Documentation Journal

2/21/24

So far, I have been able to modify the video frame by frame using thresholding and morphology to distill a clean contour of many of the waves.

As of right now, I am taking a single contour from a single frame and converting it into an audio signal by using the x and y values of the whole still contour. This is not incorporating the temporal aspect of the wave, and I would like to use contour matching to generate a temporally accurate waveform. This could be accomplished utilizing Kalman Filters.

Right now, my program is using the x and y coordinates as amplitude and frequency, respectively, however only on a still frame, tracking the curve of a still wave, and using its values to generate sound. I would like to do the same thing, but for each singular point on a wave, I would like to follow it across time, recording its journey through the water and its corresponding x and y values. This would create a sound wave for each point on a wave as it travels and disappears. Combines, they would all contribute to the sound of the physical water ripple. Doing this along every contour would create a symphony of sounds that could be thought of as a voice of the river, with natural fluctuations, beginnings and endings. As analogy, we can think of them as punctuation, capitalization and intonation.

In the end, I believe incorporating the original audio of the river would give a clear context for the generated sounds, so using sound engineering we can create a soundscape of these waves, allowing for a more intimate experience listening to the river.

As a visual motif, I am exploring different avenues of presentation, incorporating interactive design with computer vision, kinetic generators, and visual representation of the audio being played. I don’t believe that the audio must be directly tied to the video. I believe that each stand alone, but somehow generating a visual interactive waterscape as a support for the acoustics would be an engaging demonstration to bring more attention to the work and a physical interaction with it. Developing this visual interactive waterscape using kinetic generators, based on the physical characteristics, both mechanically and aesthetically of the Wallkill River, perhaps even at each point that the audio is collected, would simulate a first-hand experience with the river itself.

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I have completely modified by contour identifying procedure to integrate the frame by frame motion of an individual particle using Kalman filters. The process is still buggy, and has not correctly identified the trajectory of a large contour, but the results are promising, and indicate that further pre-processing of the video is necessary for optimal results. I’ve attempted to apply more refined morphology, a gaussian blur, and thoroughly scoured my code for any issue, but it seems to be a deeper problem. I think it has to do with the amount of noise in the image, but to be honest, the noise are the waves, so I determine they are essential parts of the video. It could also be a parameterization of the Kalman Filter problem. My next steps will be to play with the parameters and pre-processing in order to get a consistent trajectory on a wave.

Reimagining the project, and doing research, I’ve found that creating an interactive kinetic generator based on a real place would not be as difficult as anticipated with softwares like Blender. I will do more research and identify the best solution.

Finally, once I am able to get a firm trajectory of a contour, I would like to investigate sound engineering software that will be useful in editing and modifying our sounds, just for the first one.

Some things I want to investigate as well are using Genetic Algorithms to streamline the preprocessing steps.

I also want to streamline the audio generation if possible.

Finally, I would like to continue investigating the history of the Wallkill, and venture out this Saturday to start recording videos at the places that have been discovered so far.

*You are amazing and can do absolutely anything you set your mind to. Thank you so much to all the people and myself for encouraging this endeavor. You’re awesome!!*

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I was able to do some intense reflection and discussion with Derek about the final product we are shooting for, and the more specific steps I can take to get there. Thinking about inspirations:

1. [Mileece](https://www.mileece.is/bio) – Sonic Artist and Immersive Ecology Designer
2. [Refik Anadol](https://refikanadol.com/works/melting-memories/) – Generative AI
3. [Box](https://www.youtube.com/watch?v=lX6JcybgDFo) – Bot & Dolly
4. [Sonic Field](https://sonicfield.org/listening-to-the-in-between/) – Journal of Sonic Art
5. [Coding Train](https://www.youtube.com/watch?v=6vX8wT1G798&list=PLRqwX-V7Uu6aFlwukCmDf0-1-uSR7mklK&pp=iAQB) – Simulation of Natural Systems in Processing
6. [The Interactive and Immersive HQ](https://www.youtube.com/@TheInteractiveImmersiveHQ/search?query=water) - TouchDesigner
7. [Sea Organ](https://www.youtube.com/watch?v=n86pF-wQKrw) – Natural Sound Generation

Textbooks I will be guiding my exploration of sound art, for the exploration of soundscapes and their creation, deep learning in the exploration of the potential of GAN networks for sound and visual generation and finally exploring visual programming languages such as TouchDesigner and Processing:

1. Nature of Code by Daniel Schiffman
2. Sound Art by Thom Holmes
3. Deep Learning by Ian Goodfellow et al.

Programming Ideas:

* DetectCorners – ORB
* Comma.AI – George Hotz Coding Tutorials implementing orb in vision tracking
* Bezier spline – interpolation between the ORB keypoints