

ART AND MACHINE LEARNING
CMU 2023 SPRING
PROJECT 1

A Mother's Womb



On the left – RunwayML generated image, On the right – processed image of artwork from Carnegie International exhibit

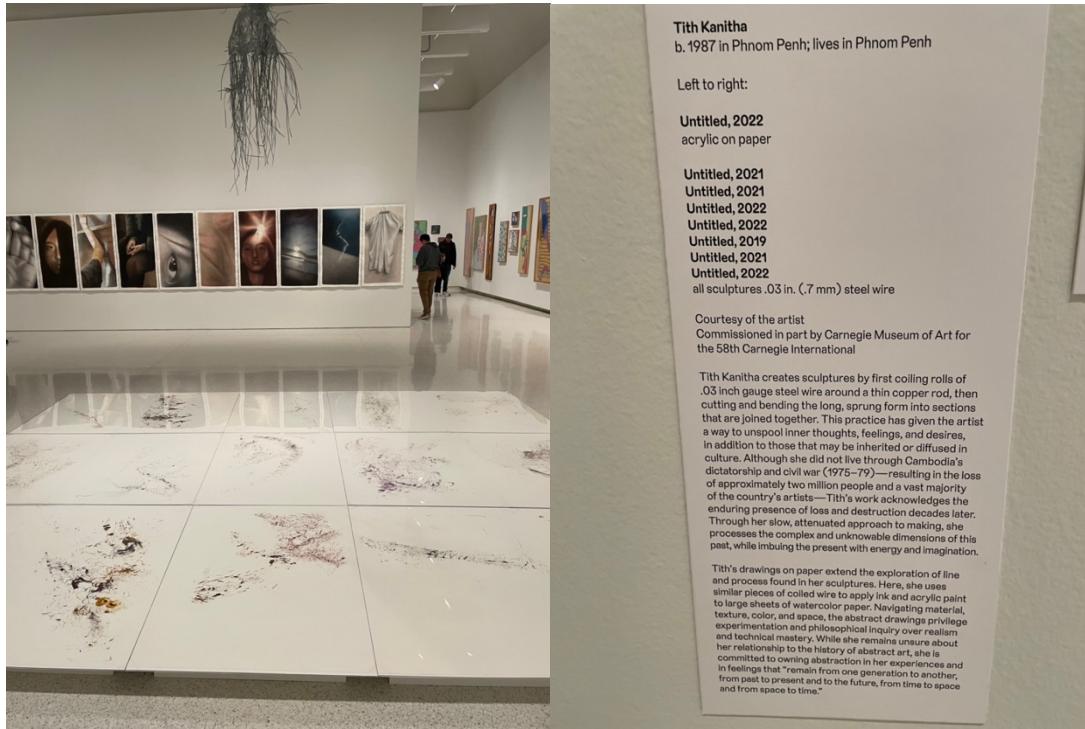
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DESCRIPTION

Concept

The artwork I was inspired by is the following –



I am always interested in more abstract drawings and interpretations, specially where they are open to individual interpretation and thought process.

This artwork, created by steel coiled wires made and then broken into parts/sections and then finally transferred onto a watercolor paper by applying different ink to these wires. The picture on the left above is one of the versions where these different paintings were ‘tiled’ into a grid of sorts, with the actual coiled wires used to draw these hanging on the top in the center of the grid.

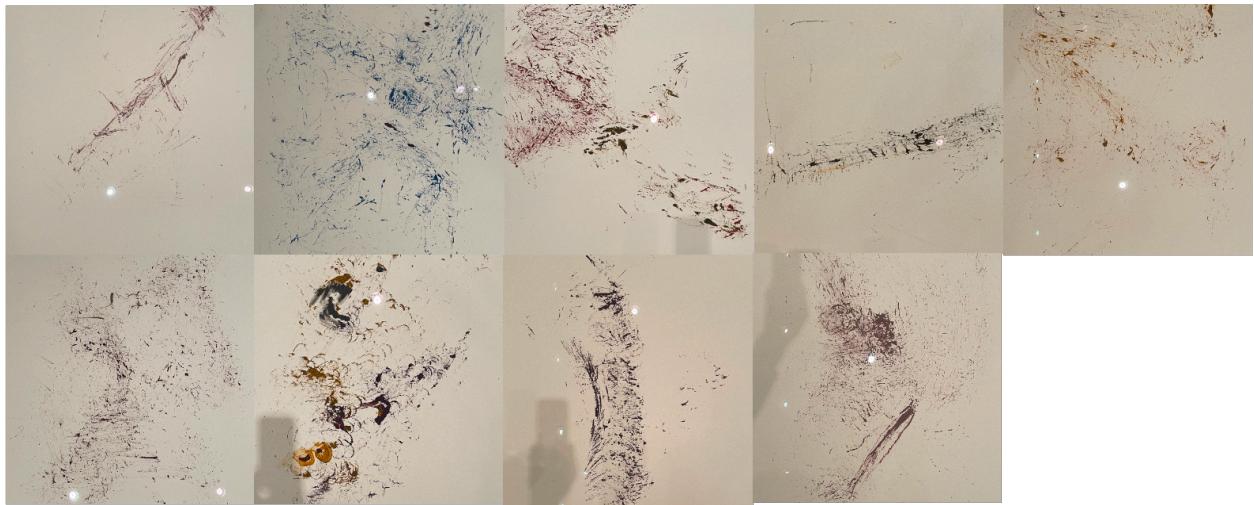
At the time I was watching this, I was more intrigued by the abstractness of it, rather than anything more profound. I was specially drawn to the artist’s honestly in the description of how “she is unsure about her relationship to the history of abstract art” and her view of the art work as something that come from her experiences and feelings and uses the term “owning the abstraction”, which I thought was a pretty cool phrase.

