# Generative Art with Processing

Ann Song
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# Generative Art with Processing: Part 1 Slides (January, 2024)

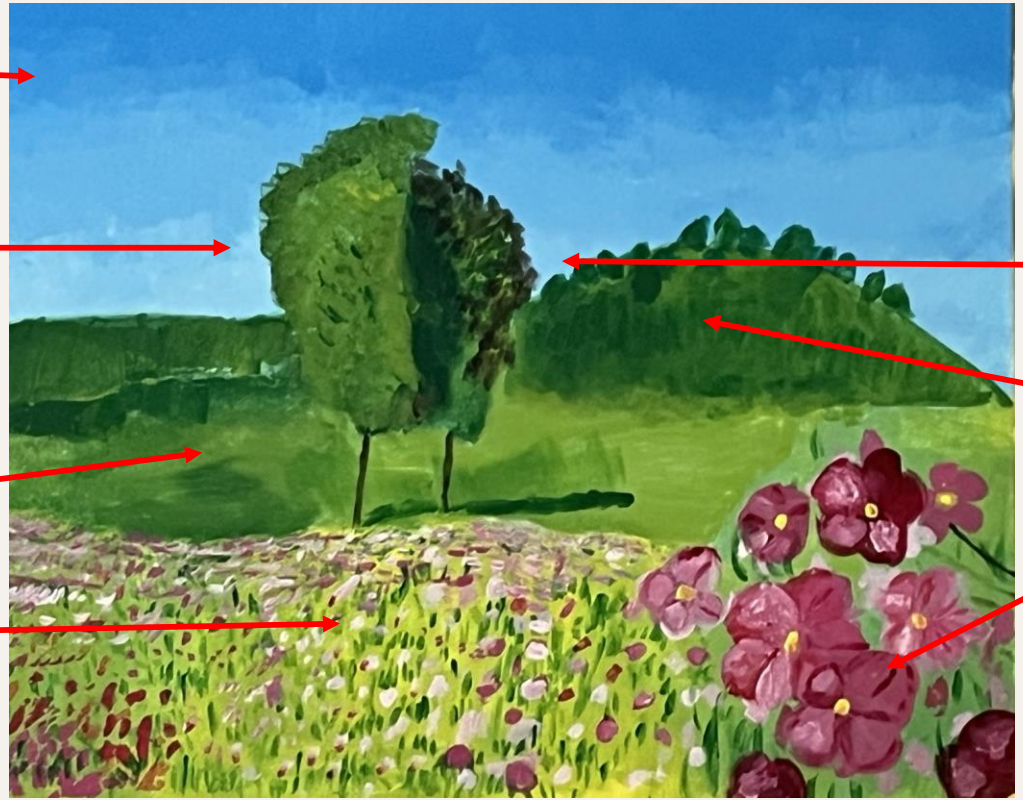
Ann Song is a high school junior and volunteer mentor and teacher for Robotics And Beyond. Her interest and ability in art began around 2015, at about age 7, and continued to grow until the age of 11. At this time, she set aside art after discovering computer software and coding languages. Very recently, Ann has connected her early interest in hand-drawn art to her continuing interest in coding and a new interest in Artificial Intelligence (AI). She has connected these interests through a topic called Generative Art. Gen. Art uses mathematical concepts and coding to create very fascinating designs. The process also allows for very interesting ways to infinitely zoom in on designs that have been created. These views create an infinite range of new designs that are all related to the original design and dependent on the coding used to create them.

In this workshop, Ann shows how Generative Art works and gives you an idea of the designs it can create and the potential for many different designs that are possible. The actual mathematical concepts and coding behind what is used here is explained in a later workshop.

