

Maxwell Crawford

CSC-475

12-7-17

CSC-475 Final Project Report

- **Description and End-Goal:**

- To create an automated Glitch Art System, which can handle multiple sizes and variations of images, and randomly produce a unique resulting image with several layers of effects applied. Effects will be predefined and created by me, but with both randomized parameters within the functions, and randomized function calls, where both the order and the effects chosen will be different every time the program is run. This ensures that different effects, in a different order of layers, are utilized to produce a uniquely manipulated image.
- The goal is to produce images with varying and unique “glitch” aesthetics, each time the program runs.

- **Timeline by week:**

- Week 1 (10/23 through 10/27): Initial planning, think of at least 3 effects to use
- Week 2 (10/30 through 11/3): Write report and finalize overall goal; think of 2 more effects to use and finalize versions of previously created effects; gather reference “glitch art” images and an article about “glitch art” in general for further information
- Week 3 (11/6 through 11/10): Finalize previous effects and think of 2 more effects; further balance parameter randomization ranges and how the effects are combined
- Week 4 (11/13 through 11/17): Gather more images and test data; optimize code and add further documentation; produce initial presentation “glitch art” images
- Week 5 (11/20 through 11/24): Produce portfolio of images that can be used in final presentation and create Harris Corner Detector and Convolution-based effects
- Week 6 (11/27 through 12/1): Optimize Harris effect and create the last Convolution-based effects; start prepping the final presentation and revise report
- Week 7 (12/4 through 12/7): Cleanup, test, and optimize code as much as possible; finalize presentation and report

- **Changes made since Proposal:**

- Added Harris Corner Detector and Convolution-based effects
- Ensure that the first effect called isn’t “Copy Over”, as it would be redundant
- Ensure that the effect called next in the list cannot be the same as the last one, to further alleviate repetition

- **Challenges and Issues Encountered:**

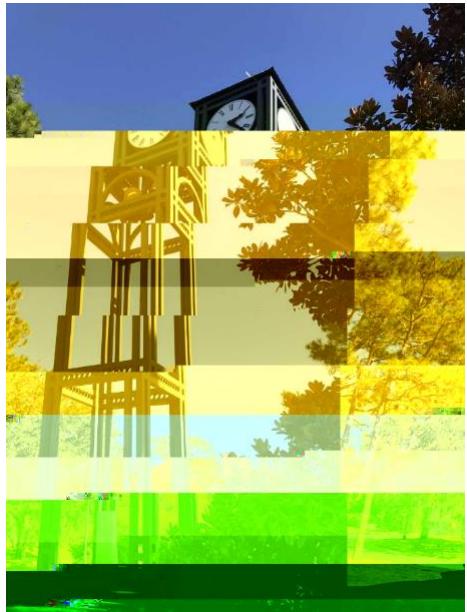
- Optimization:
 - *Performance/speed on effects that iterate through every pixel in image*
 - *Getting parameters that worked well on all images*
- Ensuring variation and uniqueness in every result
- Having “destructive” effects that had a useful balance between:
 - *Manipulating the image in a very noticeable way (and)*
 - *Not ruining or oversaturating the image with harsh layers*

- **References:**

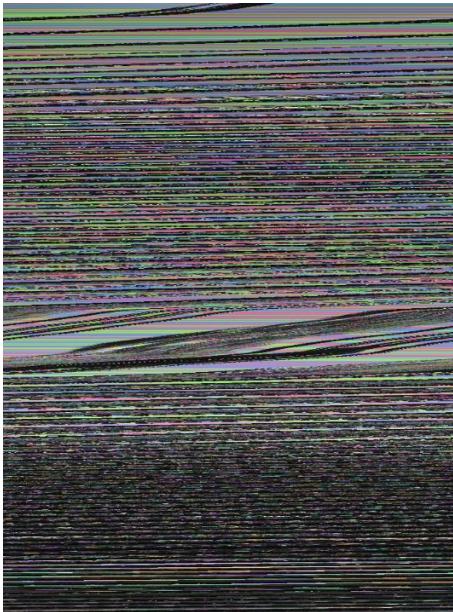
- *Example Images:*



(tower.jpg original)



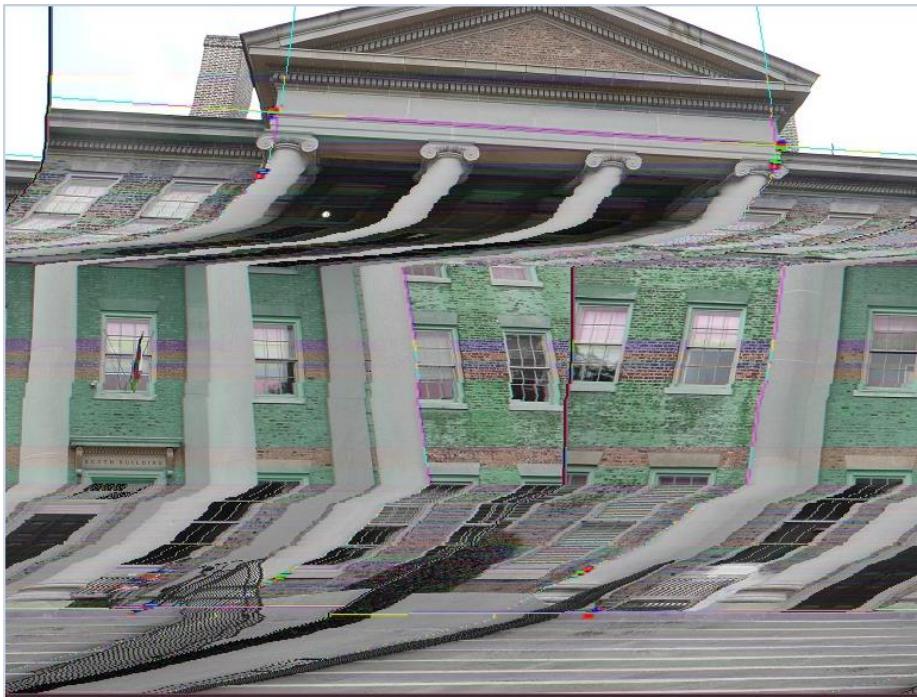
("Image Glitch Tool" using tower.jpg)



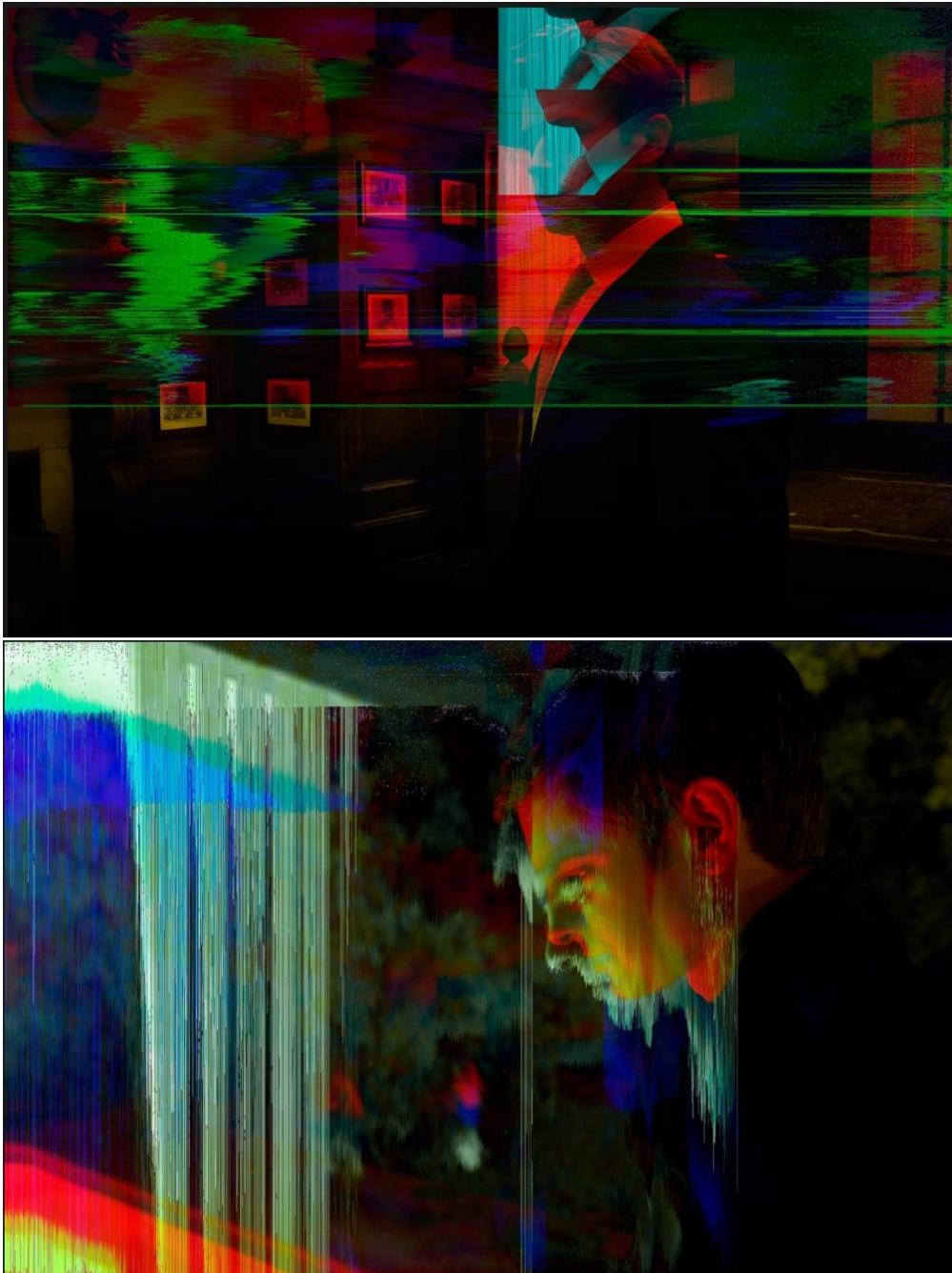
(WordPad Glitch – using tower.jpg)



