

Computer Graphics Lab Experiment No: - 07

Aim: Fractal generation

Fractal generation

Fractals are very complex pictures generated by a computer from a single formula. They are created using iterations. This means one formula is repeated with slightly different values over and over again, taking into account the results from the previous iteration.

Fractals are used in many areas such as –

- Astronomy – For analyzing galaxies, rings of Saturn, etc.
- Biology/Chemistry – For depicting bacteria cultures, Chemical reactions, human anatomy, molecules, plants,
- Others – For depicting clouds, coastline and borderlines, data compression, diffusion, economy, fractal art, fractal music, landscapes, special effect, etc

Fractals can be generated by repeating the same shape over and over again as shown in the following figure. In figure aa shows an equilateral triangle. In figure bb, we can see that the triangle is repeated to create a star-like shape. In figure cc, we can see that the star shape in figure bb is repeated again and again to create a new shape.

We can do unlimited number of iteration to create a desired shape. In programming terms, recursion is used to create such shapes.



(a) Zeroth Generation



(b) First Generation



(c) Second Generation

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Code

```
#include<graphics.h>

#include<conio.h>

#include<math.h>

void koch(int x1, int y1, int x2, int y2, int it)

{

float angle = 60*M_PI/180;

int x3 = (2*x1+x2)/3;

int y3 = (2*y1+y2)/3;

int x4 = (x1+2*x2)/3;

int y4 = (y1+2*y2)/3;

int x = x3 + (x4-x3)*cos(angle)+(y4-y3)*sin(angle);

int y = y3 - (x4-x3)*sin(angle)+(y4-y3)*cos(angle);

if(it > 0)

{

koch(x1, y1, x3, y3, it-1);

koch(x3, y3, x, y, it-1);

koch(x, y, x4, y4, it-1);

koch(x4, y4, x2, y2, it-1);

}

else

{

line(x1, y1, x3, y3);

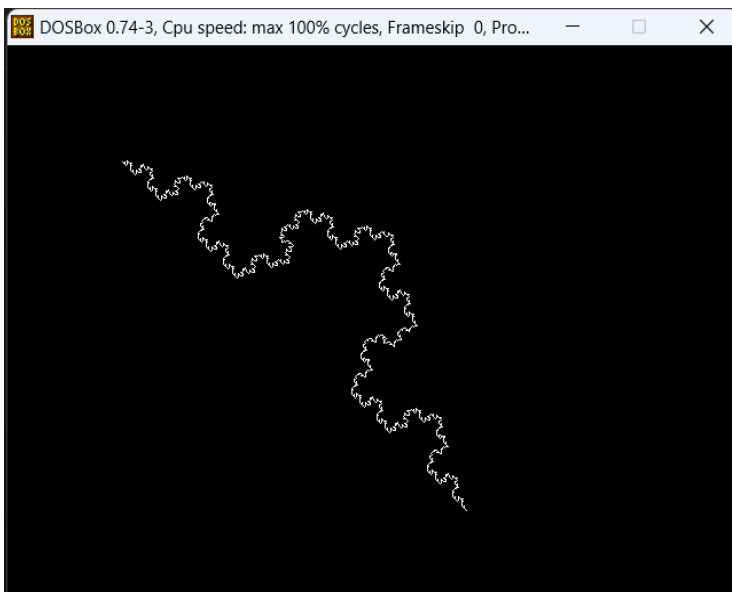
line(x3, y3, x, y);
```

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```
line(x, y, x4, y4);  
  
line(x4, y4, x2, y2);  
  
}  
  
}  
  
int main(void)  
{  
  
int gd = DETECT, gm;  
  
initgraph(&gd, &gm, "C:\\\\TC\\\\BGI");  
  
int x1 = 100, y1 = 100, x2 = 400, y2 = 400;  
  
koch(x1, y1, x2, y2, 4);  
  
getch();  
  
return 0;  
  
}
```

Output



Conclusion: LO1,mapped.

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