Assignment 0: Iterated Function Systems

1 代码实现

IFS类

```
class IFS
{
public:
    IFS(int numTransforms, int numPoints, int numIters);

    void SetTransform(int index, float probability, Matrix transform);

    void PerformIFS(char* outputFile, int imageSize);


private:
    int numTransforms;
    Matrix *transforms;
    float *probabilities;
    int numPoints;
    int numIters;

};
```

PerformIFS函数

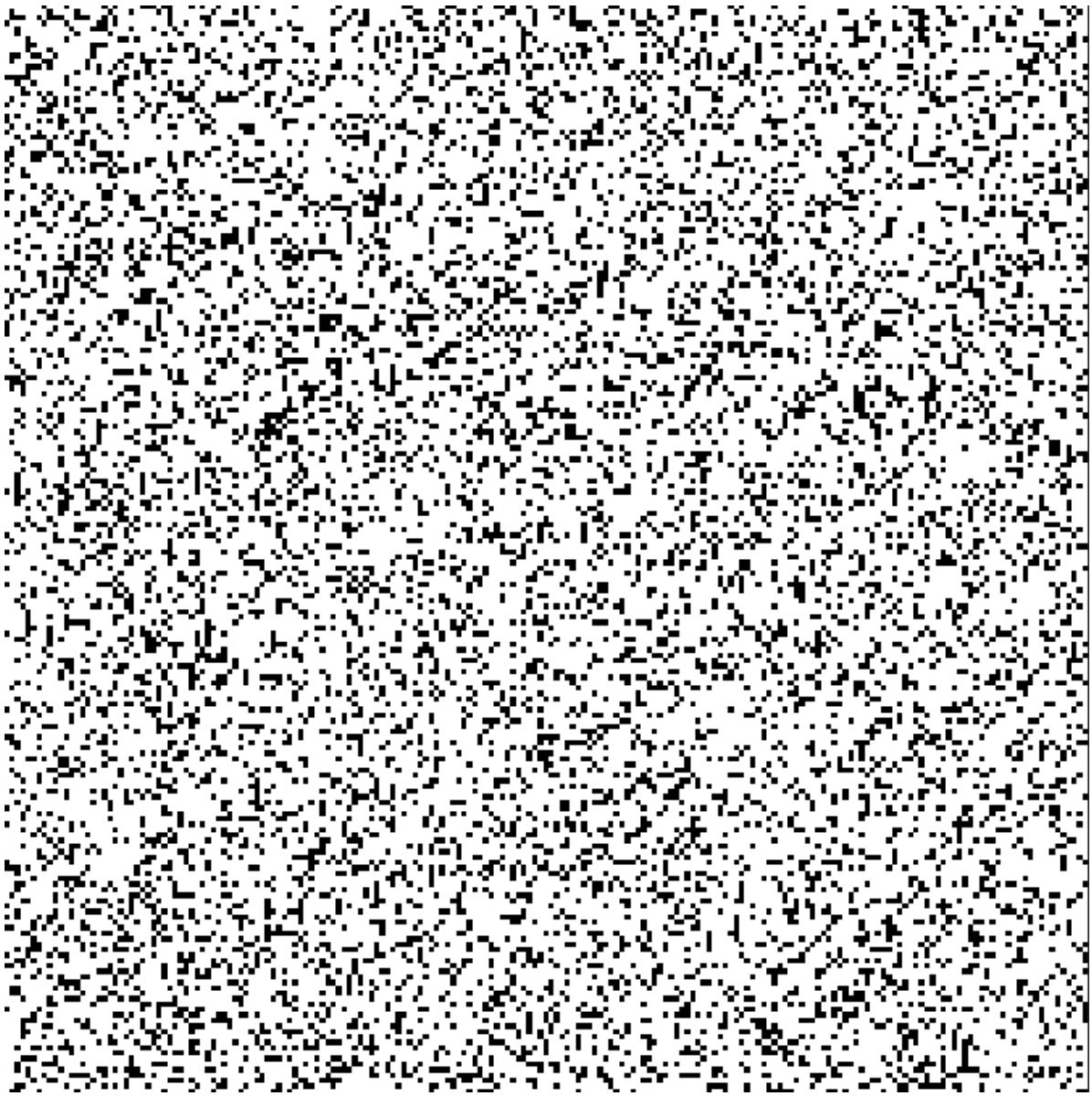
产生随机点并循环按概率施加变换

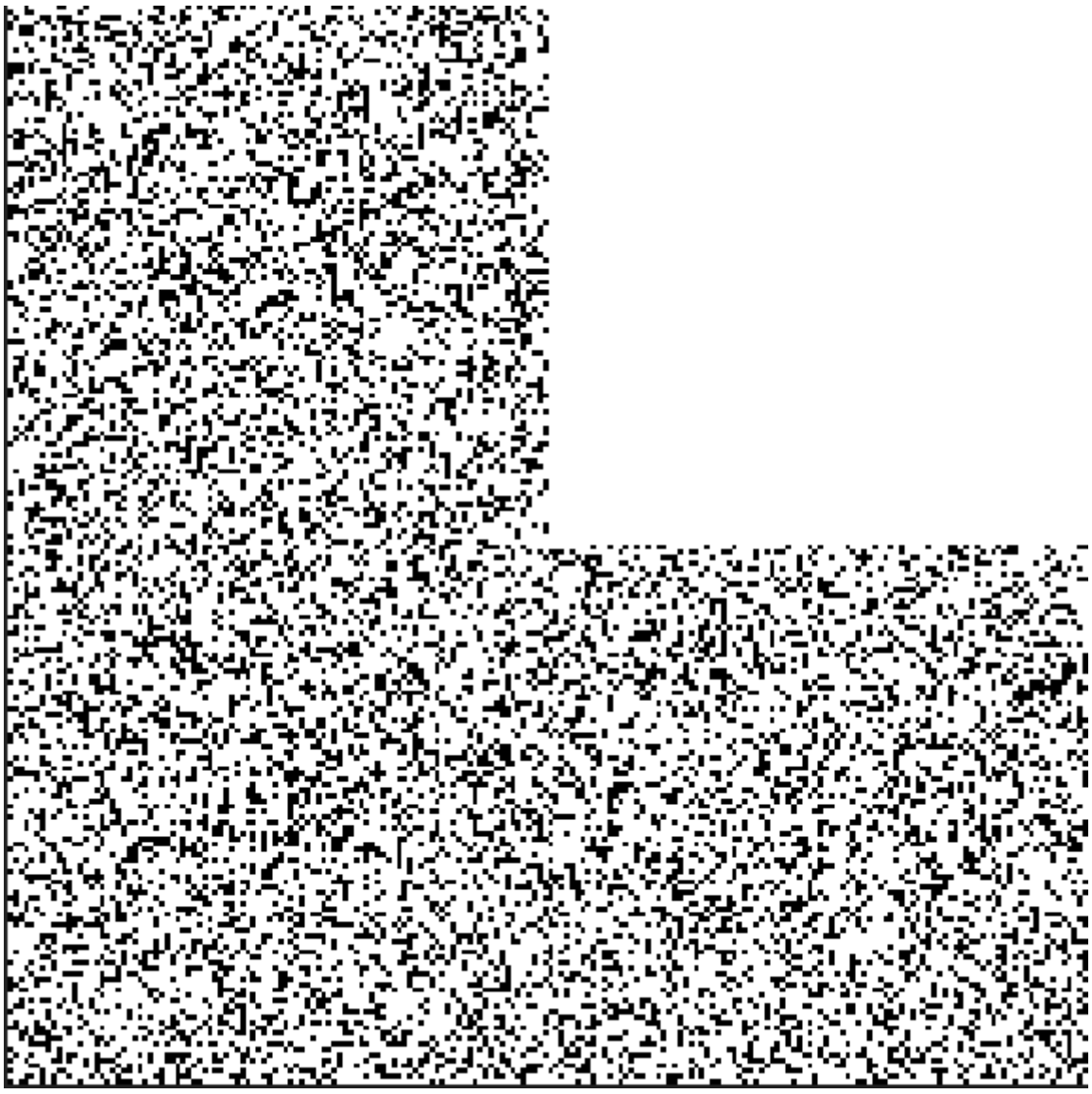
```
    void PerformIFS(char* outputFile, int imageSize)
    {

        srand((unsigned int)(time(NULL)));
        Image outputImage(imageSize, imageSize);
        outputImage.SetAllPixels(Vec3f(1, 1, 1));

        for (int i = 0; i < numPoints; i++)
        {
            Vec2f point((float)rand() / (float)RAND_MAX, (float)rand() /
(float)RAND_MAX);