(building1.jpg original)



(WordPad Glitch – using building1.jpg)



(Examples - Copyright Rob Sheridan 2010, from the film *The Social Network*)

- **References (cont.)**

- *Articles:*
 - <http://karborn.com/llegal-Films-of-Angels>
 - <https://snorpey.github.io/jpg-glitch/>
 - <http://www.theperipherymag.com/on-the-arts-glitch-it-good/>
 - <http://datamoshing.com/2016/06/26/how-to-glitch-images-with-wordpad/>
- *Inspirations:*
 - <https://www.rob-sheridan.com/design/analog-glitch/1/thumbs>
 - <https://www.rob-sheridan.com/design/the-social-network/1/thumbs>
 - <https://www.flickr.com/groups/glitchsafari/pool/>
 - <https://vimeo.com/4578366>

- **Reflections**

- *Describe your understanding of two computer vision concepts or technologies you'll be using in your final project. Review how your understanding of these topics has changed throughout the semester (if at all).*

My final project will use a combination of skills learned from convolution and filtering, and anaglyphs. These concepts were important for grasping how to affect specifically targeted areas of an image for effects, how to apply them in a radial and non-simplistic manner, and also for iteration and sampling of color values. Convolution, in particular, aided me in the concept of patches and windowing, and choosing when and how to apply math to values in matrix iteration, rather than just applying a simple calculation to all pixels in an image evenly. It is usually more helpful to be able to apply math dynamically and variably, depending upon the kernel size and window location. Anaglyphs helped me realize how simple and yet how important it is to be able to sample color values, manipulate them on the fly, and then be able to detect edges of the window and set an appropriate offset. I have become much more comfortable with matrix iteration and applying math to sections of an image thanks to these concepts.

- *Name two potential applications for a method or technology you'll be using in your final project. Examine and explain how these applications can impact society. Are these impacts positive, negative, or a combination of both? Do the positive impacts outweigh the negative impacts?*

The results from my project produce pieces of “glitch art”, which can be subjectively used for overall aesthetic appeal, or for practical study of image data, such as knowledge of file formats and photo manipulation effect layers. Posters for film, banners for websites, box art for video games and video discs, even parts of music videos, such as “Welcome to Heartbreak” by Kanye West actively utilize data glitches throughout moving frames. Traditionally, art may try to preserve clean lines and “perfect” design, however, glitch art finds beauty in deconstruction, and actively breaks the mold. On the more pragmatic side, glitch art can act as a tool to educate, as it takes skill and knowledge of the image’s file format, matrix mathematics, and proper layering of manipulation effects and geometry to be able to craft unique “glitches”. Some traditionalists may see glitches as being detrimental to art and proper, minimal, and correct design, however, glitch art does not have to replace classic aesthetics, but rather it can supplement and aid in crafting new ideas for future designs. Also, in learning how to produce the art, there is the objectively positive effect of education, since one has to learn some computer vision basics in order to manipulate an image manually.

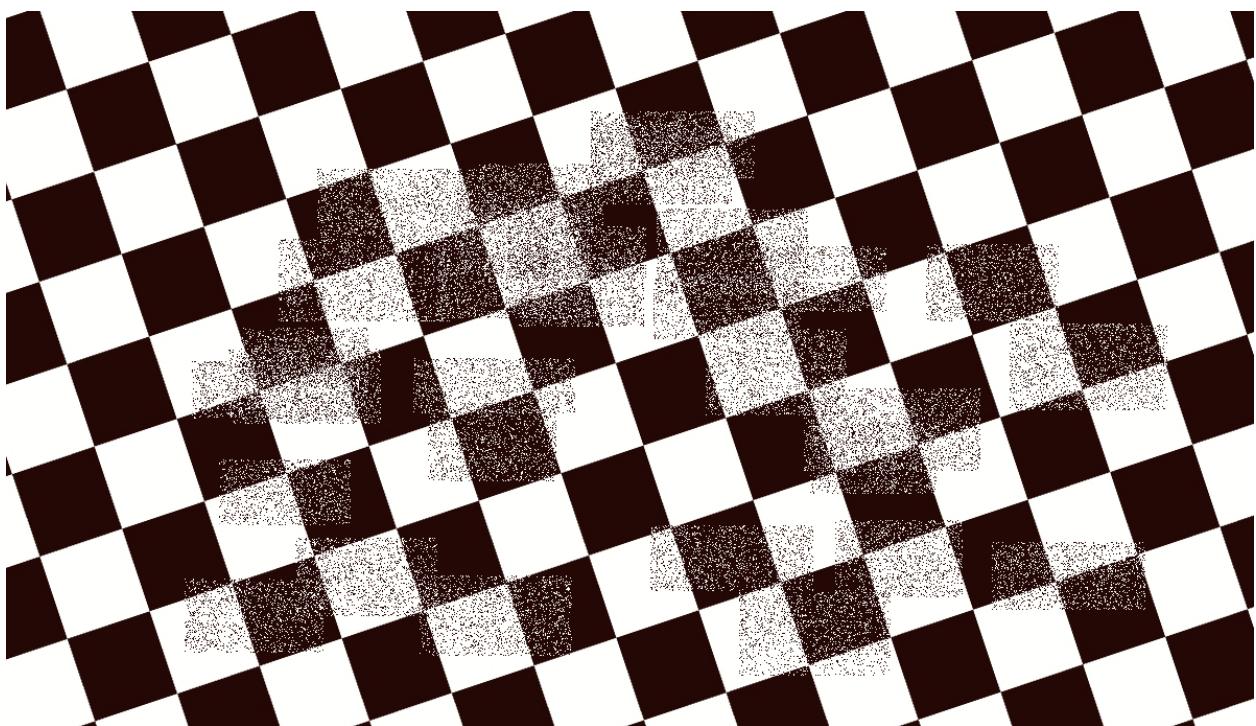
Link to video example: <https://vimeo.com/4578366>

- *What skills/knowledge do you hope to gain from completing this project? Will these skills help you at all in your academic or career goals?*

This project will aid me in becoming much more familiar with matrix mathematics, image iteration and manipulation, and creating effect layers which can stack and blend with each other. These skills make me more comfortable with algorithm usage in general, but also lend me the tools to be more creative and create custom functionality for usage in other programs. Additionally, I will gain knowledge of aesthetics and design, and can apply some of the visual appeal created here to other projects, such as website interfaces and banner design. With my interest in website programming and CSS, any user interface experience is helpful.

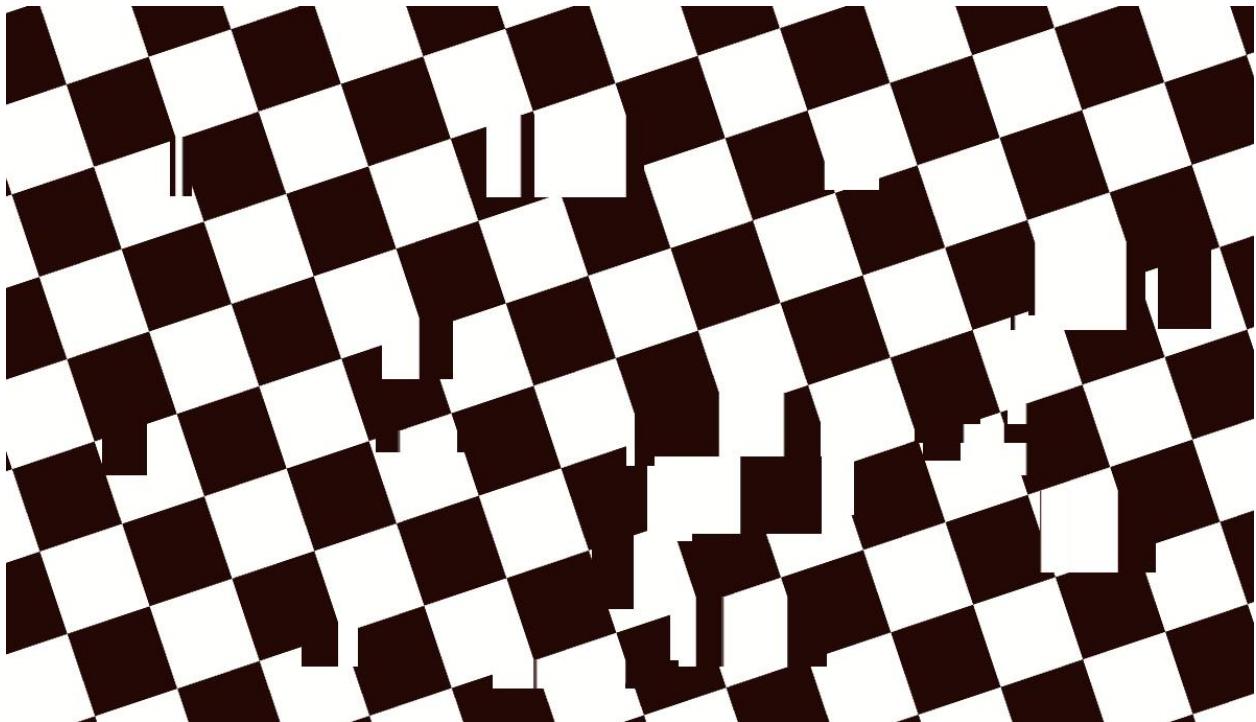
Results and Examples of Effects

Random Pixel Shift:



Crawford 8

Color Smear:

