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GENERATIVE ART: FROM ZERO TO `random()`

BEER CITY CODE

JONATHAN CHAFFER

IN THIS TALK...

WE WILL:

Learn what generative art is and what it can be used for

Learn why it's a great hobby for first-time coders

Build our first generative art program

WE WON'T:

Focus on one specific library or language

Dive deeply into AI and machine learning

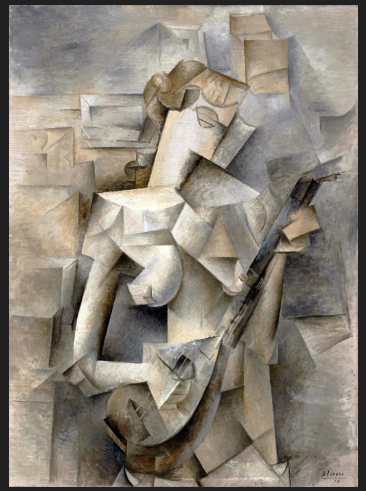
Cover cryptocurrencies, NFTs, blockchains, etc.

WHAT IS GENERATIVE ART?

Pieces of artwork generated through some autonomous, or semi-autonomous process

INSPIRATIONS

CUBISM



Pablo Picasso, 1910

DADAISM

Marcel Duchamp, 1917

SURREALISM

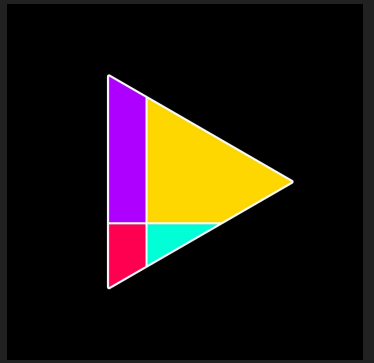
André Masson, 1924

TYPES OF GENERATIVE ART

GENERATIVE MUSIC

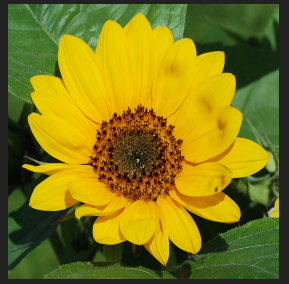
Brian Eno popularized the “generative music” genre with his ambient pieces

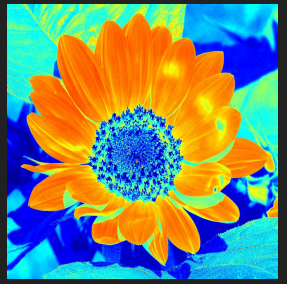
Generative.fm has a library of music players that never end and never repeat



GENERATIVE PHOTOS

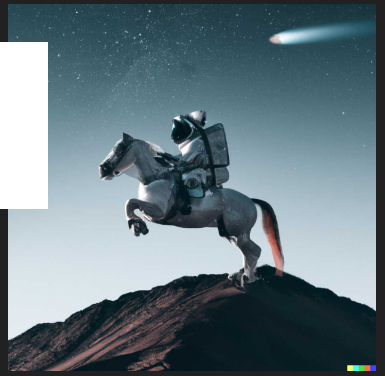
Image filters - color adjustments, facial detection, etc.





Machine learning models like DALL-E 2 can create generative artworks from a text prompt

“An astronaut riding a horse in a photorealistic style”