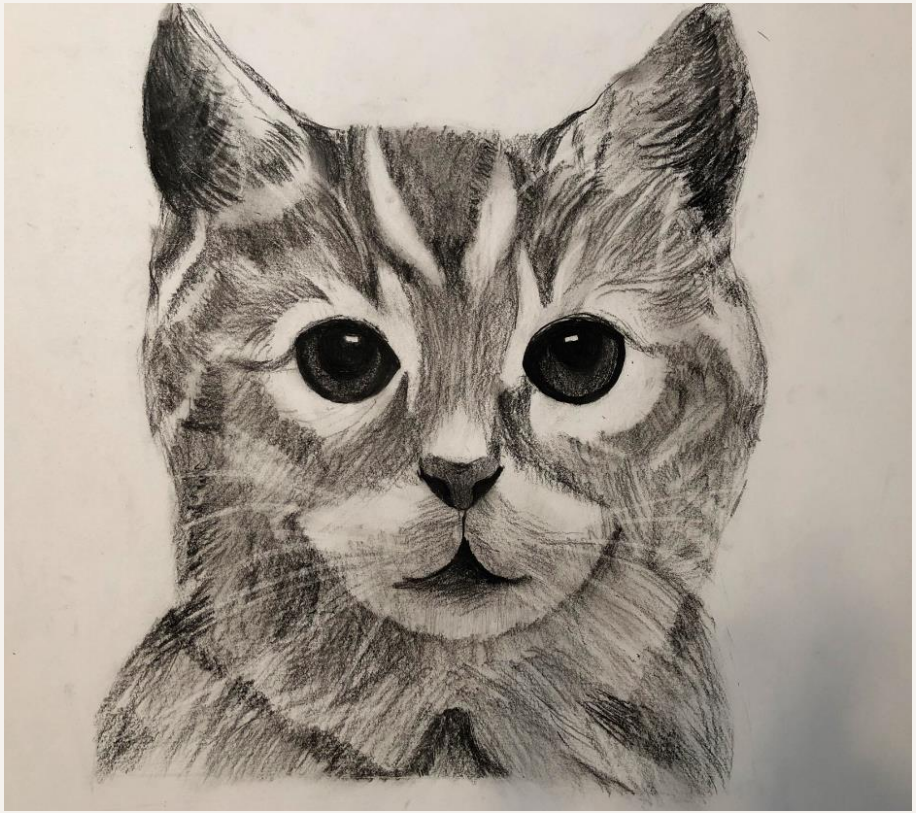
# 2015

# 2016

# 2017



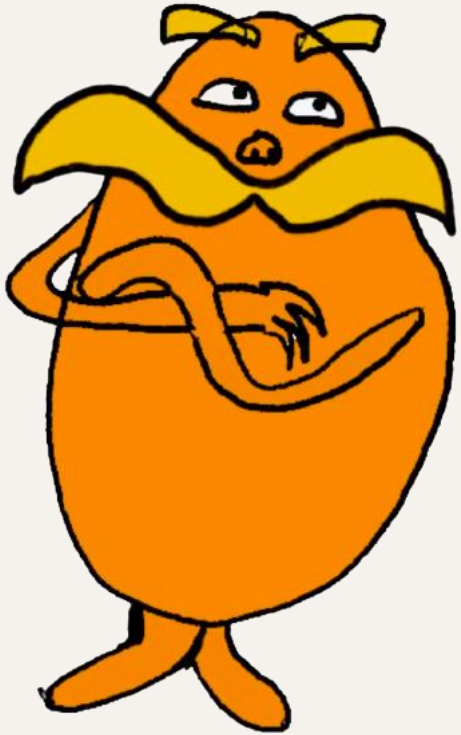
# 2018



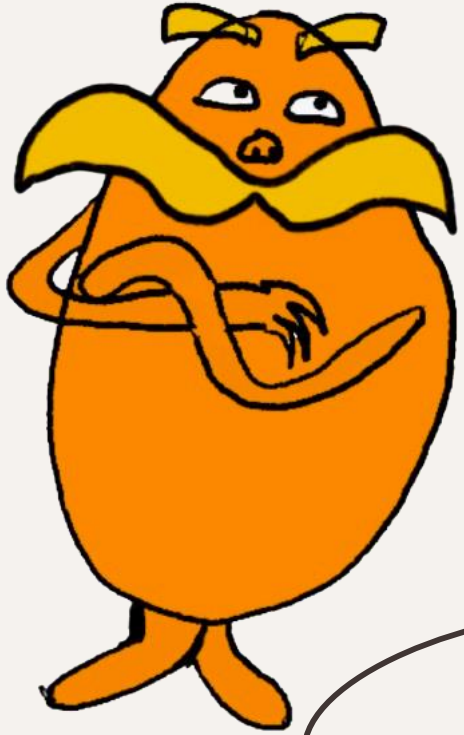
# 2018

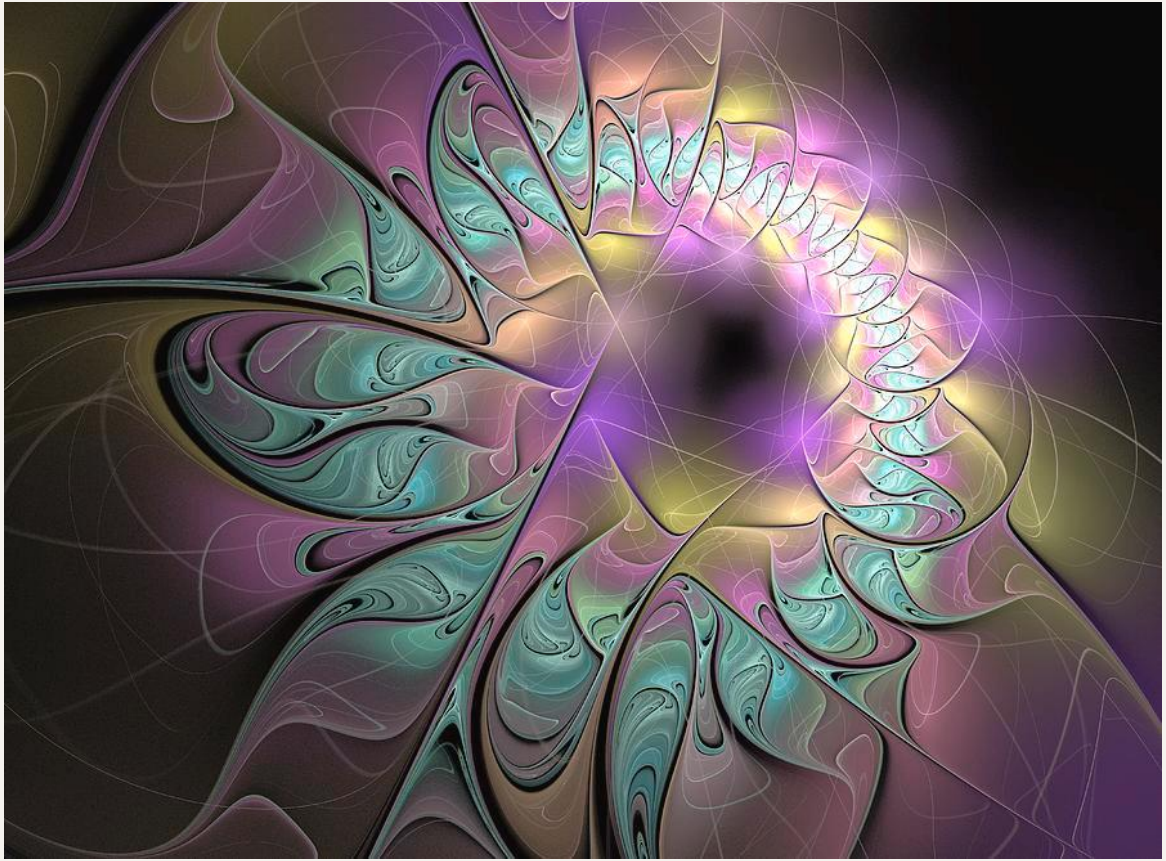
# 2019

# 2024



5 years





# Generative Art with Processing

Ann Song

01 GENERATIVE ART

02 ALGORITHMS
(a kind of equation or formula)

03 PROCESSING (a coding language)

# 01. Generative Art

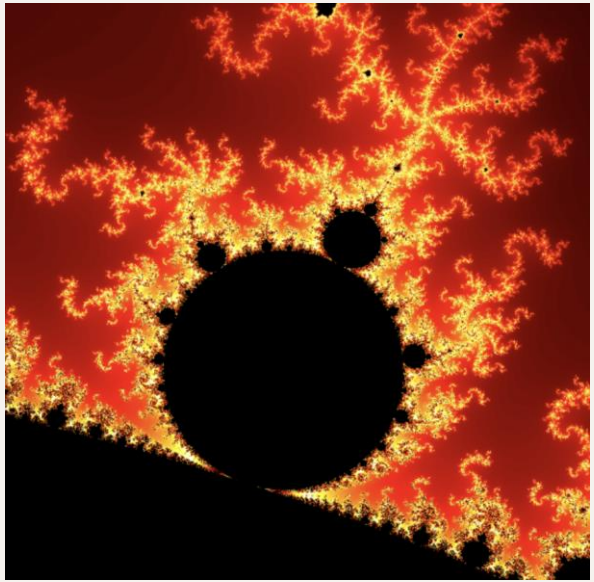
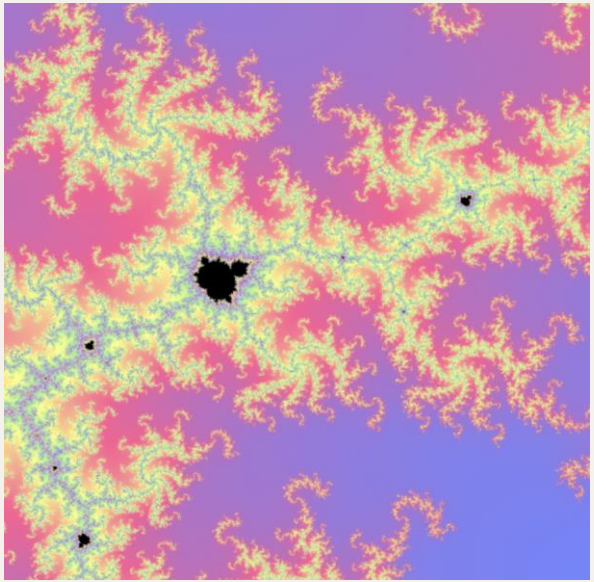
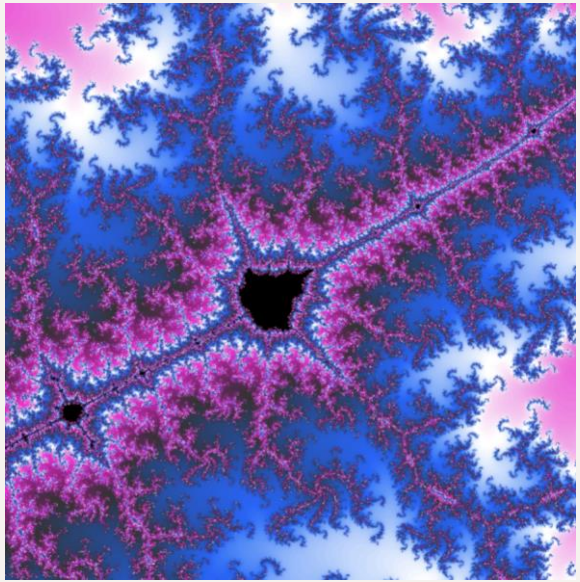
- Made using algorithms to produce visual images
  - Combine rules and randomness

We humans see these designs as art.

- Surprising
- Unpredictable

We combine human creativity and machines (computers) to do show what can be made using the rules and randomness.