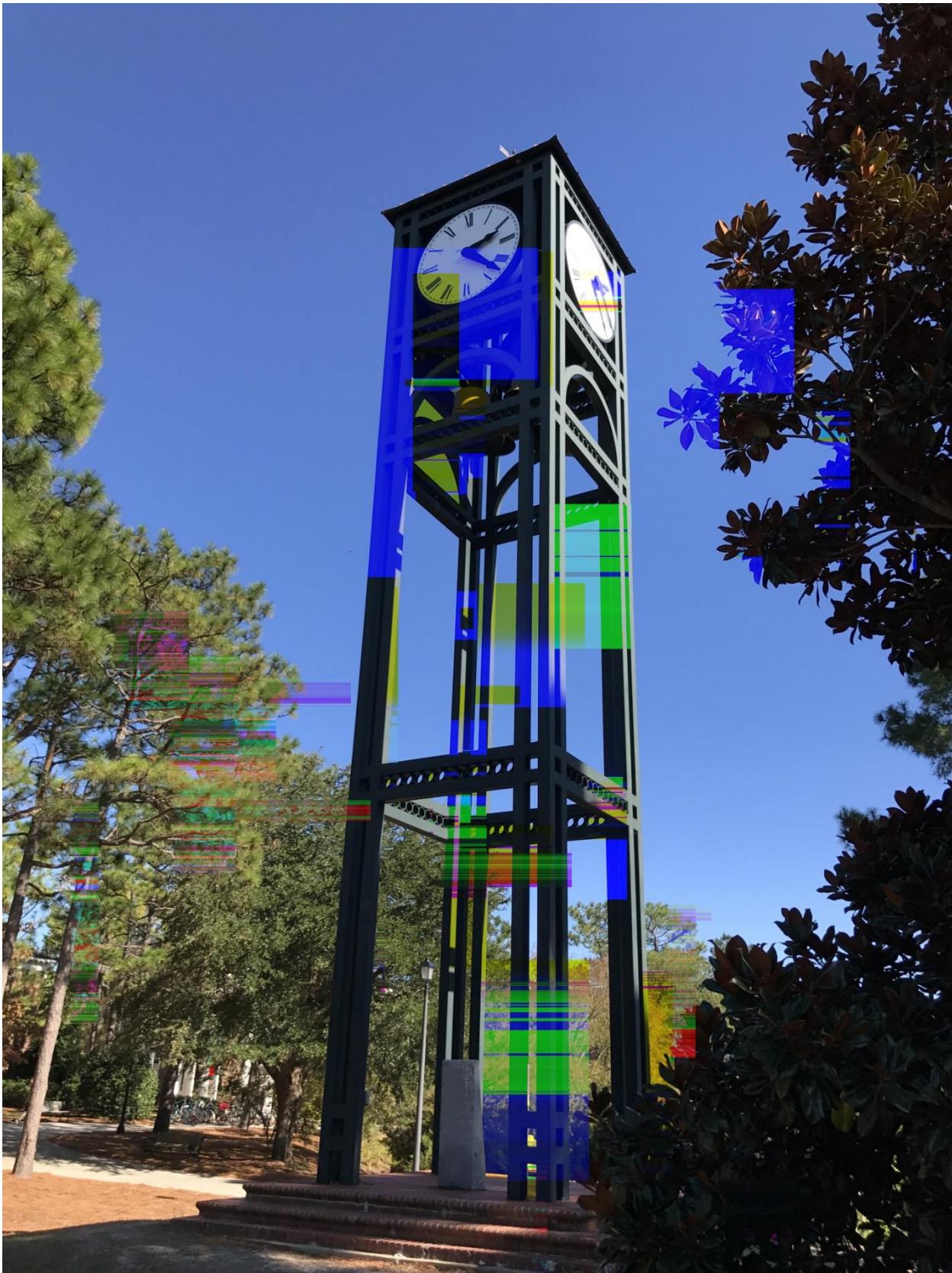


Color Scratch (Scratch Dir = 0):

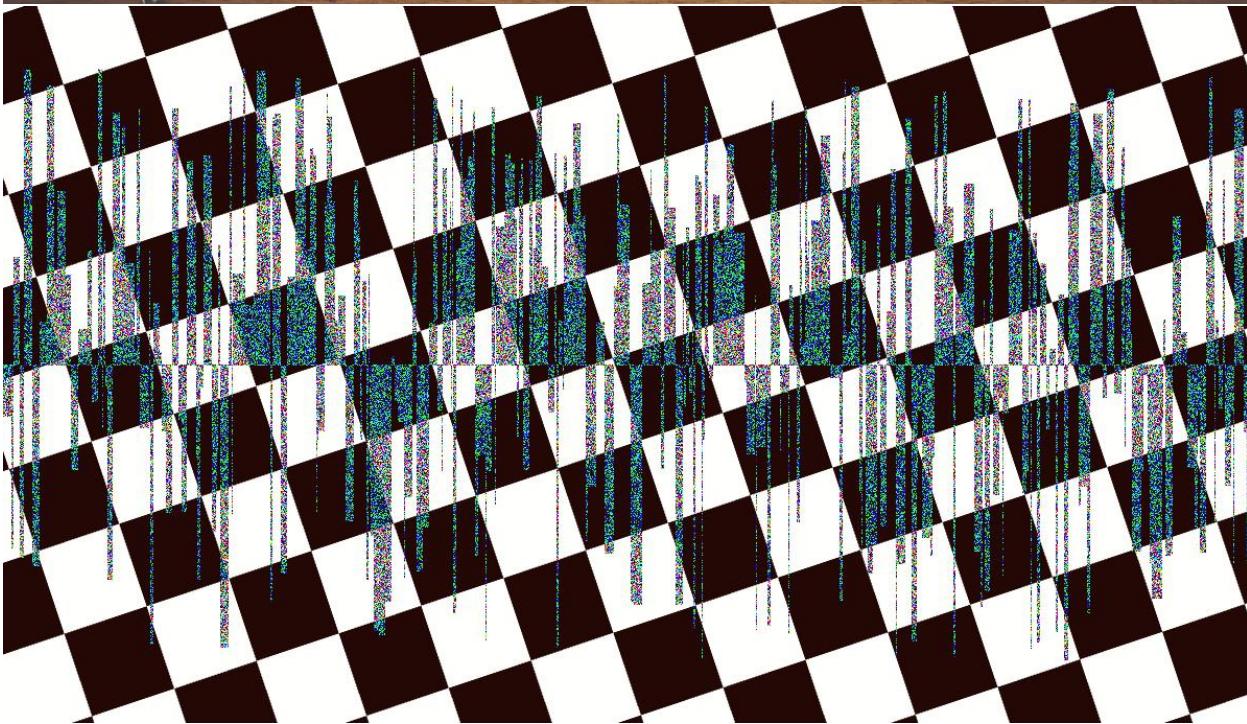
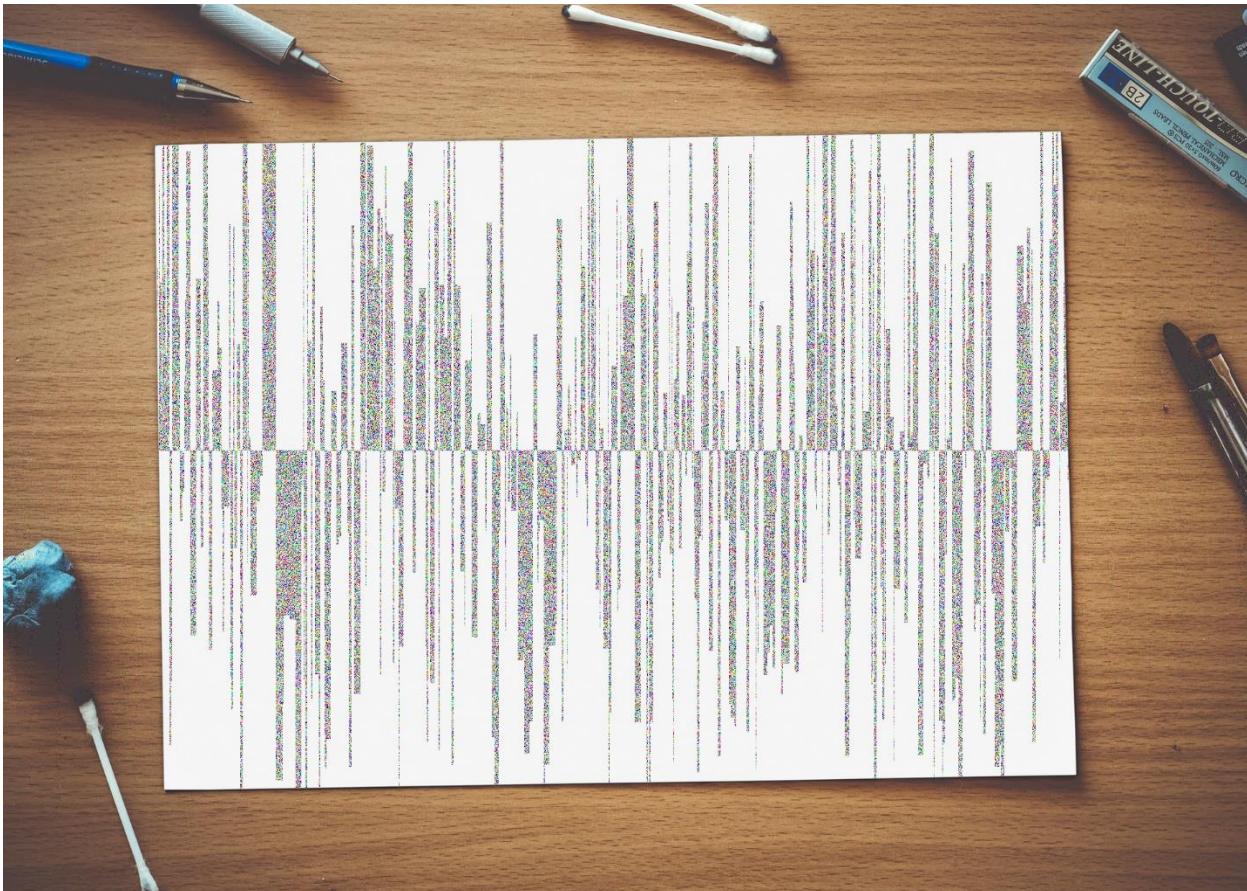