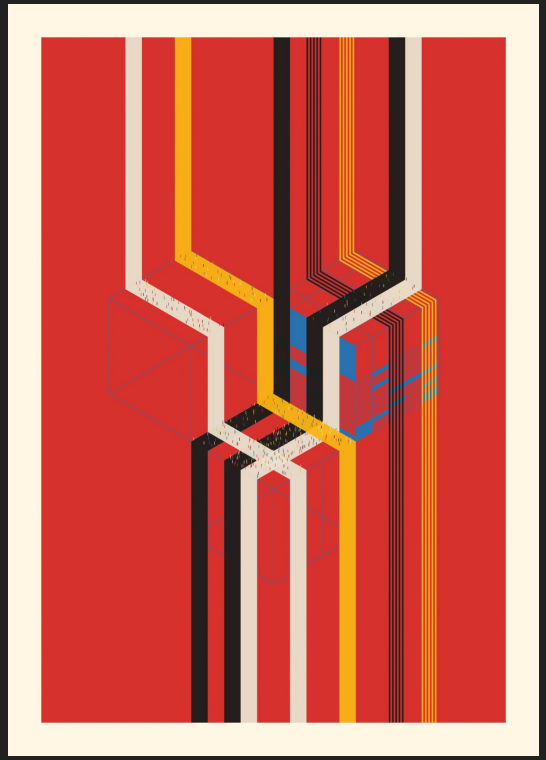
https://openai.com/dall-e-2

GENERATIVE DESIGN

Artist writes a program to generate a pieces of artwork

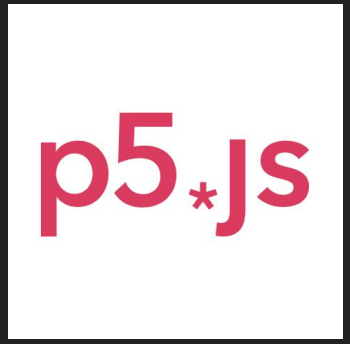
Uses a combination of math and randomness

Often very geometric and stylized



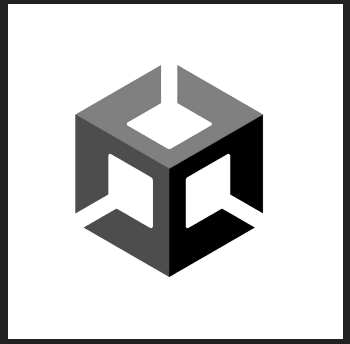
@studioyorktown

TOOLS



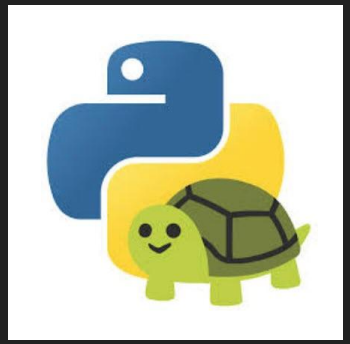
p5.js

openFrameworks



Unity

Processing



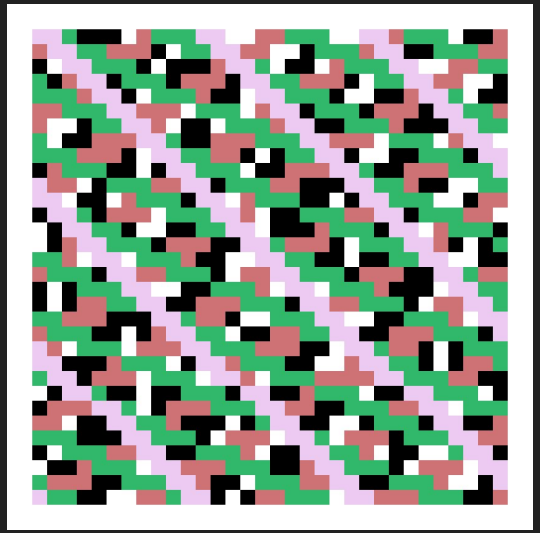
Turtle

BUILD YOUR OWN GENERATIVE ART PIECE

Three simple steps to follow

STEP ONE: FIND INSPIRATION

Explore the #generativeart hashtag on Twitter and Instagram



@loackme_

@p4stoboy

STEP TWO: CHOOSE A TOOL

Choose a tool based on the language you're most interested in

View the docs and online communities to determine which is the best fit for you

Java	Processing	processing.org
Javascript	p5.js	p5js.org
C++	openFrameworks	openframeworks.cc
C#	Unity	unity.com
Python	Turtle	docs.python.org/3/library/turtle

STEP THREE: SKETCH IT OUT, CREATE A PLAN, & BUILD IT!

Use the sketching process to map out how you would implement it in code

LET'S MAKE SOME ART!