In this way we can create things that we never could have imagined.

# 02. ALGORITHMS

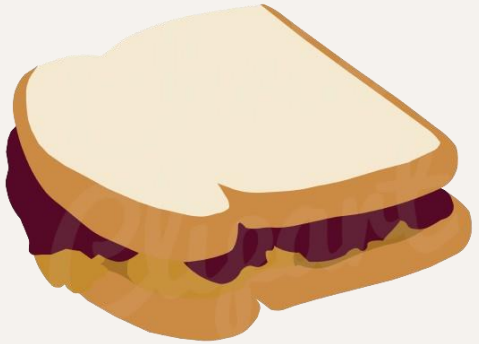
Algorithm is just another word for a set of rules.

Algorithms are all around us in

1. Search engines
2. Social Media feeds
3. Online shopping
4. And more

Of course, these are more complex algorithms, but let’s take a look at some simple examples.

# Example 1



**Algorithm Goal:** Make a Peanut Butter and Jelly Sandwich

**Instructions**

Ingredients: Bread, Peanut Butter, Jelly

1. Take two slices of bread.
2. Using a butter knife, spread peanut butter on one slice of bread.
3. Using the same knife (or a different one if you prefer), spread jelly on the other slice of bread.
4. Press the two slices of bread together with the peanut butter and jelly sides facing each other.
5. Your peanut butter and jelly sandwich is ready to eat!

**Output:** Peanut Butter and Jelly Sandwich

# Example 2

**Algorithm Goal**: Dress for the Weather

**Input**: Current Weather

**Instructions**

1. Check if it's hot:
    a. Wear light clothes (shorts, T-shirt).
2. If it's not hot:
    a. Wear something comfortable (jeans, shirt).
3. Check if it's raining:
    a. Bring an umbrella and wear a jacket

**Output**: Appropriate outfit for the current weather

# 03. Processing

Processing is a programming language designed for creative coding. It is similar to the programming language Java.