            for (int k = 0; k < numIters; k++)
            {
                Matrix transform;
                float temp = (float)rand() / (float)RAND_MAX;
```

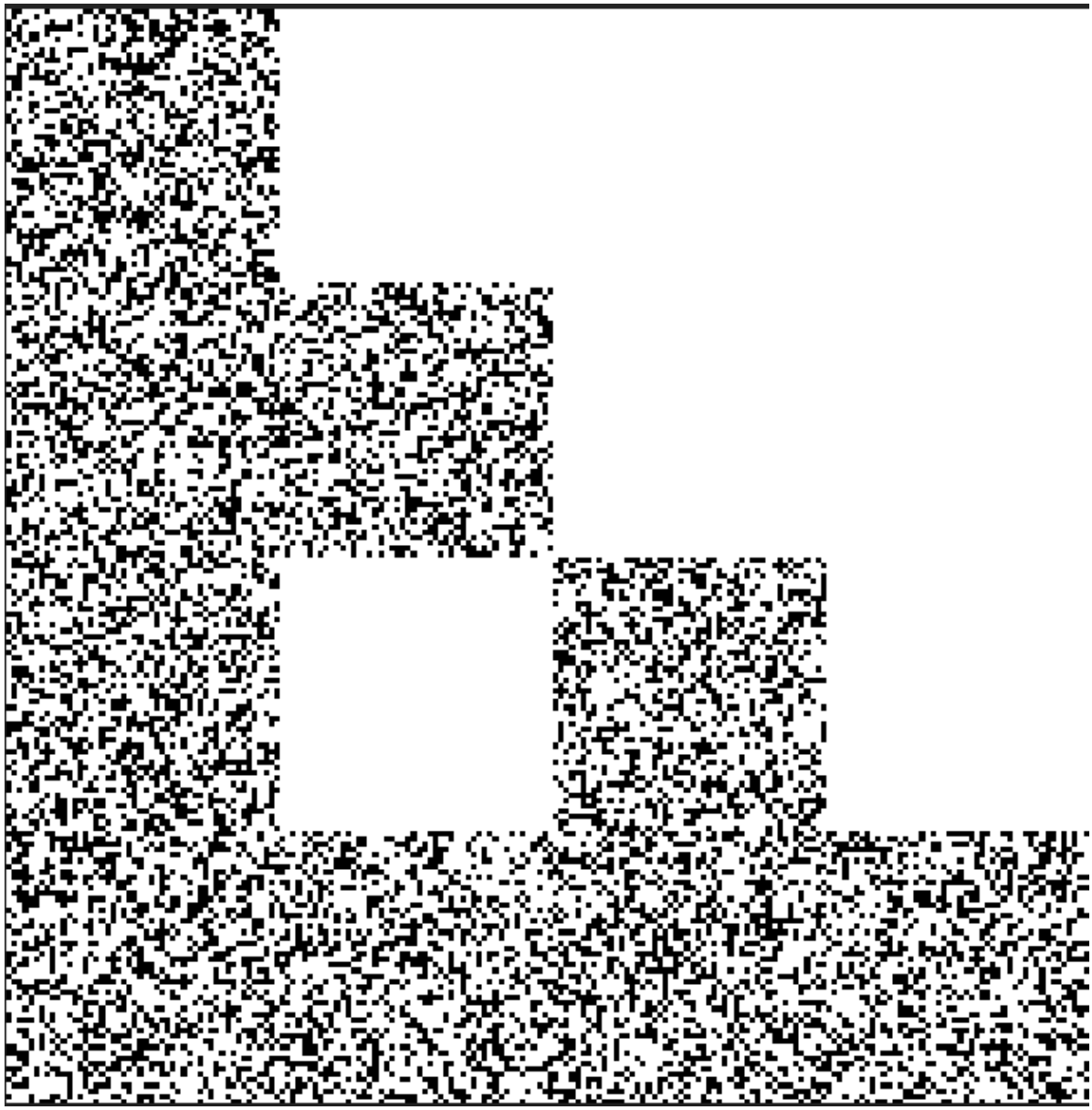
```
                float total=0;
                for (int j = 0; j < numTransforms; j++)
                {
                    total += probabilities[j];
                    if (total >= temp)
                    {