INSPIRATION

@artplusbrad

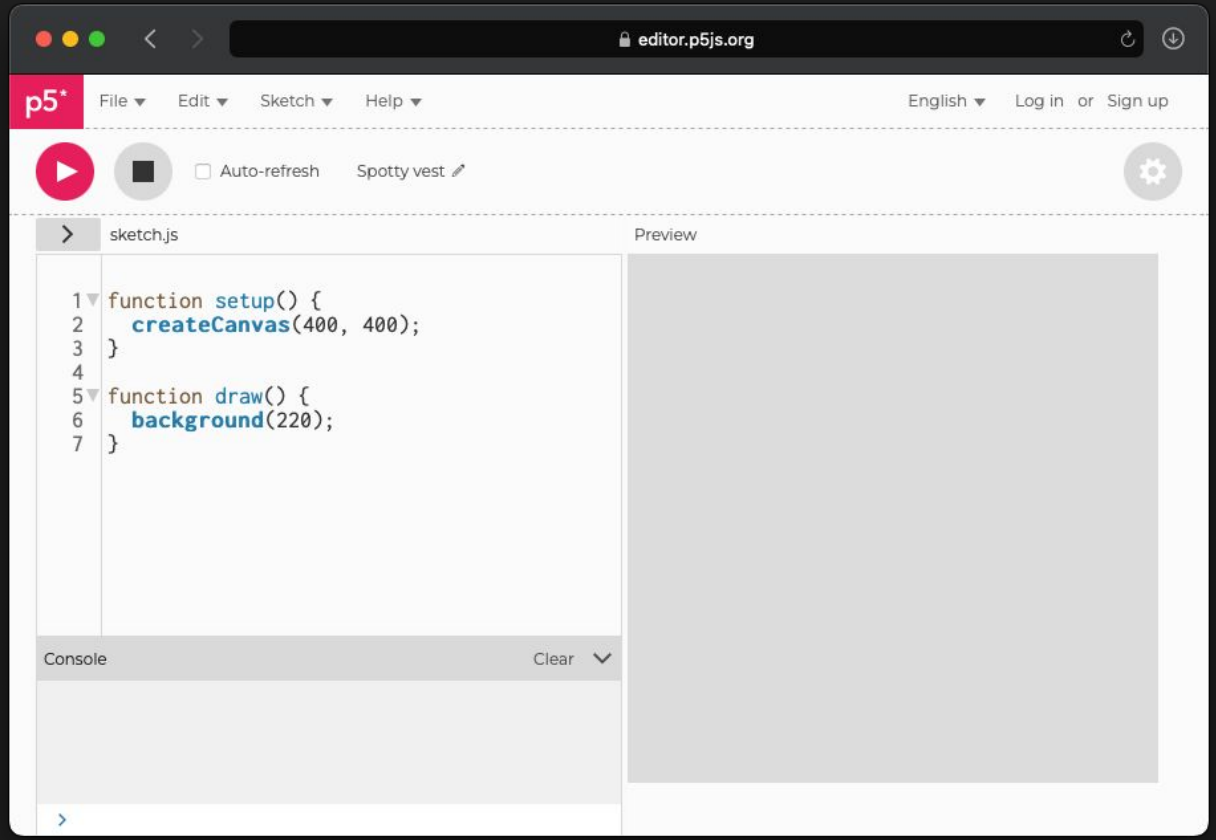
TOOL

p5.js

SKETCH

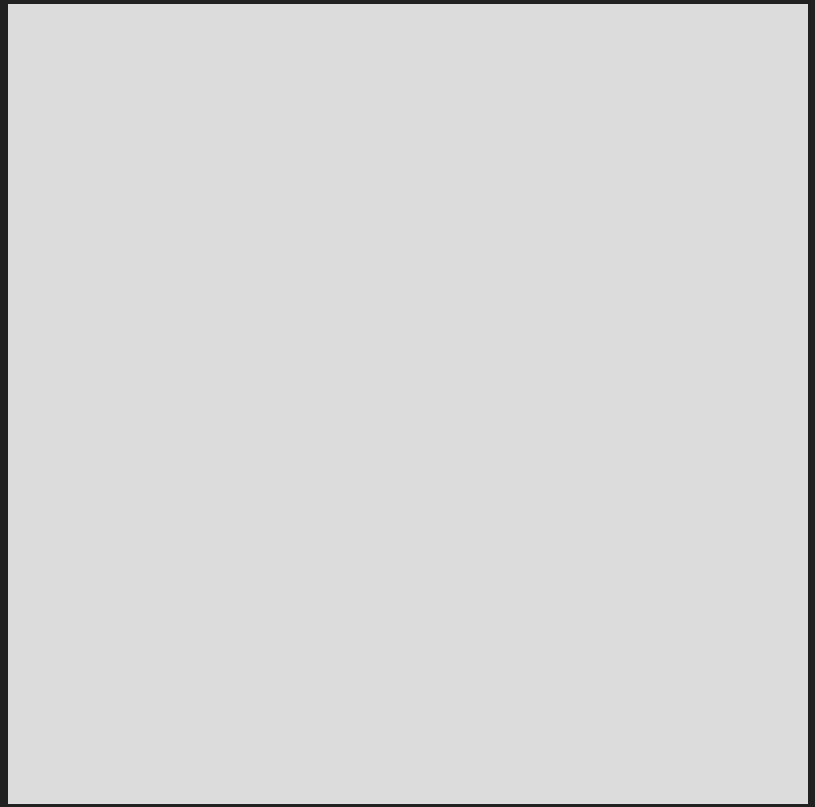
LET'S BUILD IT!

