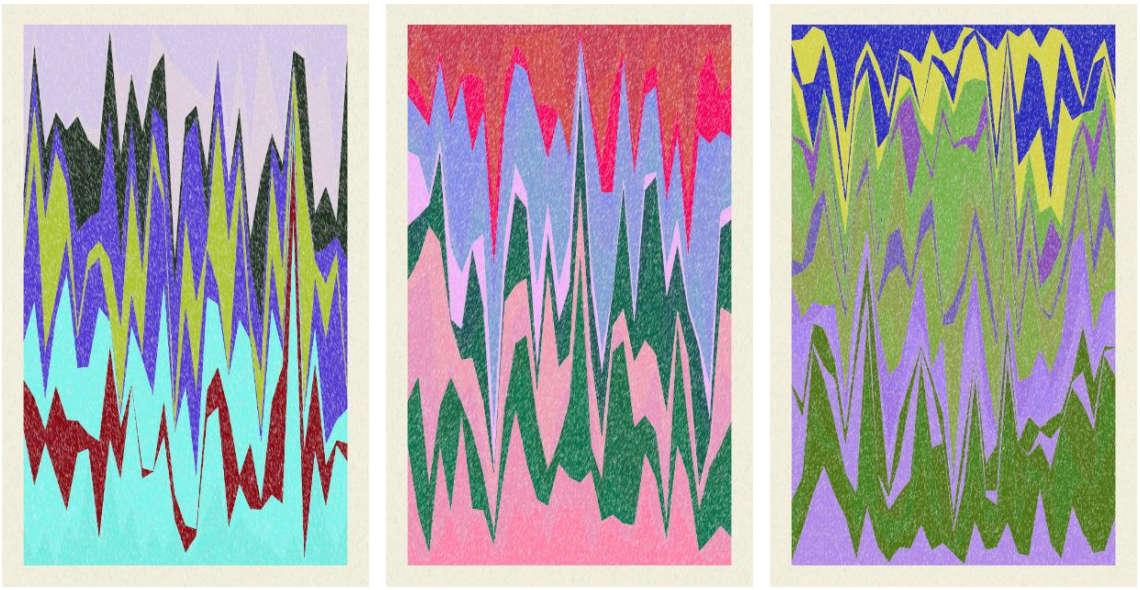
Minh Pham

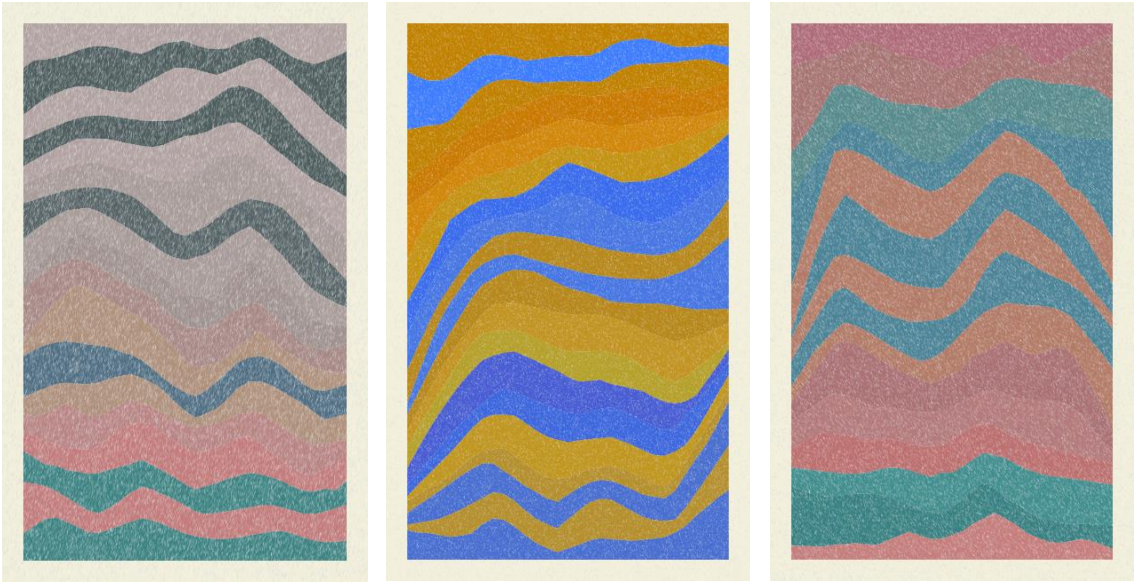
Write up

1) Example results

Below are three examples of the results without any use of AI



Below are three examples of the results with the use of AI



2) Explaining the AI

The AI is implemented to aid both the sketching and the painting processes.

When drawing the lines, it uses the simulated annealing algorithm to achieve the following goals

- It should make the strokes look curvy and go up and down naturally, rather than looking like white noise
- It should minimize instances of two adjacent strokes going in opposite directions and encourage them to go in the same direction because in my opinion humans tend to like harmonizing things
- It should encourage a reasonable number of hills a stroke goes through (fewer than 5)

When coloring, it uses a local genetic algorithm to achieve the following goals

- It should create a balance between the colors in the top half and the bottom half
- It should minimize instances where unrelated colors are placed next to each other, and encourage instances where colors that have similar or contrast tones are next to each other

The AI achieves those goals well as we can see from the examples above. The strokes look smooth and not like white noise. The number hills are few and reasonable. The strokes seem to have coordinated well. The colors look balanced and the mixing between adjacent colors seem good.

3) Notes and appendix

The AI takes around 15 seconds to run on my machine. Most of the work is done in the drawing part that uses simulated annealing.

In the proposal, I wrote that I intended to use a q-learning algorithm for the AI artist. But after lots of consideration, I decided to use local search algorithms instead. Specifically, the AI now uses the simulated annealing algorithm to draw the sketches and uses a genetic algorithm to paint.

The constants can be tweaked, for example the number of horizontal lines and vertical steps can be increased or decreased. But from lots of playing around, I find the numbers currently in the code to be the sweet spot for both the run time and the aesthetics.