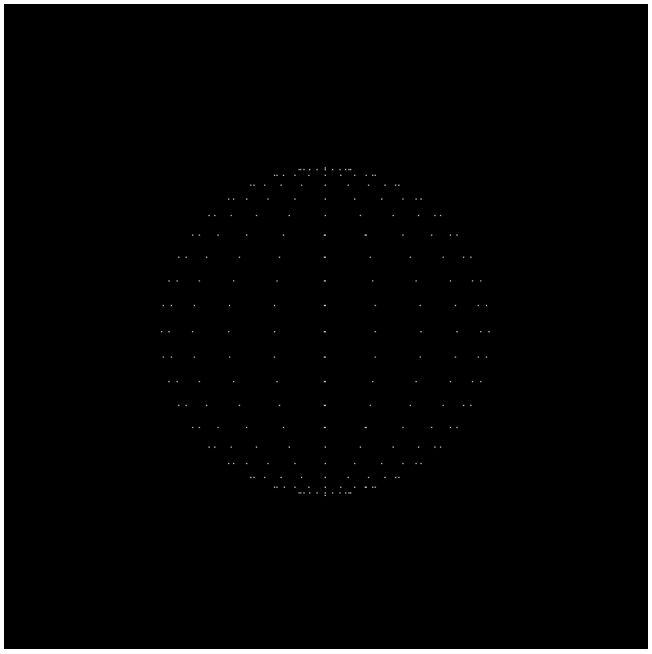

Figure 3: vertex of sphere

3.3 fill the triangles

If fill all the triangles, get the image below.

with the fill method, I can prevent there is a light on the top of the ball, simply by add a rgb change method in for loop of filling the triangles.

4 summary

After finish the basic requirement, I add the ellipse method by given template. And then I implement a SSAA anti-alias with uniform sampling method. Furthermore I add a new primitive, triangle. And use it combine with my new sphere method. At last, add some useful method like scale, fill the triangle to get the gradient color spheres.

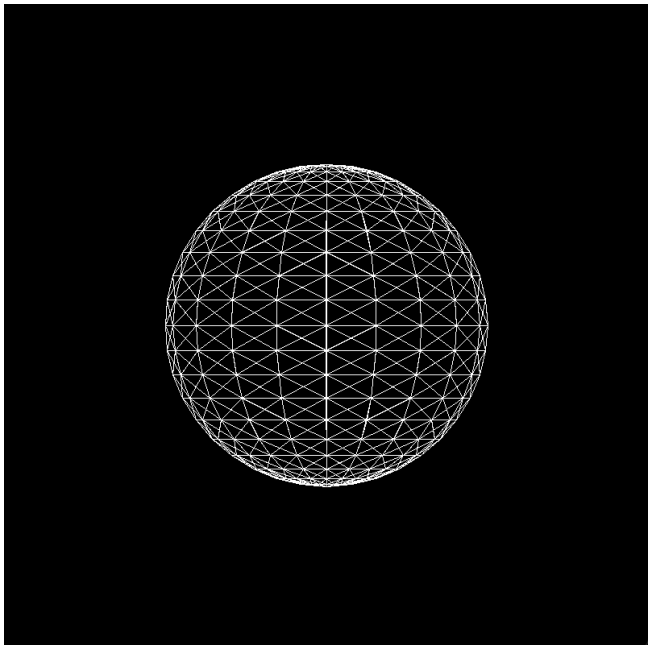

Figure 4: triangles of sphere

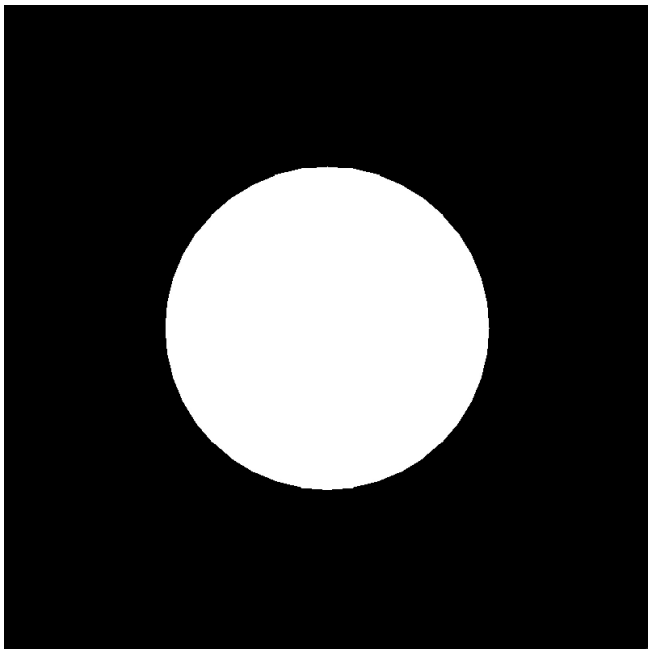

Figure 5: fill all the triangles of sphere

5 further work and what I learn

I never learnt about how write Bresenham's line-drawing algorithm by hand, I think its much more harder that I excepted. I really wanna to change the sampling method of SSAA to Poisson disk sampling, but I do not have enough time, maybe I will do this in the future.

References

[1] https://blog.csdn.net/ProgramNovice/article/details/129975110

[2] https://www.shadertoy.com/view/4ssXRX

[3] https://zhuanlan.zhihu.com/p/484414050

[4] template by the professor

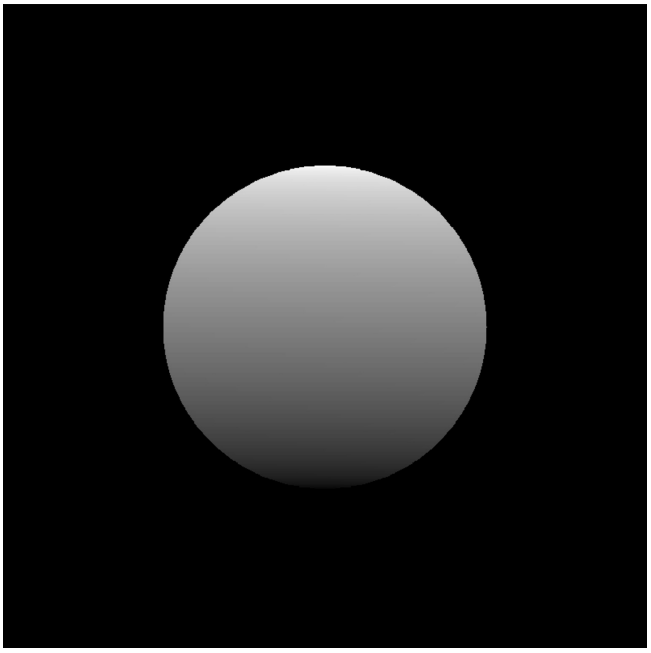

Figure 6: prevent there is a light