My initial idea was to translate these patterns into a ‘magnetic field’ of sorts with ‘iron filings’ that could move around, due to the nature of the coiled steel wires and the magnetic field like patterns on the grid. But as you’ll see later, this idea evolved into something else as I tried making progress.

Technique

One of the tools I am familiar with for image processing is '[ImageMagick](#)'. It's a command-line open-source tool that is like a swiss-army-knife of image manipulation tools.

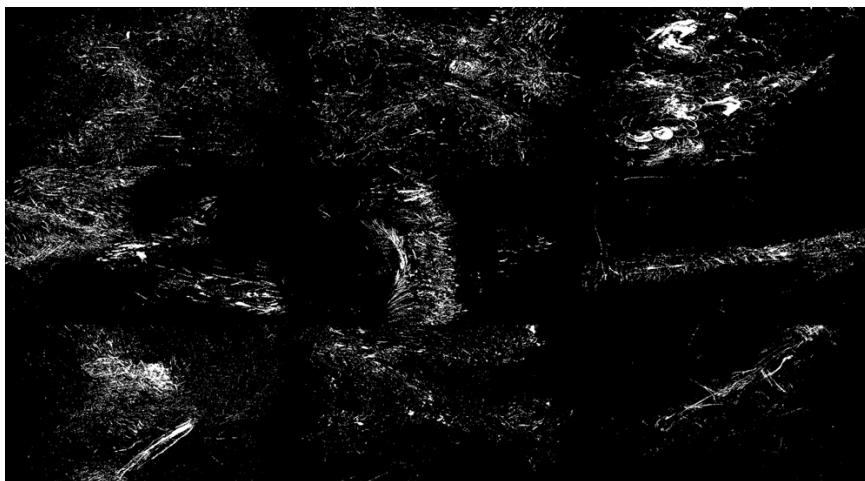
Here are the images that I actually took from this artwork of the individual grid spaces on the outside as I couldn't get a good top-down picture due to the way it was placed on the ground –



As you can see, there are a couple of minor problems in these pictures –

1. The lights from above which create these white spots on each of the grid spaces.
2. My phone and hand place a shadow over half of these grid spaces.

To overcome these problems, I negated the images with a certain 'threshold' using ImageMagick so that I could now get a black and white picture set and then I could just focus on the painted patterns, rather than these extraneous elements. Once I negated the images, I made a 3x3 collage of these negated images -



This was much better than the original images in the sense that it gave a much more clearer view of the patterns. Next, I wanted to come up with some ‘connected’ pattern, not that just a random collage of images. So, I had to re-arrange this collage and drop certain grid spaces to come up with –



The commands I used on the terminal for the above 3 steps are –

Step 1.

```
// Negate the images with a given threshold  
convert *.jpeg -threshold 50% -separate +channel -negate img_%d.jpeg
```

Step 2.

```
// Arrange the images sequentially that makes them look 'connected' in some sense
```

Step 3.

```
// Convert images into a collage  
montage -geometry +0+0 -tile 3x *.jpeg result.jpeg
```

This was the final image that I was happy to use as an input to any ML tool to play around with.

Technique – ML Tools

Since my input to the ML tool was an image, I wanted to check which tools allow for an image generation from an existing image and a prompt. The 3 tools that I explored were –

1. [DALL-E](#)
2. [Pix2Pix](#)
3. [RunwayML – Image to Image](#)

My ‘edit instruction’ to all these tools was ‘A Mother’s Womb’, since the pattern in the input picture reminded me of a ultrasound capture of a mother’s womb.