                        transform = transforms[j];
                        break;
                    }
                }

                transform.Transform(point);

            }

            point.Set(floorf(point[0] * imageSize), floorf(point[1] *
imageSize));

            outputImage.SetPixel(point[0], point[1], Vec3f(0, 0, 0));
        }


        if (outputFile != NULL)
            outputImage.SaveTGA(outputFile);
    }
```

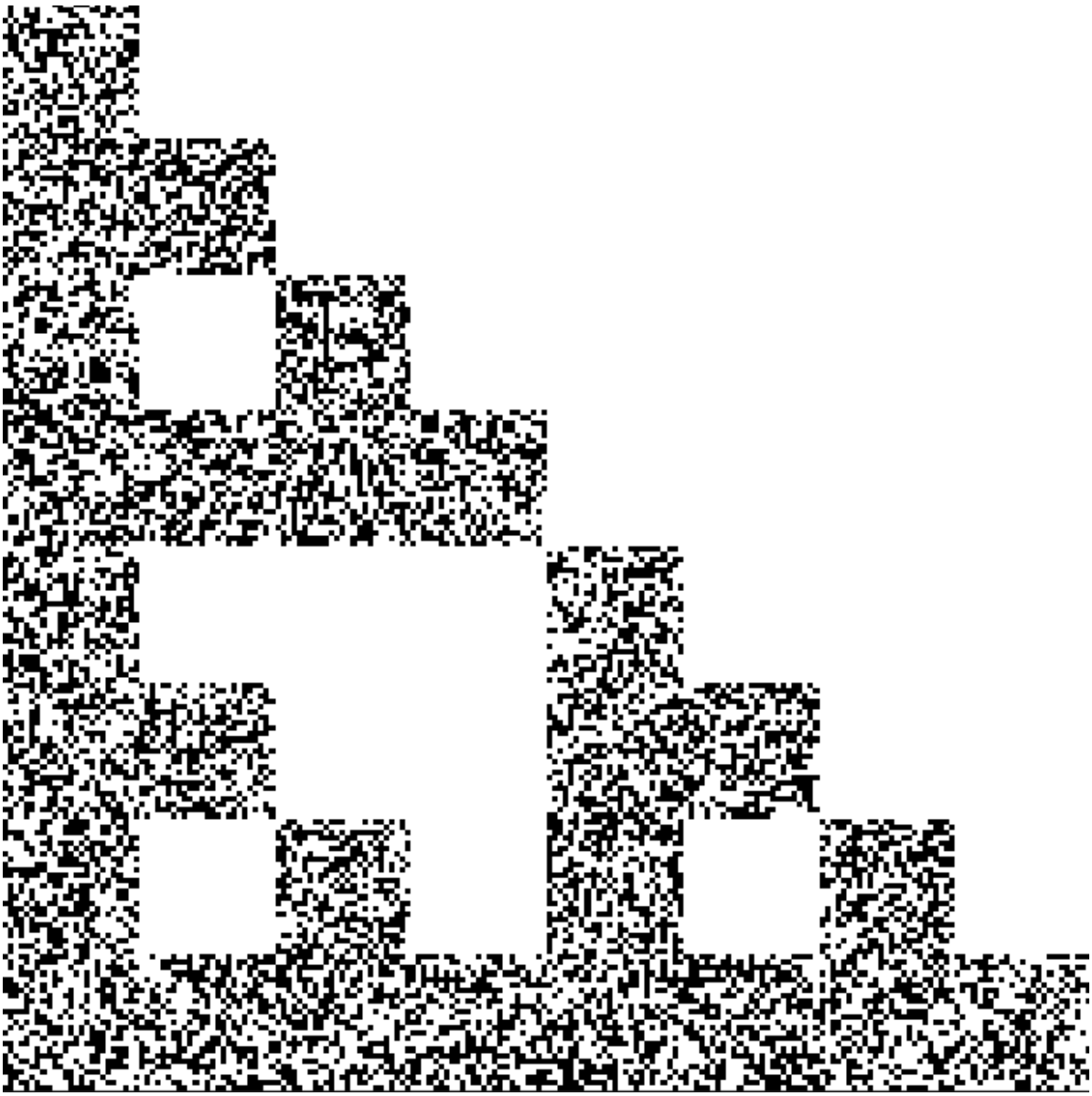
2 实验结果

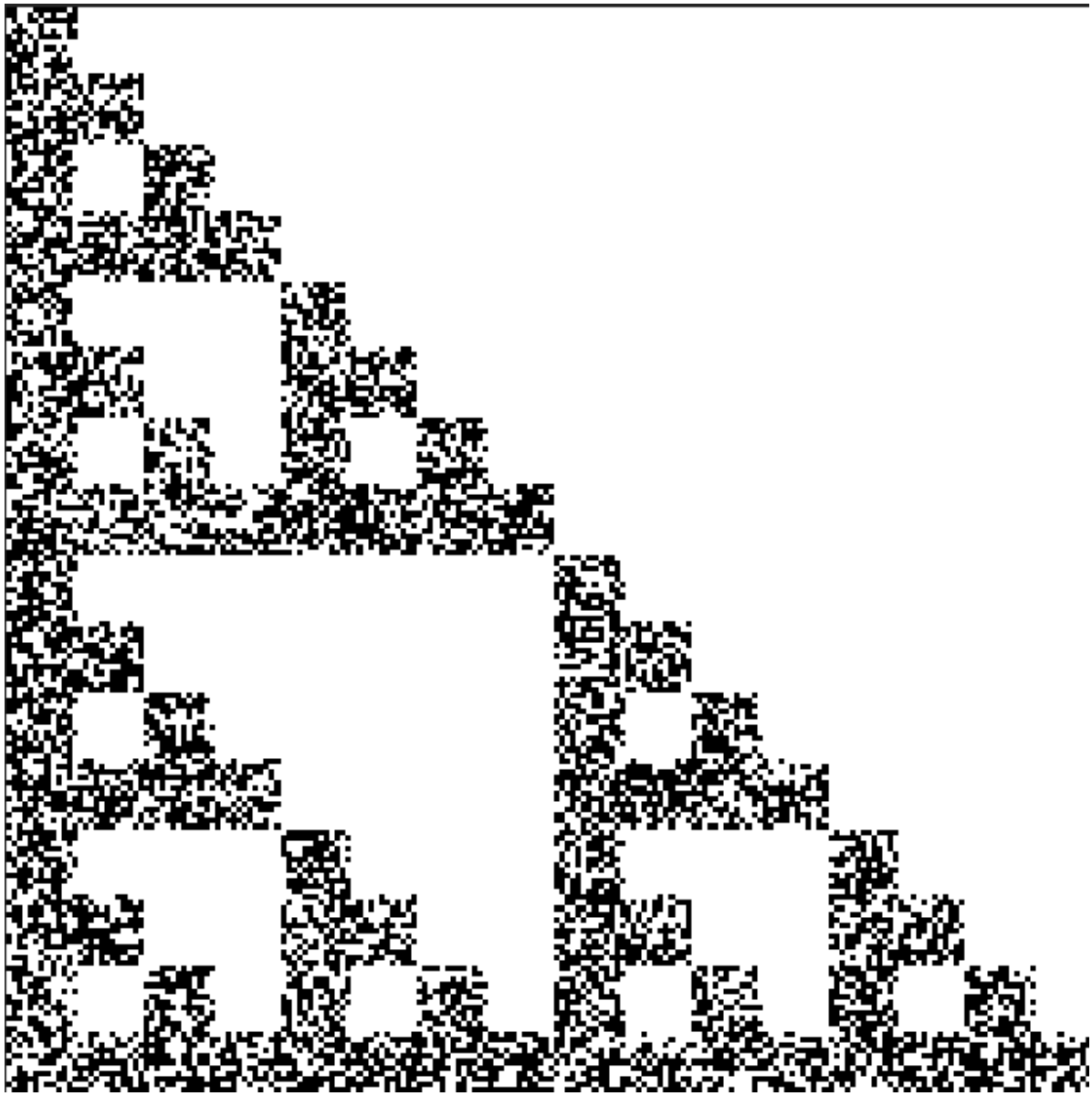
```
ifs -input sierpinski_triangle.txt -points 10000 -iters 0 -size 200 -output
sierpinski_triangle_0.tga
ifs -input sierpinski_triangle.txt -points 10000 -iters 1 -size 200 -output
sierpinski_triangle_1.tga
ifs -input sierpinski_triangle.txt -points 10000 -iters 2 -size 200 -output
sierpinski_triangle_2.tga