We will use an app on the computer that is able to run Processing code, called the integrated development environment (IDE).

# The Mandelbrot Set

The images we saw earlier in the previous slide are all examples of “The Mandelbrot Set”.

But what exactly is the Mandelbrot Set? It can be difficult to grasp, but The Mandelbrot Set is actually a design that can be infinitely zoomed into.

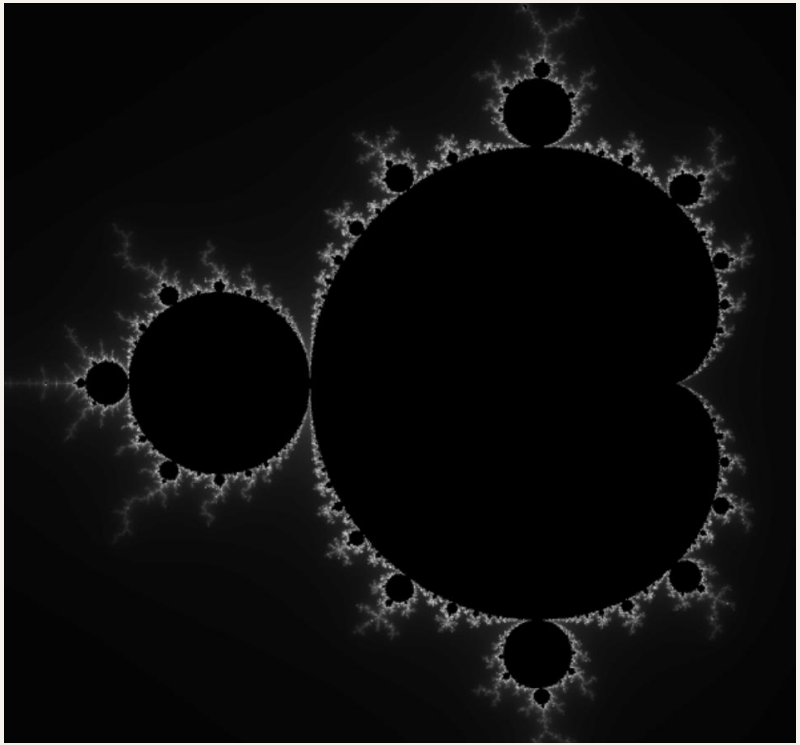
Depending on where you zoom in, you get a different design. There are infinite possibilities for where you zoom in, how much you zoom in, and the colors of the set. This is because of how the algorithm works. It controls what we see at every step of zooming in or out.

# Experiment with zooming in on The Mandelbrot Set here

https://math.hws.edu/eck/js/mandelbrot/MB.html

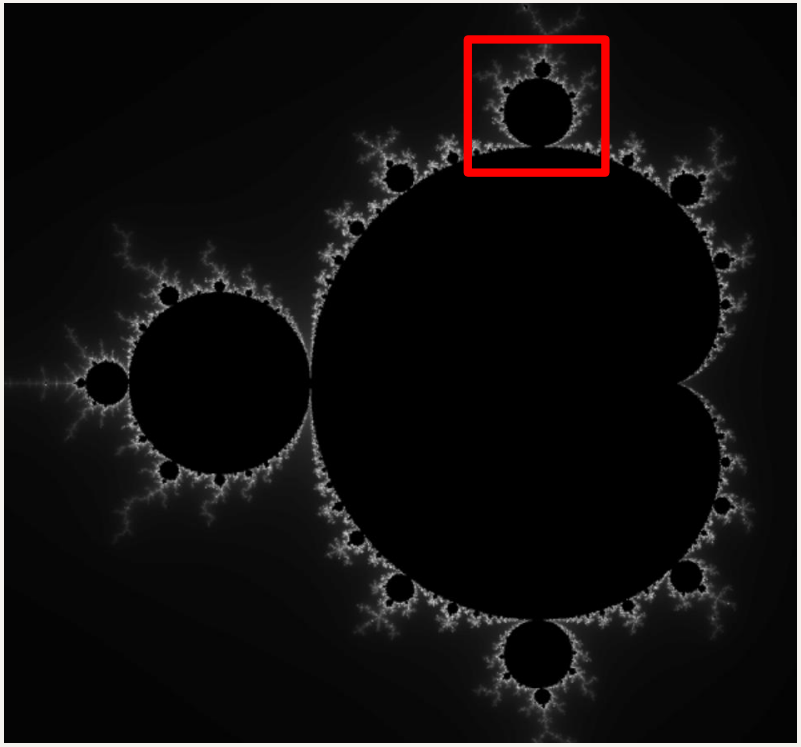
Let’s look at some examples of how we can zoom in on this infinite design!