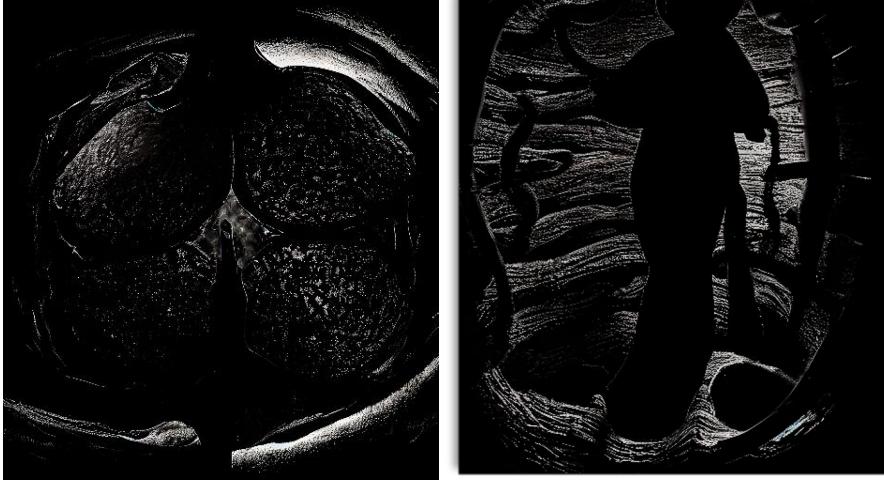
DALL-E -> surprisingly, it didn’t produce any significant result. It just kept regenerating almost the same picture as my black and white image, with very little changes in the pattern. I wasn’t sure why this was the case. I am not pasting the output since it was exactly/almost same as the input.

Pix2Pix -> the images that Pix2Pix generated didn’t vary greatly, even when I randomized the CFG. Over a few times, it kept regenerating very similar images. Also, the images that were generated were more ‘realistic’ in some sense, which was not my goal. For e.g.



RunwayML -> generated the most ‘variety’ of images over multiple runs. Some of the images are very strange but then some were pretty inspiring. RunwayML doesn’t have parameters like CFG or any

customization in their free version. Also, the free version is limited to 25 runs, so I had limited options to review. Here are some other strange outputs from RunwayML for my edit instruction –



There were other really strange ones as well but this is just an example of how varied the output from this tool was.

Overall, I liked the variability of the RunwayML output even though I couldn't configure any parameters in the free version. The output from Pix2Pix was a bit too realistic for what I wanted to generate.

Process

An alternative idea I did have which didn't involve any ML tool was to generate a GIF of the different images I had and this is what I came up with –



Even though it didn't involve any ML tool, I thought it was worth sharing here. This is all done using ImageMagick again, by converting the dots/patterns into thin lines that form these island like patterns.

Other than this, I also tried generating different GIFs –



This is based on the original images but with a different negation threshold and not completely black and white, using colors as well.

Both these were good starting points for me but I found that making this GIF added more complication to the viewer than what it was saying.

Reflection

Finally, I chose this picture generated from RunwayML –



Couple of reasons why I liked this generated artwork – 1. It had a slight human, slight non-human/alien characteristic to it, which is what I was looking for, not too realistic. 2. It followed the patterns in the original image to a large extent and didn't seem to random/detached from the input pattern.

I am satisfied with what the tool generated, although I still find the randomness of it very unsettling, as the ‘intentionality’ behind an artwork seems slightly lost. I would be much happier with a more ‘repeatable’ process, where I can be sure of the fact that if I choose some input parameters, I’ll get the same image again. Right now, this seems pretty random.

RESULT

Overall, I think the results are pretty impressive and yet, pretty random as well. There’s a large hidden intelligence that makes it impossible to understand the process behind the generation of the art work and that in-turn makes it hard to reason and take ‘ownership’ of such an artwork.

The final result of my project is uploaded here –

Input -> https://github.com/FrailWords/art_ml_project1/blob/main/submission/input.jpg

Output ->

https://github.com/FrailWords/art_ml_project1/blob/main/submission/sriram_a_mothers_womb.png

CODE

The ImageMagick script that I used is here -

https://github.com/FrailWords/art_ml_project1/blob/main/submission/imagemagick_script.sh

REFERENCE

1. ImageMagick - <https://imagemagick.org/>.
2. “Image to Image.” RunwayML, <https://runwayml.com/ai-magic-tools/image-to-image/>.
3. “Dall-E 2.” OpenAI, <https://openai.com/dall-e-2/>.