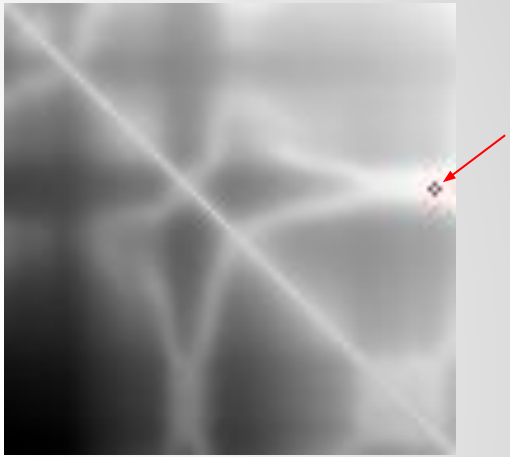
Computational Photography
Assignment #7
Video Textures

Ronak Patel
Spring 2019

Transition Matrices for Best Sample Conditions

Diff 1: candle_diff1

Diff 2: candle_diff2



Diff 3: candle_diff3_circle

Best Results from Sample Input

*Start frame filename in output: frame0000
Index frame number: 39

*End frame filename in output: frame0052
Index frame number: 91

What alpha value produced the smoothest loop? - 0.02

Link to your candle video texture gif -

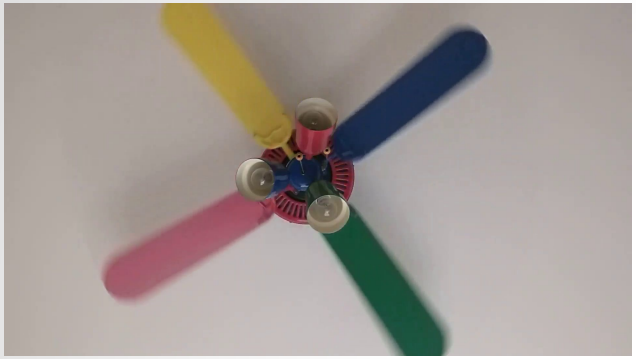
https://drive.google.com/open?id=1Hl9Mlb39zfAmQuHWCy8K3X3d17J4S304

Input files: candle

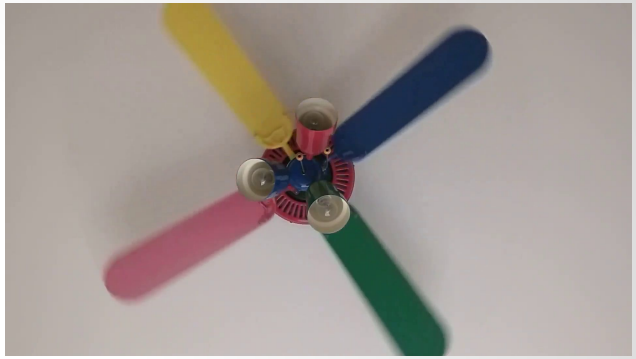
Results from Sample Input

- Clearly explain your procedure to get a good result
  - The input candle frames were run in main.py with an initial alpha parameter of 0.5. The output frames were produced and a gif was created using ffmpeg software. The gif was analyzed too see if it created a seamless loop, and the output frames were compared against the input frames. The process was then repeated with different alpha values which were tested with values (0.50, 0.25, 0.10, 0.20, 0.15) to find the best output.
- What was difficult? Explain.
  - The procedure was not difficult but rather tedious since it required manual analysis of the output images/gifs and tuning of the alpha parameter.

Best Results from Your Own Input



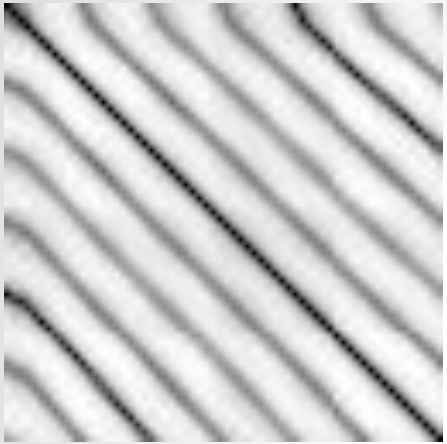
Start frame filename: frame0000
Index frame number: 17