# When the design is completely zoomed out:

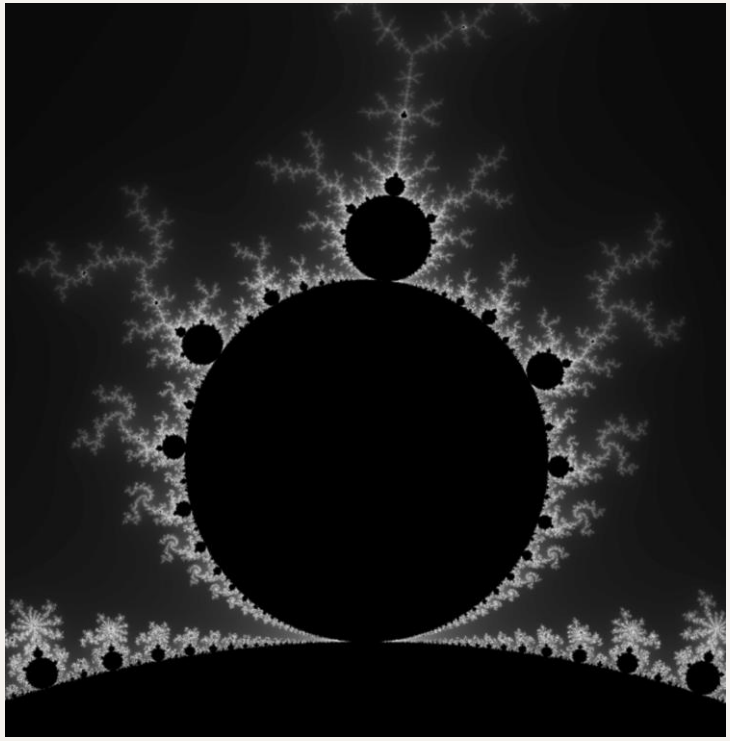


*It's cool but kinda boring*

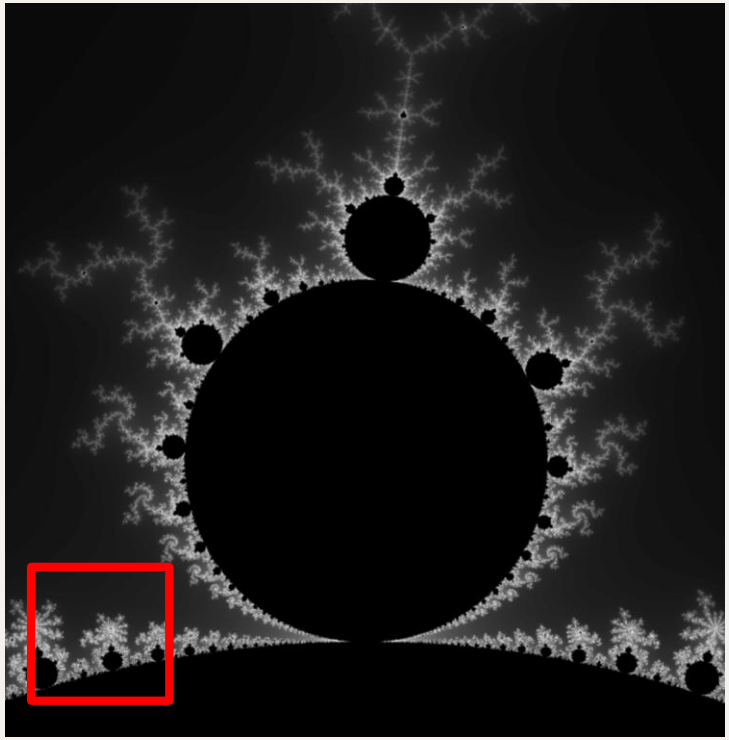
Zoom in here



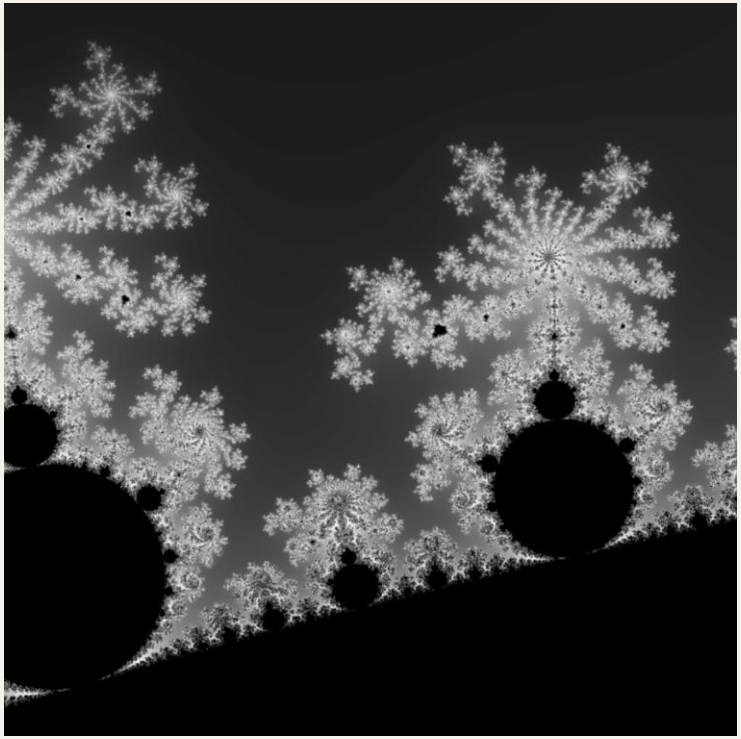
Result



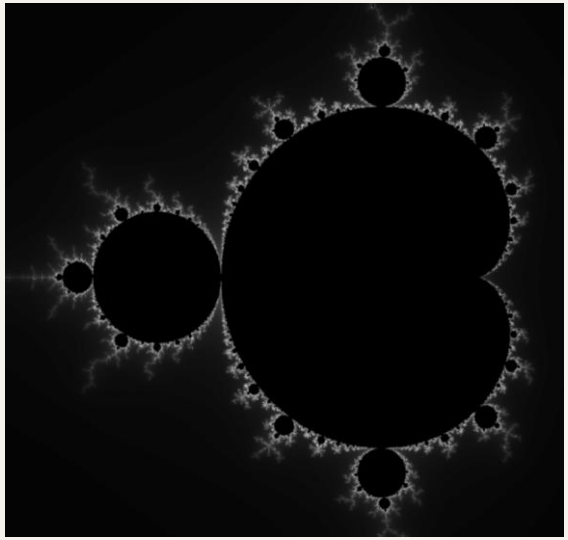
Zoom in here

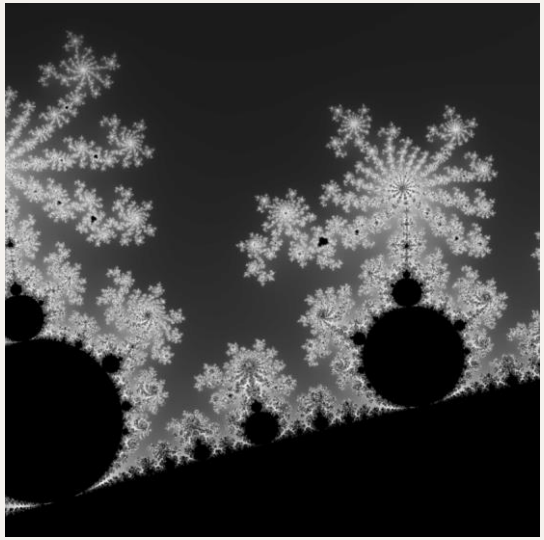


Result

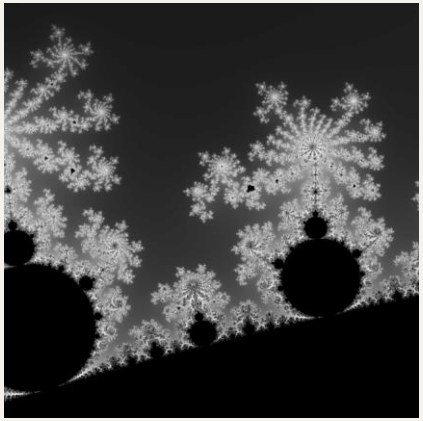
