

Mandelbrot Zoom

CS293 Project
Data Structures and Algorithms Lab

Mandelbrot set is a set of points which diverges according to the following equation $z = z^2 + c$ where c is a point in a complex plane. Mathematically we get that if we start from $z=0$ as initial value then it always diverges at infinity if at some point the value of z reaches out of the range $[-2,2]$.

Hence, any point which diverges depends only on ' c ' (initial value). Now, if we map a RGB color value to the number of iterations it took to diverge then we get a beautiful pattern on this complex plane. Zooming into this creates an amazing animation known as Mandelbrot zoom.

In this project I have implemented a program to show the Mandelbrot zoom using SDL Graphics library in C++. We first calculated the number of iterations the equation $z = z^2 + c$ to reach infinity. The code has its own defined infinity. If this infinity is reached by the iterator without exceeding the range $[-2,2]$, we take it inside our mandelbrot set, otherwise we map it to a RGB function to color that particular pixel.

To zoom into our mandelbrot set we reduce the range for which the mandelbrot set was plotted and map it to the width and height of our window which provides a zoomed view. This activity is done by the program continuously which makes it look zoomed continuously.

Project Description

Directory Structure:

Mandelbrot_Zoom

```
|— main.cpp
|— mandelbrot.h
|— helper.h
|— Makefile
|— mandelbrot      (BINARY)
```

Programming Language : C++

Graphics Library : Simple DirectMedia Library (SDL)

Environment Required :

Install SDL in ubuntu and then use the Makefile. Command 'make mandelbrot' will create a binary 'mandelbrot' and then run it. This command will also create images in images directory which we can use to see faster zoom to the Mandelbrot set.