Open up
editor.p5js.org



```
function setup() {
  createCanvas(400, 400);
}

function draw() {
  background(220);
}
```

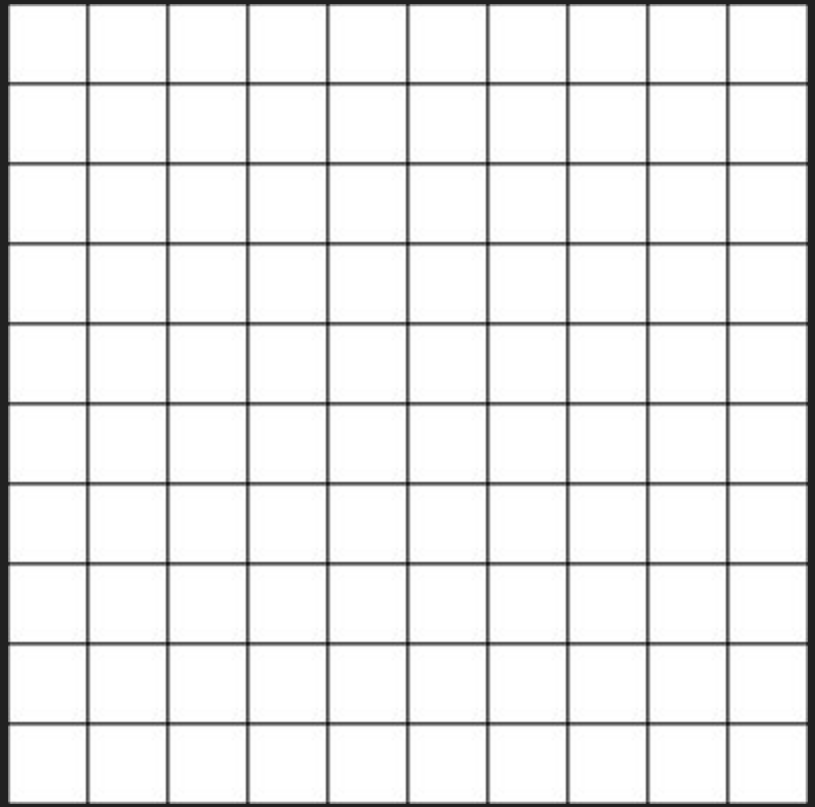


```
const canvasSize = 400;

function setup() {
  createCanvas(canvasSize, canvasSize);
  noLoop();
}
```

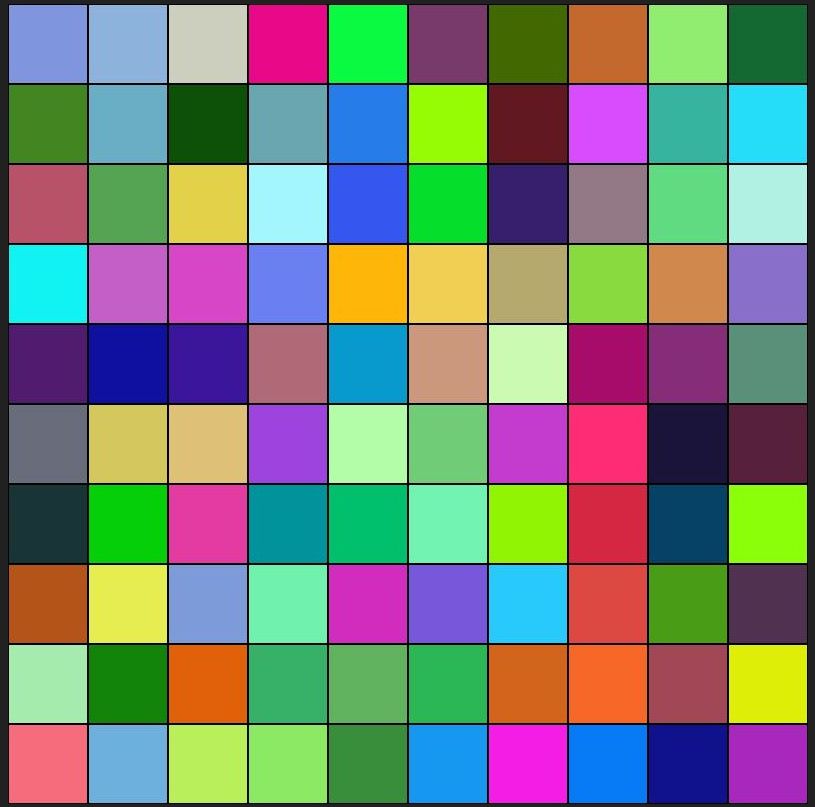
```
function draw() {
  const density = 10;
  const cellSize = canvasSize / density;
  for (let r = 0; r < density; r++) {
    for (let c = 0; c < density; c++) {
      drawCell(r, c, cellSize);
    }
  }
}
```

```
function drawCell(row, col, cellSize) {
  const x = col * cellSize;
  const y = row * cellSize;
  square(x, y, cellSize);
}
```



```
function pickAColor() {
  const c = color(
    random(255),
    random(255),
    random(255)
  );
  fill(c);
}
```

```
function drawCell(row, col, cellSize) {
  const x = col * cellSize;
  const y = row * cellSize;
  pickAColor();
  square(x, y, cellSize);
}
```