Crawford 10

Color Scratch (Scratch Dir = 1):



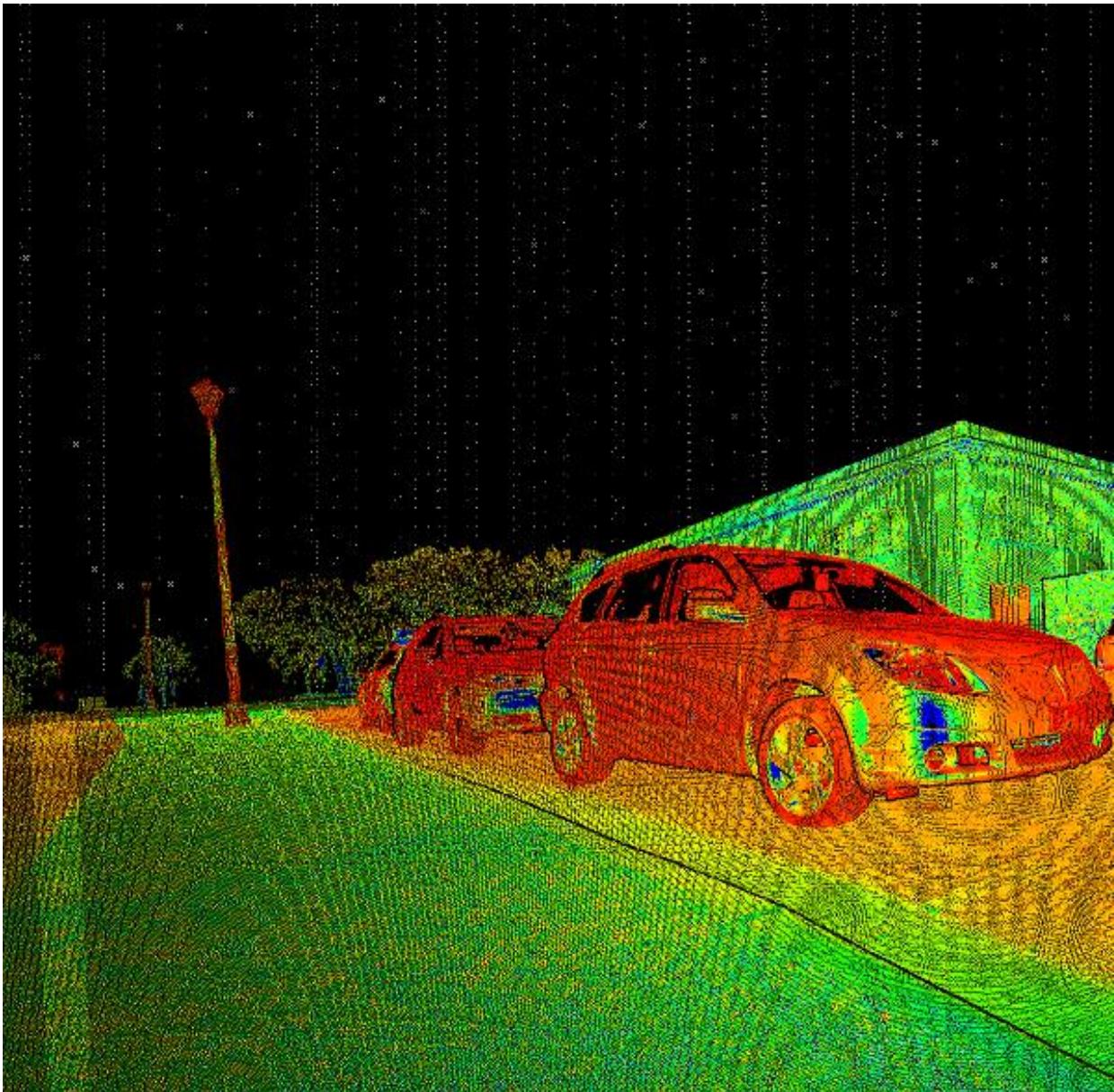
SoundWave:



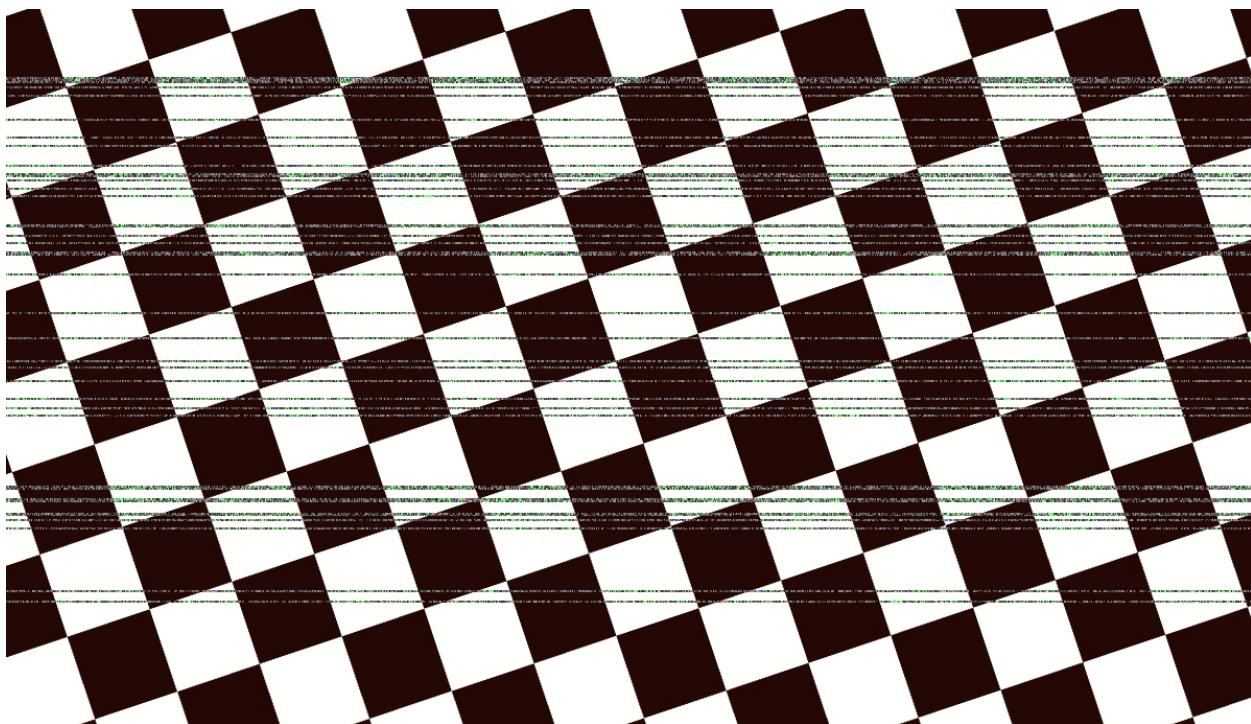
Static:



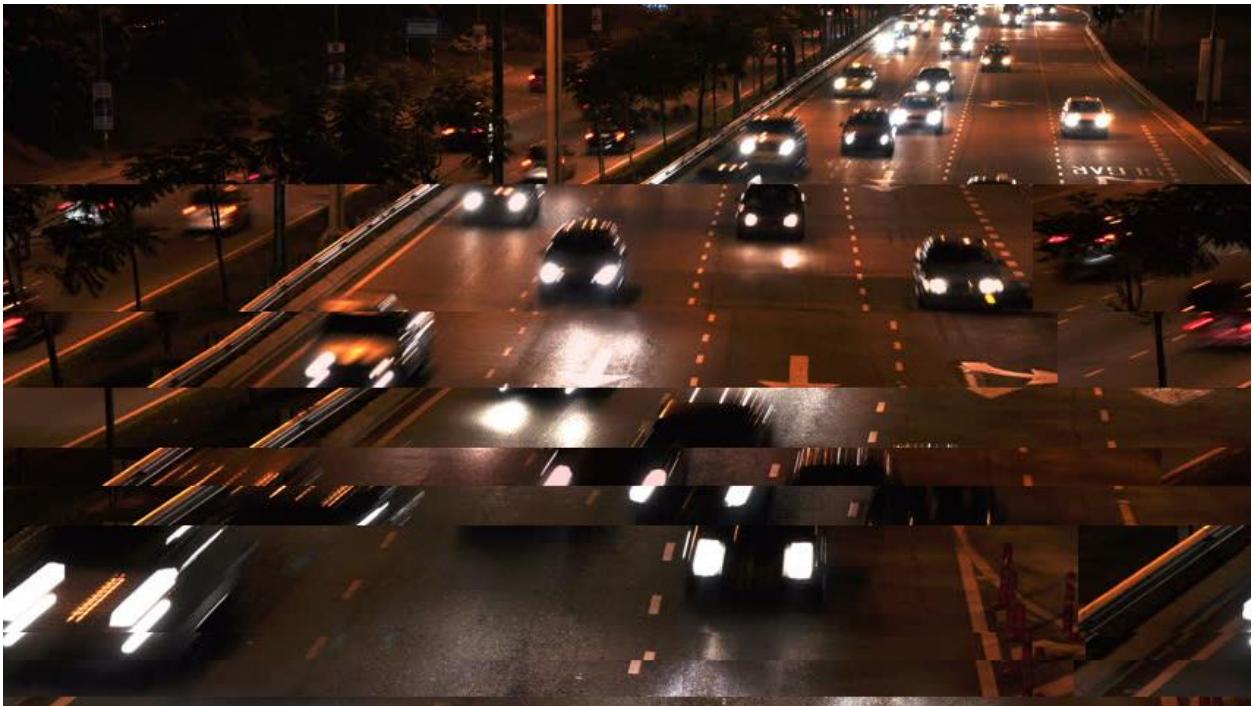
Static (cont.):