ifs -input sierpinski_triangle.txt -points 10000 -iters 3 -size 200 -output
sierpinski_triangle_3.tga
ifs -input sierpinski_triangle.txt -points 10000 -iters 4 -size 200 -output
sierpinski_triangle_4.tga
ifs -input sierpinski_triangle.txt -points 10000 -iters 30 -size 200 -output
sierpinski_triangle.tga
```

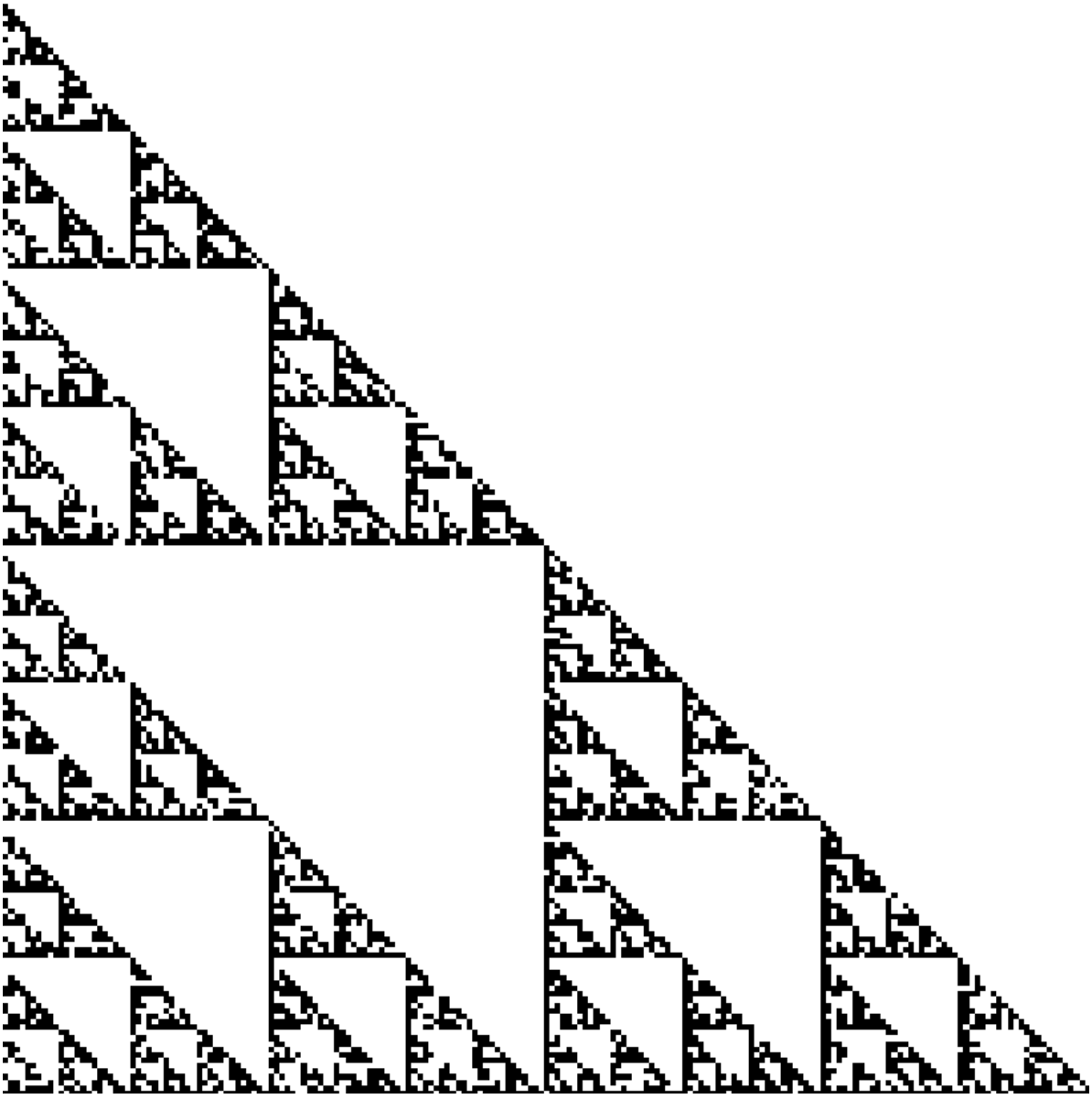












```
ifs -input fern.txt -points 50000 -iters 30 -size 400 -output fern.tga
```