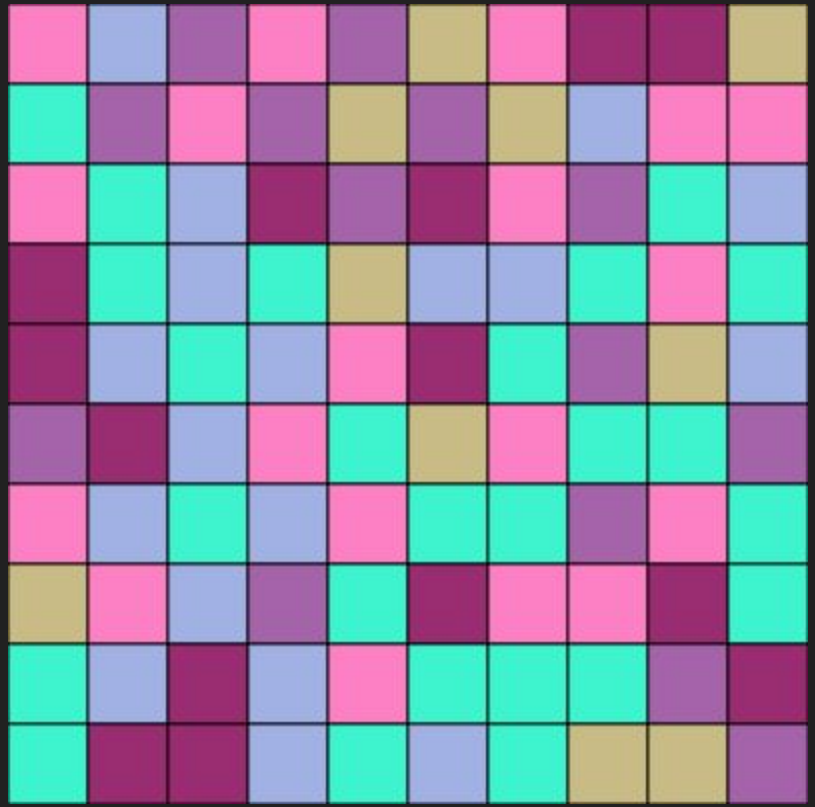


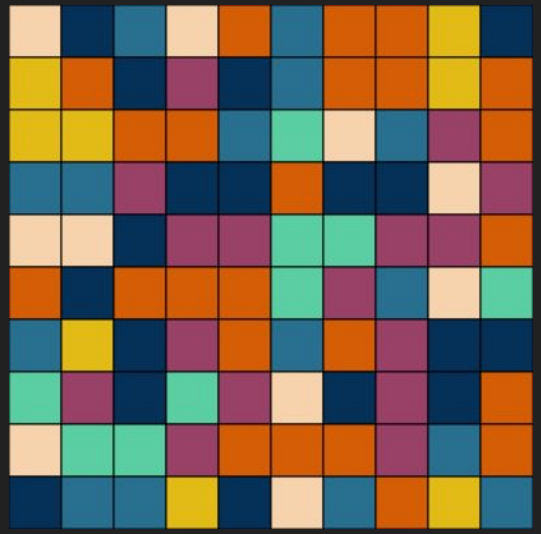
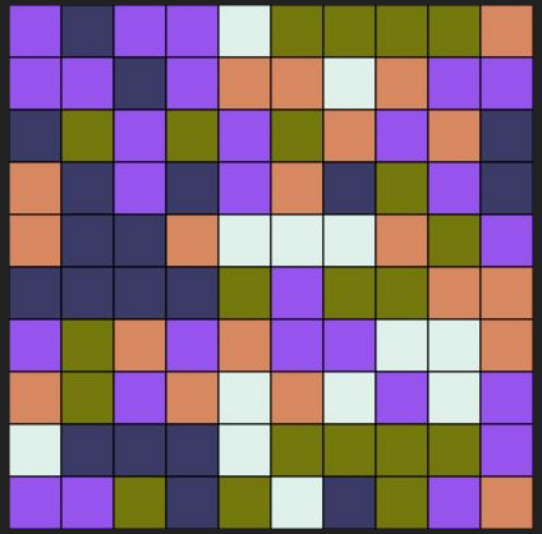
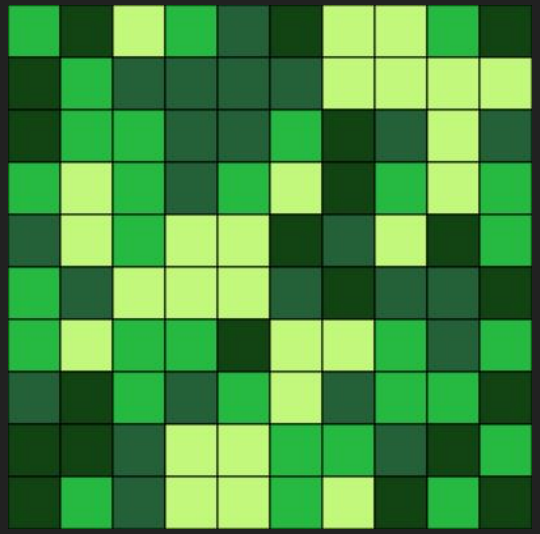
```
function generatePalette(array) {
  const numColors = random(2, 10);
  for (let i = 0; i < numColors; i++) {
    const c = color(
      random(255),
      random(255),
      random(255)
    );
    array.push(c);
  }
}
```

```
const canvasSize = 400;
const palette = [];

function setup() {
  createCanvas(canvasSize, canvasSize);
  noLoop();
  generatePalette(palette);
}
```