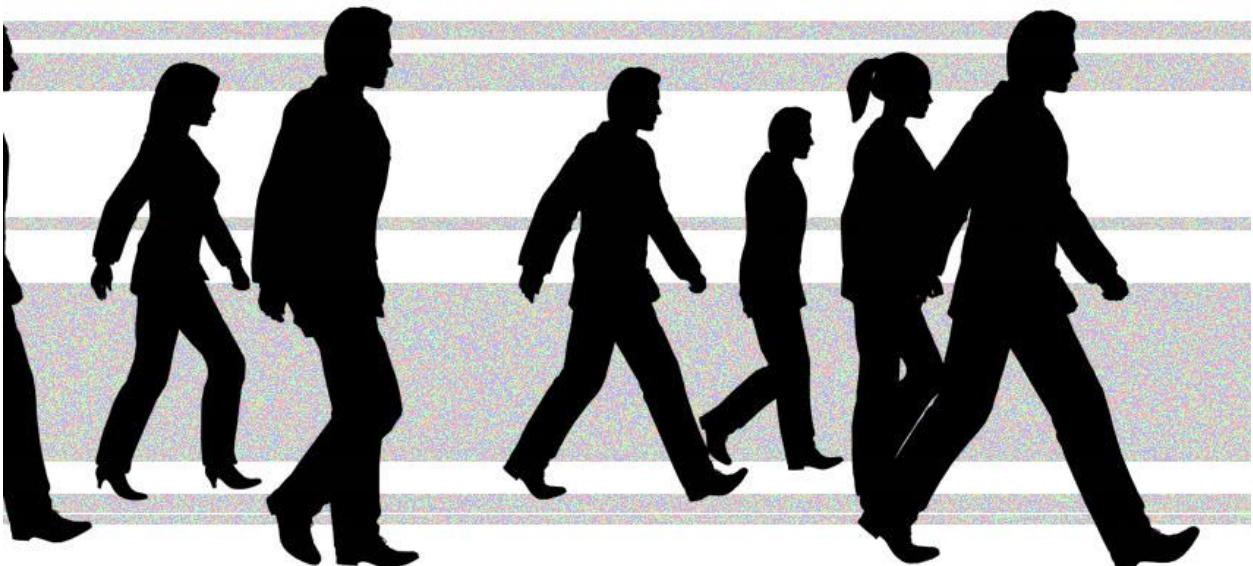
Scanlines:



Horizontal Shift:



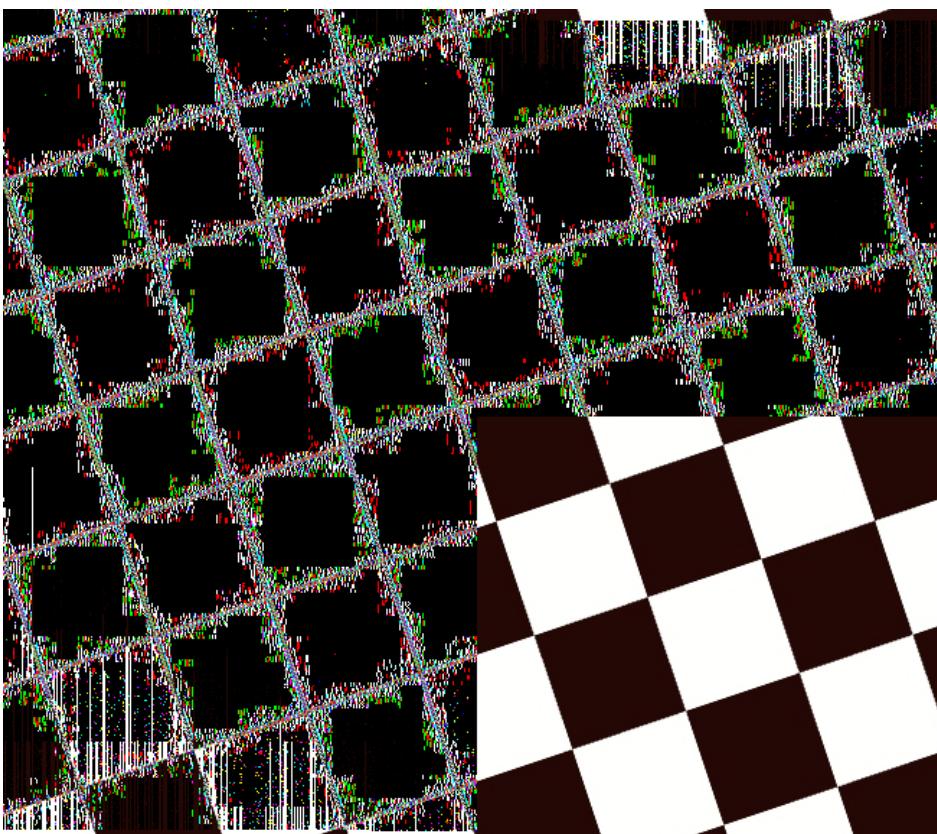
Color Compression Bands:



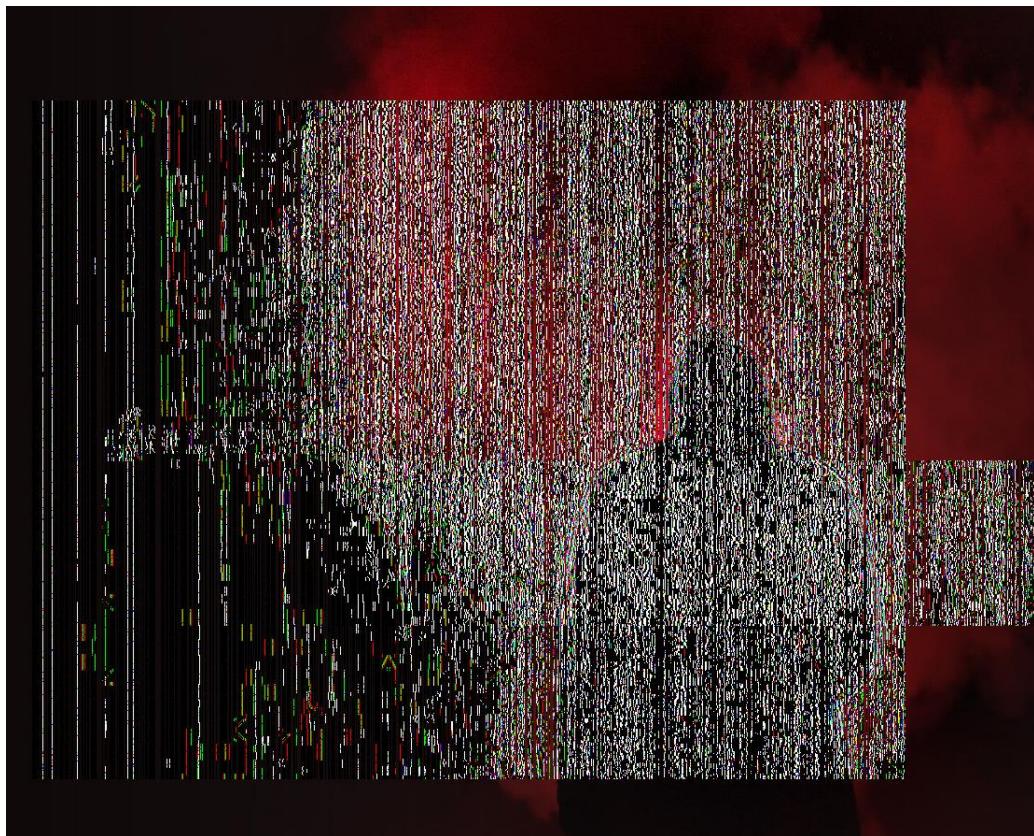
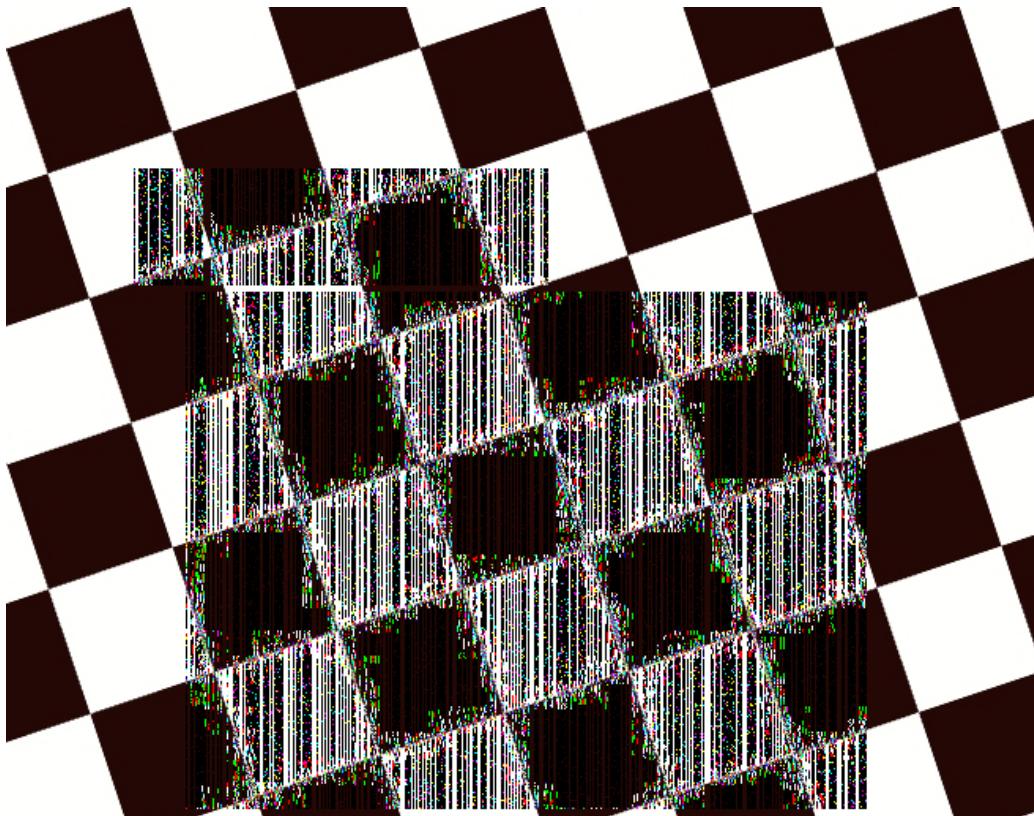
Harris Color Shift:



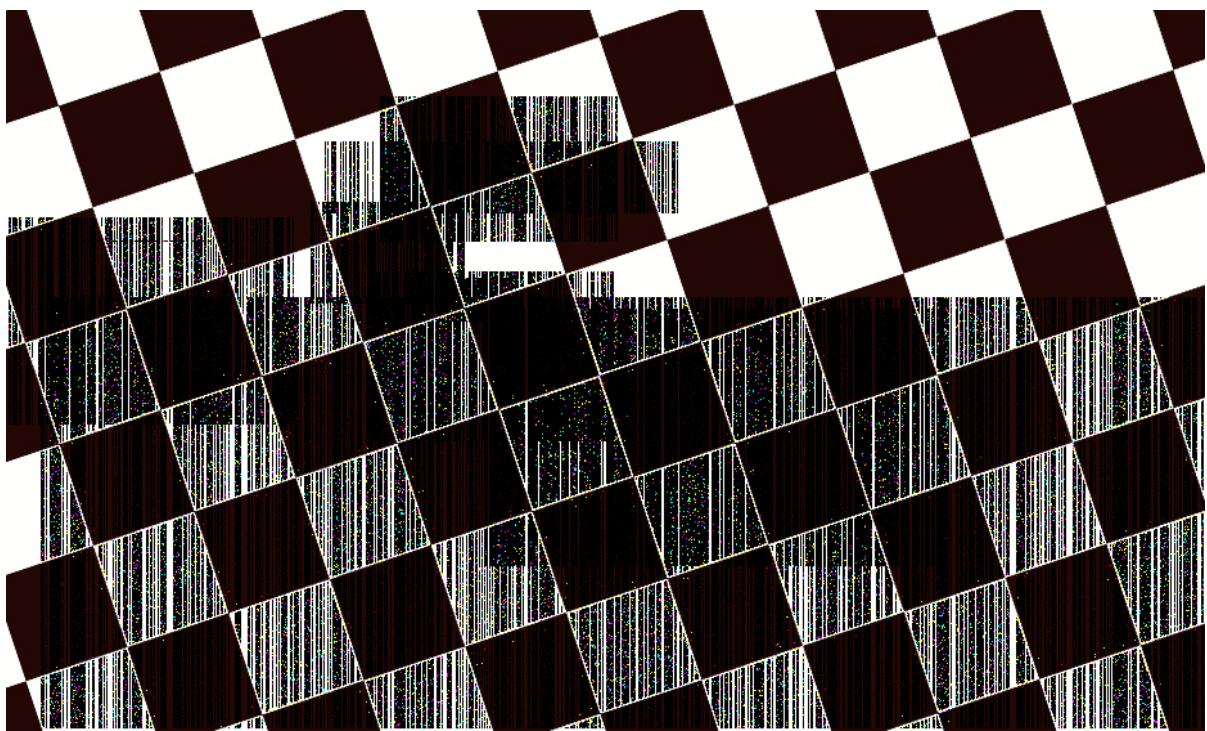
Copy Over (Original):



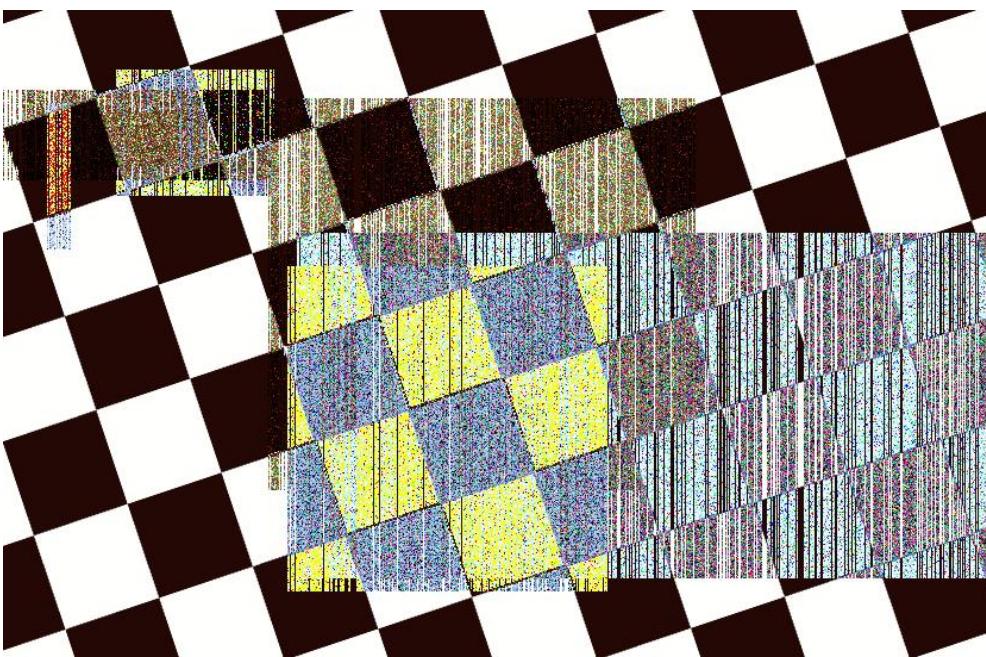
Convolution Edge Lines:



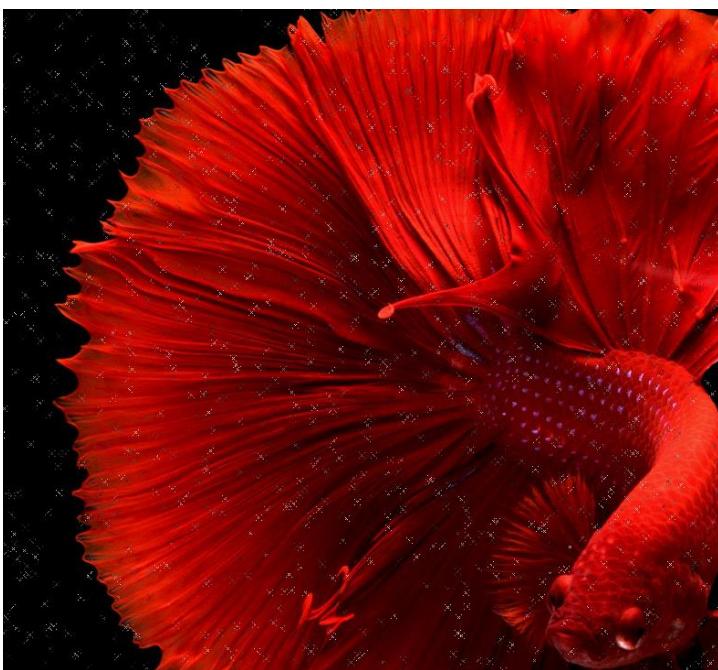
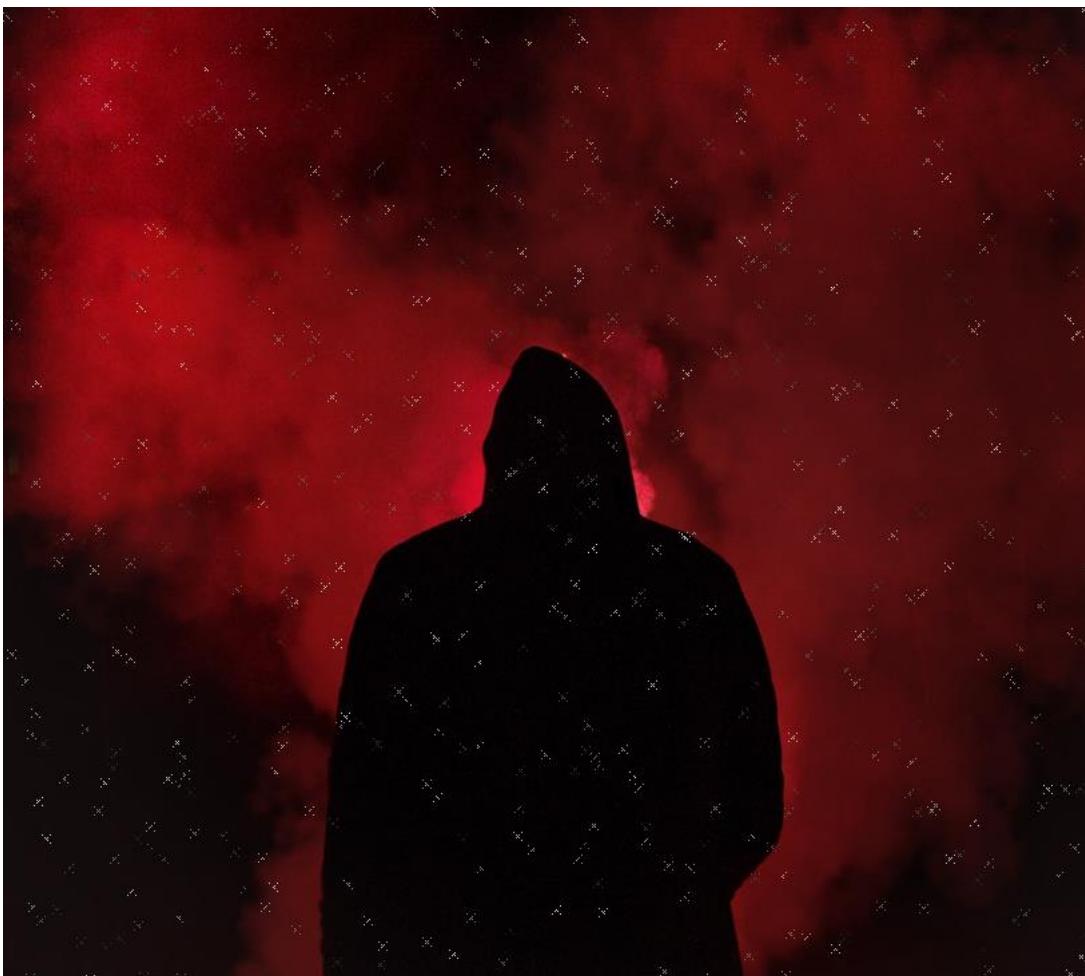
Convolution Edge Dilation:



Convolution Dynamics:

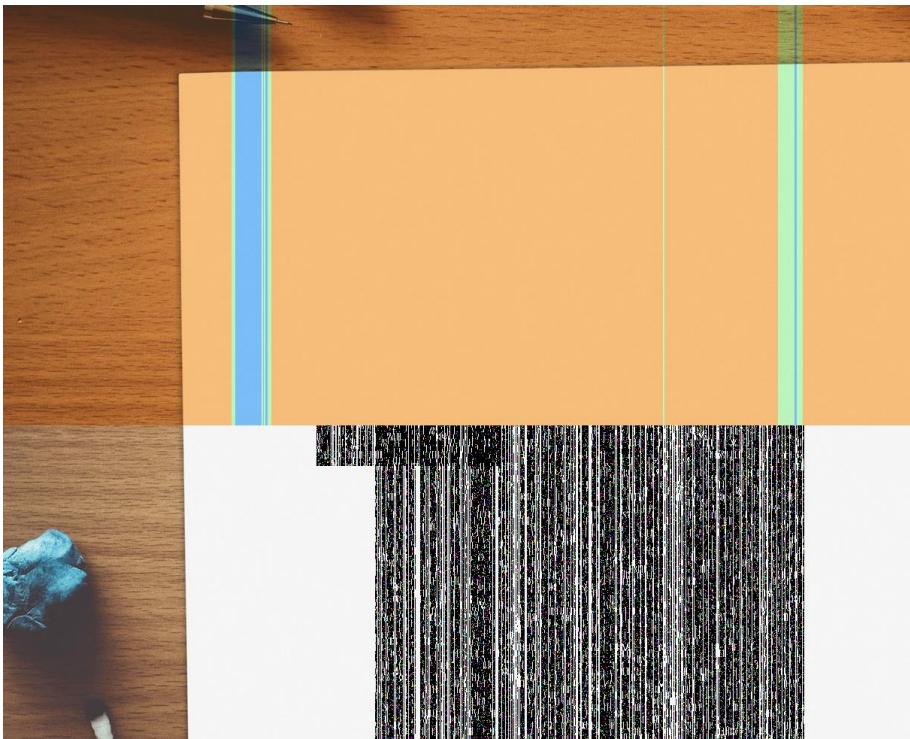
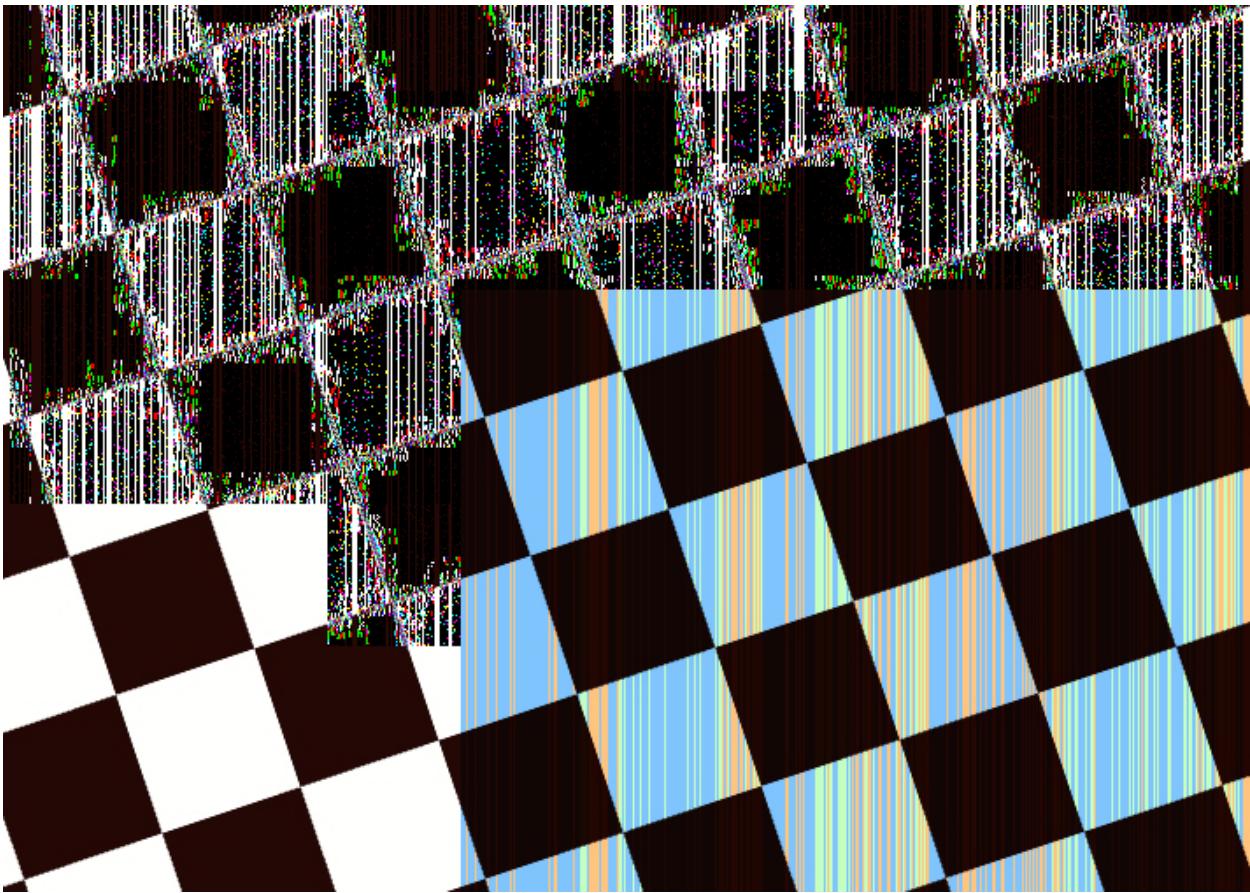


Cross Hatch:

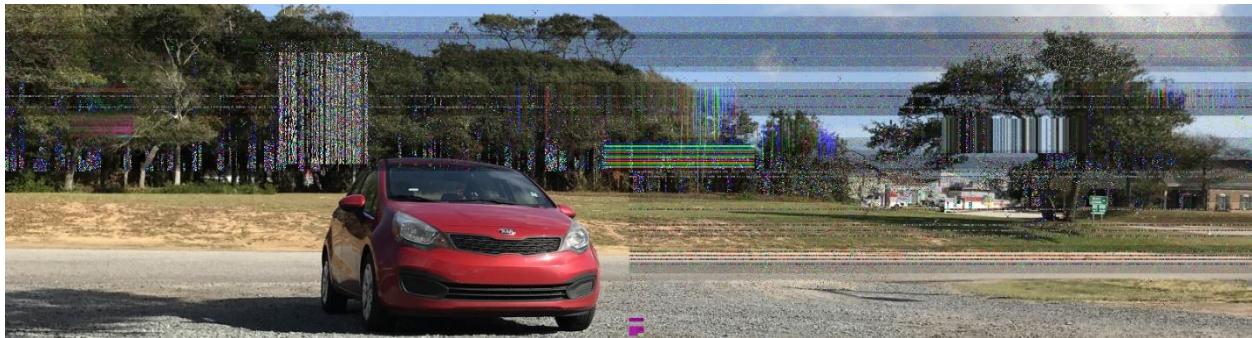


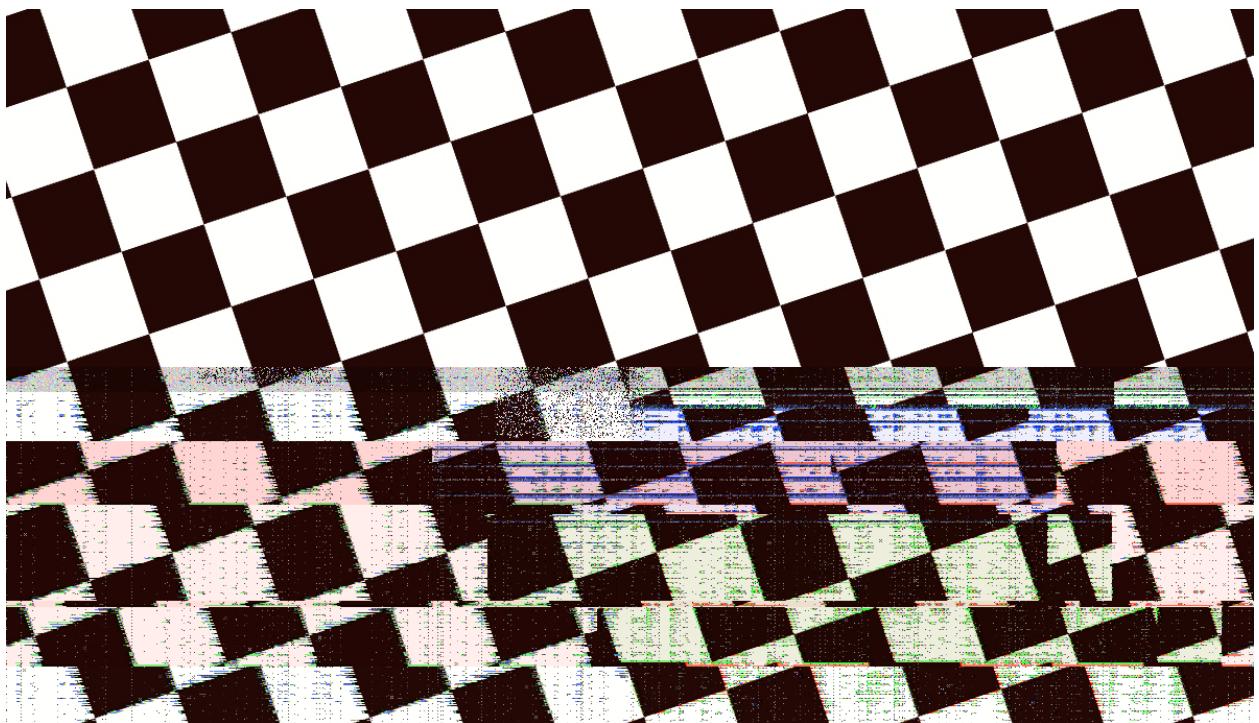
Crawford 23

Copy Over (Color Distort):

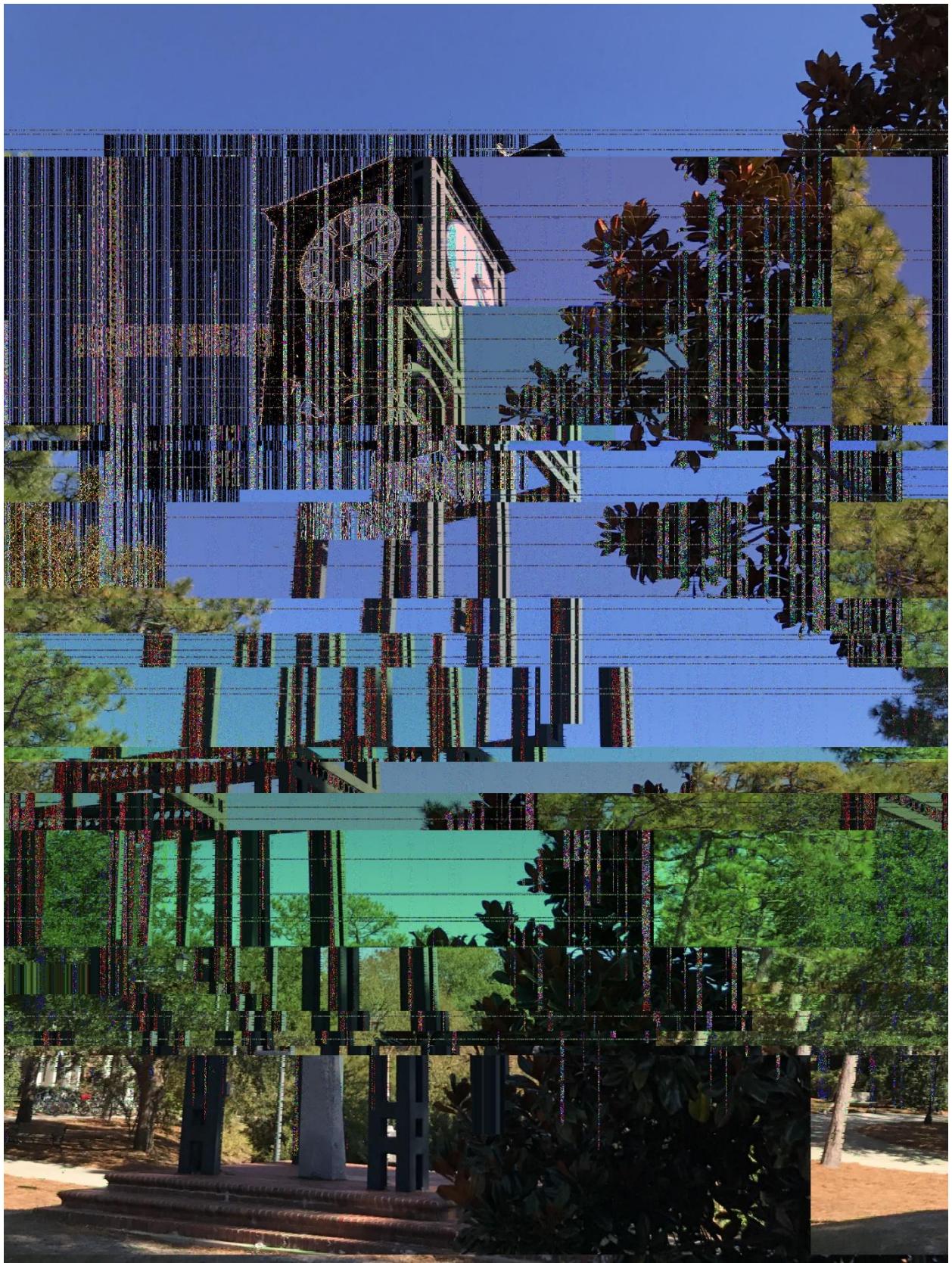


Composite Results:

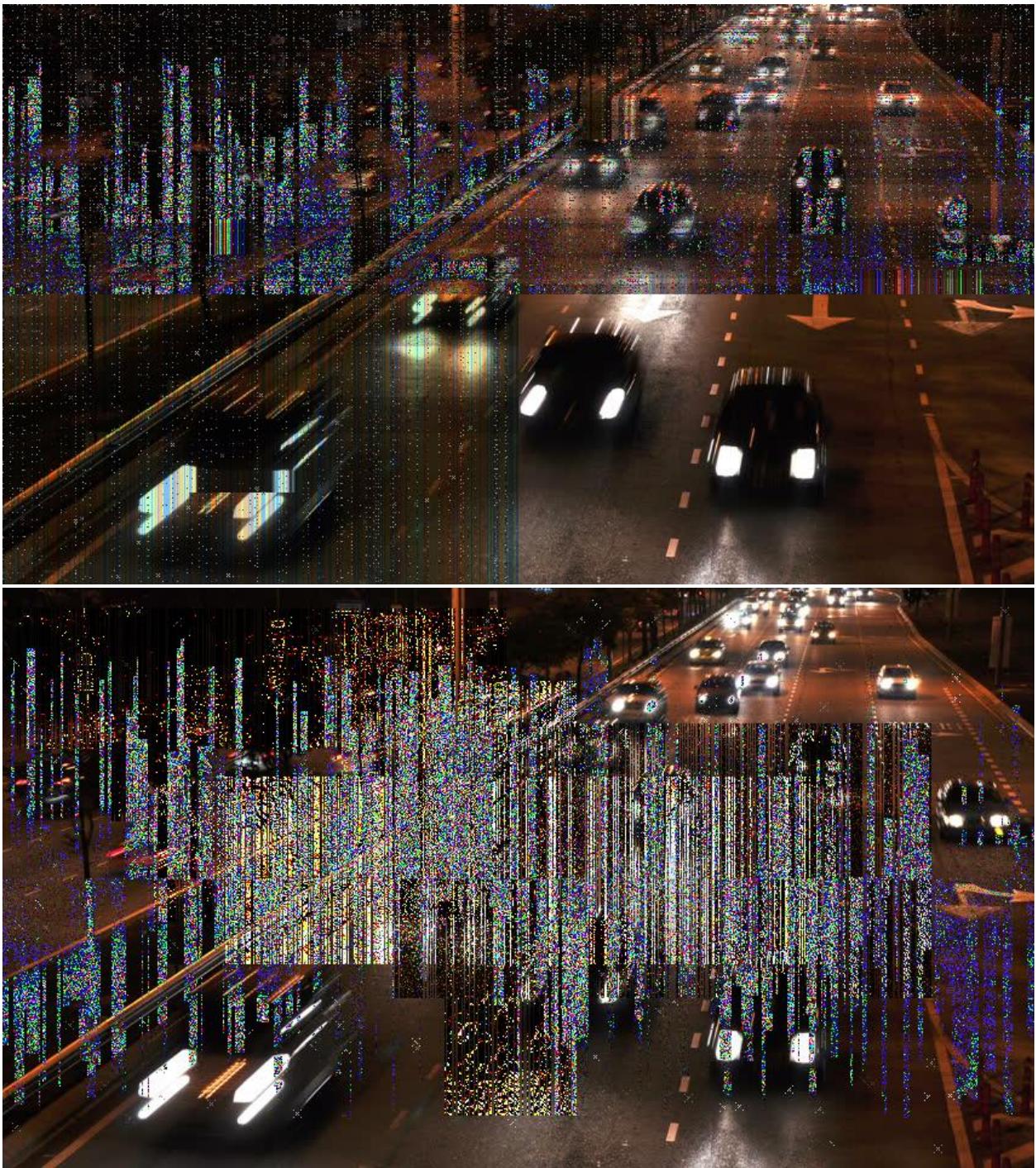




Crawford 26



Crawford 27



Crawford 28