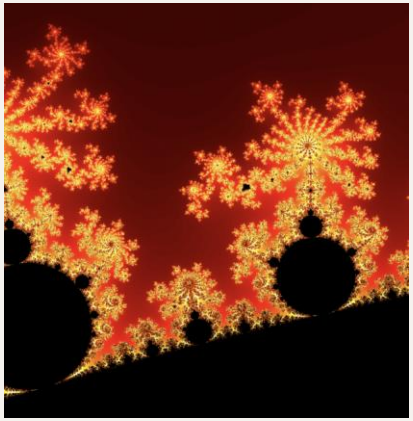
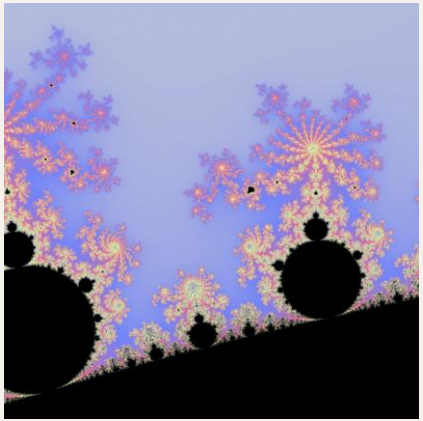
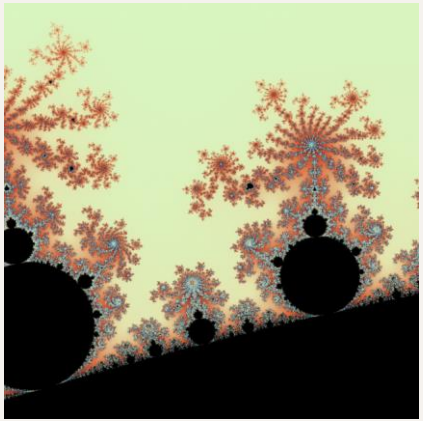


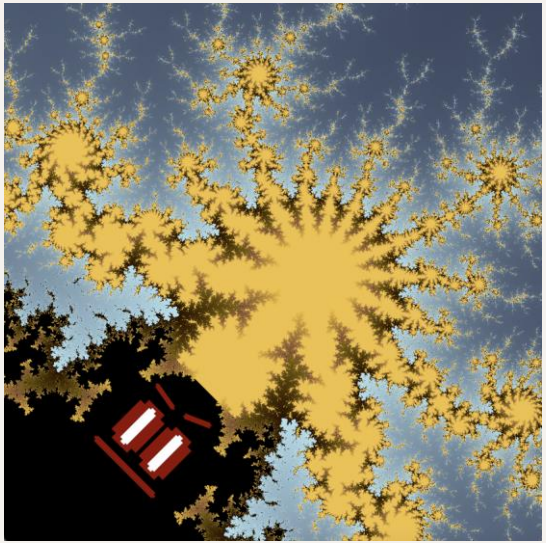
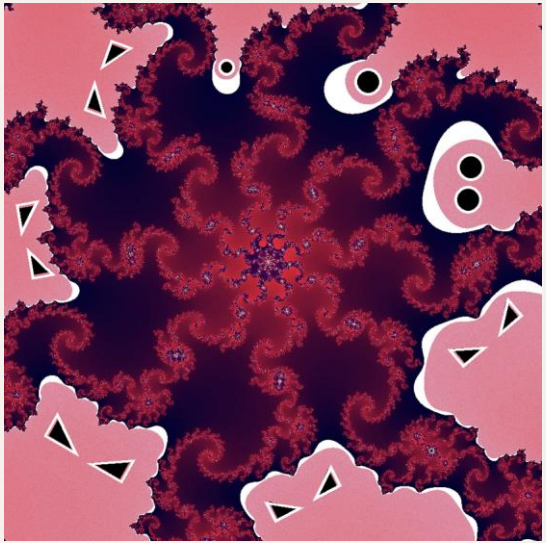
# With just zooming in randomly twice we got a completely different design





# We can add color too!

# We can do this with Processing

While the Mandelbrot Viewer gives us a taste of the power of The Mandelbrot Set, the possible designs are still limited. With Processing we can create very customized designs with The Mandelbrot Set. Here's a couple examples of ones I created in Processing in the past. As you see I have a thing for creating faces with The Mandelbrot Set.