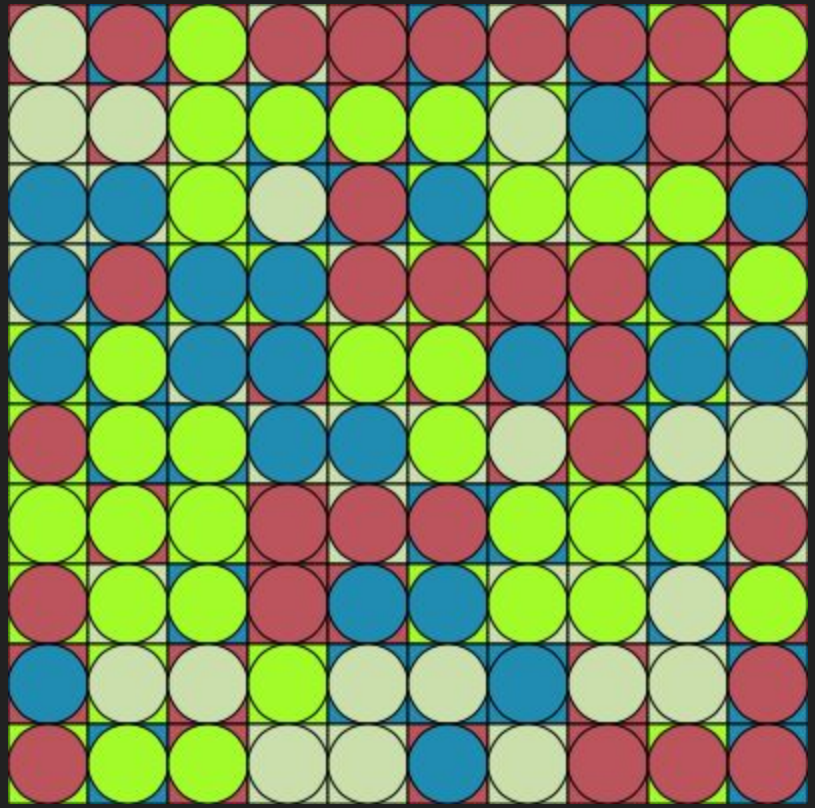
```
function pickAColor() {
  const c = random(palette);
  fill(c);
}
```



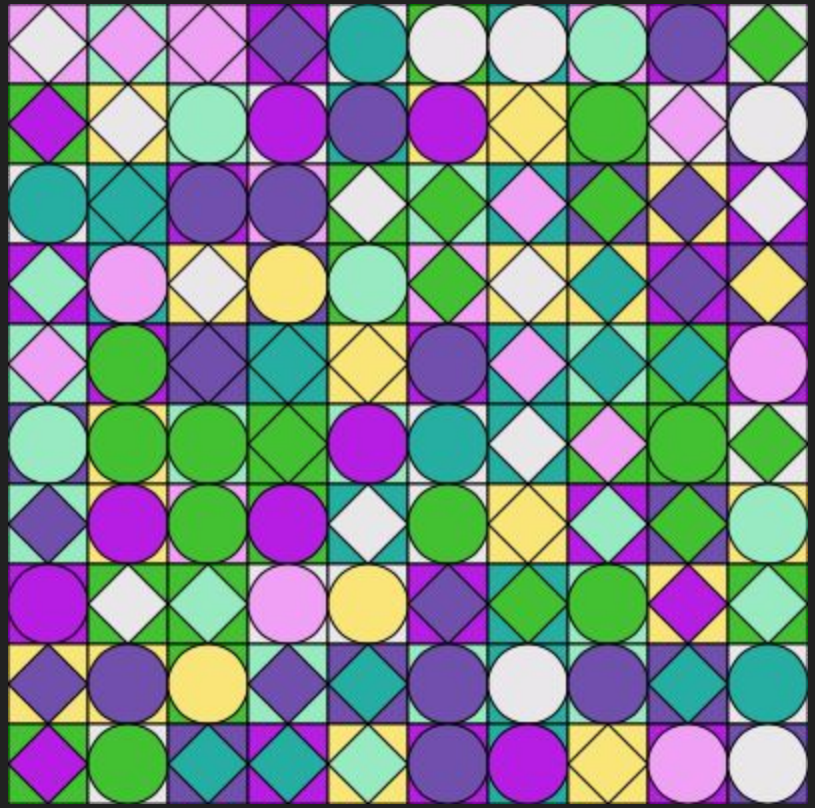
```
function drawCircle(row, col, cellSize) {
  const halfCellSize = cellSize / 2;
  const centerX = col * cellSize +
halfCellSize;
  const centerY = row * cellSize +
halfCellSize;
  pickAColor();
  circle(centerX, centerY, cellSize);
}
```

```
function drawCell(row, col, cellSize) {
  const x = col * cellSize;
  const y = row * cellSize;
  pickAColor();
  square(x, y, cellSize);
  drawCircle(row, col, cellSize);
}
```



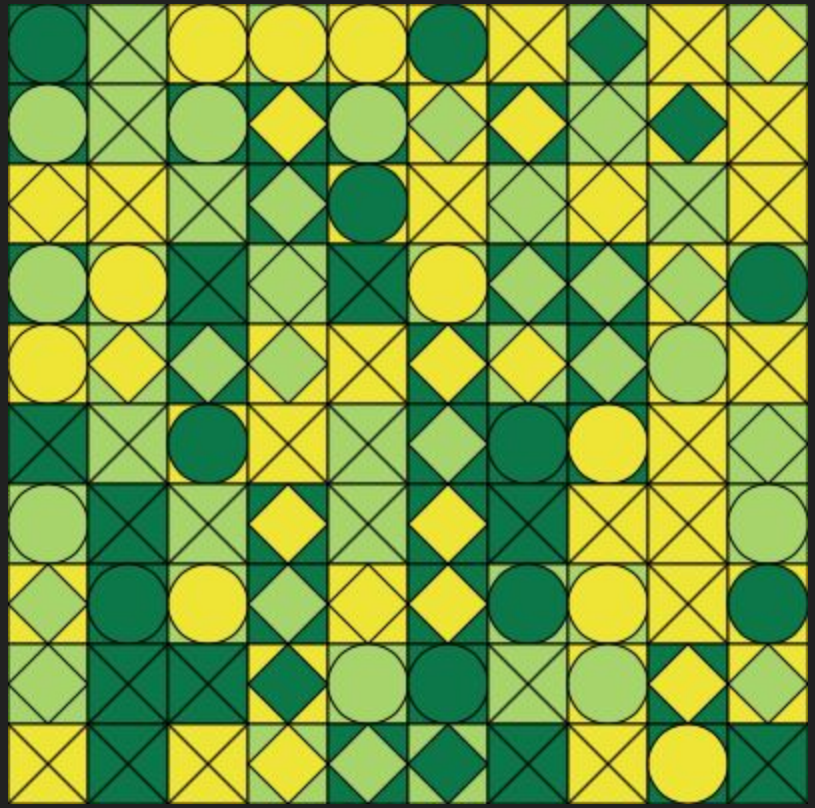
```
function drawDiamond(row, col, cellSize) {
  const halfCellSize = cellSize / 2;
  const centerX = col * cellSize + halfCellSize;
  const centerY = row * cellSize + halfCellSize;
  pickAColor();
  quad(
    centerX, centerY + halfCellSize,
    centerX + halfCellSize, centerY,
    centerX, centerY - halfCellSize,
    centerX - halfCellSize, centerY
  );
}
```

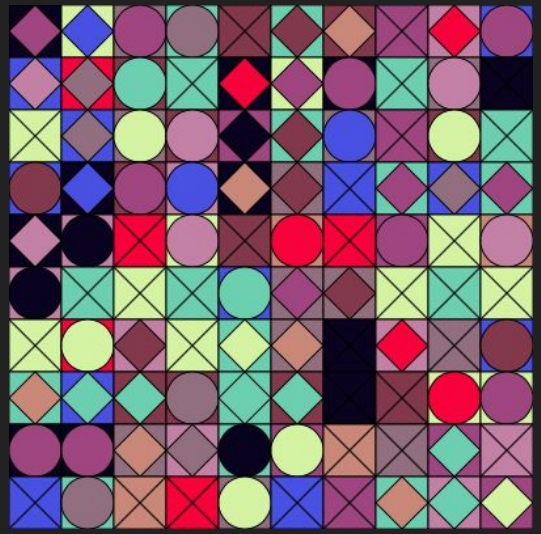
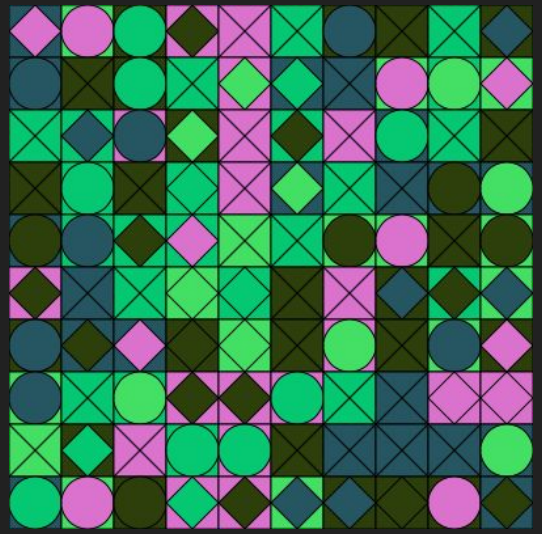
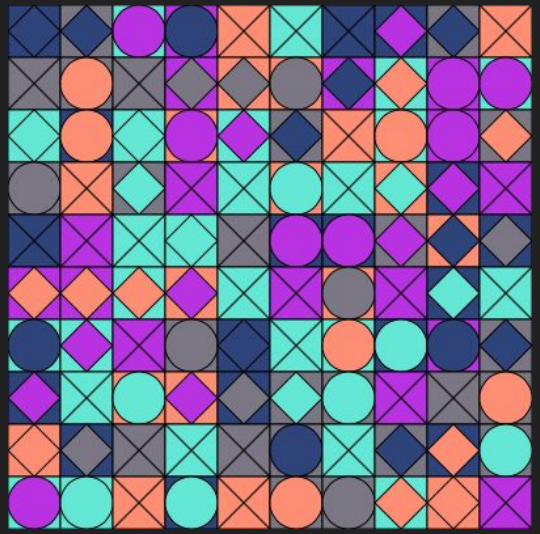
```
function drawCell(row, col, cellSize) {
  const x = col * cellSize;
  const y = row * cellSize;
  pickAColor();
  square(x, y, cellSize);
  const shapeFunction = random([
    drawCircle, drawDiamond
  ]);
  shapeFunction(row, col, cellSize);
}
```



```
function drawCross(row, col, cellSize) {
  const x = col * cellSize;
  const y = row * cellSize;
  line(x, y, x + cellSize, y + cellSize);
  line(x + cellSize, y, x, y + cellSize);
}
```

```
function drawCell(row, col, cellSize) {
  const x = col * cellSize;
  const y = row * cellSize;
  pickAColor();
  square(x, y, cellSize);
  const shapeFunction = random([
    drawCircle, drawDiamond, drawCross
  ]);
  shapeFunction(row, col, cellSize);
}
```



MAKE IT YOUR OWN!

- Randomize the number of rows/columns in the grid
- Add more shapes - triangles, half-circles, stars, etc.
- Build a more advanced color palette generator
- Use recursion to make the piece infinitely complex
- Add animation to the piece
- Fill shapes with a gradient instead of a solid color
- Make the piece respond to mouse clicks or keyboard events

WHY GENERATIVE ART?

- Tangible nature makes it a great introduction to programming
- Intersection of art and computer science makes coding more accessible to more people
- Provides a different perspective into coding for more experienced developers
- Not all mistakes are bugs
- Allows us to exercise creative muscles while also practicing programming skills
- Easy to start, difficult to master

THANKS FOR LISTENING!

 @jonathanchaffer

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https://editor.p5js.org/jonathanchaffer/sketches/gLd5Fqb7f