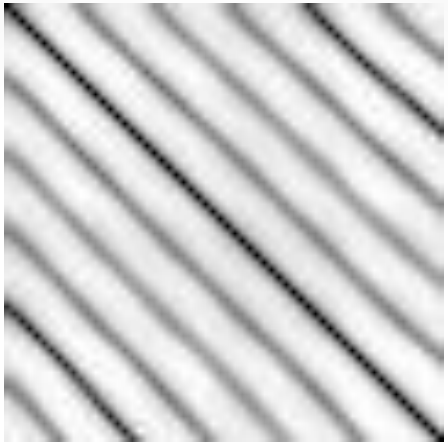
End frame filename: frame0042
Index frame number: 59

- Describe your gif. What is it? What is the location?
  - The gif is the fan in my home (in Atlanta, GA) spinning. Each fan blade has a different color which allowed me to easily track the fan blade movement.
- Alpha value for the best loop - 0.03
- Link to your video texture gif - https://drive.google.com/open?id=1O-onFgoJH6N63n-SOdzGxp2TTKPT0R1u
- Link to the frames (folder) - https://drive.google.com/open?id=18hvPyY1MSRUo7kQ1bq6MhJji2Ytt55JR

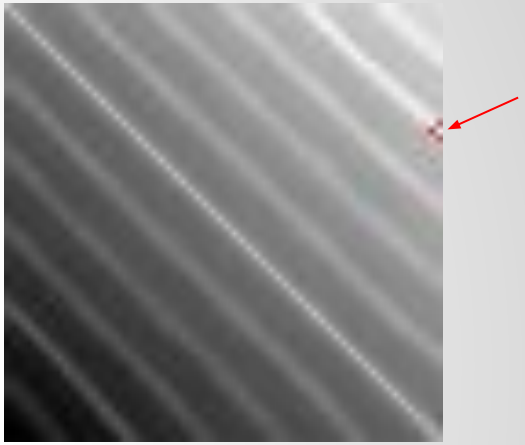
Transition Matrices for Your Own Best Input



Diff 1: fan_trim_diff1



Diff 2: fan_trim_diff2



Diff 3: fan_trim_diff3_circle

Results from Your Own Input

- Did you get a good result on your own video? Explain.
  - Yes, a good result was produced from my video. By sampling the video at 20 fps to produce the frame images, smaller positional changes in the fan were captured. This allowed for the video_texture program to find similar start and end frames for the gif compilation. However, in the output there was one small hang up where we can see that the fan blade momentarily pauses before it continues spinning. This could be a result of improper frame alignment, resulting in a gif that isn't quite seamless.
- How was this video different from working on the sample frames?
  - Working with the video was different from the sample frames since the video required trimming before processing and a different sampling rate to accurately capture fan blade movement.
- What was difficult? Explain
  - One difficult aspect of working with my own input was that memory errors would come forth if there were too many frames in the source folder. Therefore, the sampling rate was carefully selected for the frames and the video was carefully trimmed to limit memory requirement when sampling frames.
- What would you do differently?
  - Next time, I would try downsizing the input image files (after sampling) to allow for a finer sampling frequency and more images without running into memory errors when running main.py

Finding Alpha

- Describe how you determined the best alpha value for each video texture (candle and your own).
  - Candle video alphas tested: [0.50, 0.25, 0.10, **0.20**, 0.15]
  - My video alphas tested: [0.50, 0.25, 0.40, **0.30**]
  - Alpha values were found through a guess and check method. Alpha values that output frames that weren't close to the number of input frames and greater than ~10 frames were sought after. Gifs were then compiled to see what the final output looked like. If the number of frames needed to increase, the alpha value was increased in size. Similarly, if the number of frames needed to decrease, the alpha value was decreased in size.
- How are your results affected as alpha increases? Decreases? (Try changing by orders of magnitude, e.g., x1/10, x10, x100, etc.)
  - Higher alpha values preserved the image transition matrix differences from the original input file. In other words, the number of frames were not reduced as much. Similarly, lower alpha values resulted in less frames being preserved from the input images since the correlation values between frames were scaled down.

Finding Alpha (Continued…)

- Was the best alpha for your video the same as the one for the sample video? Discuss.
    - No, the alpha value for my video was 0.030, while the alpha value for the sample video was 0.020. If an value of 0.020 would be used on my video, it would result in a small number of output frames and an inconsistent loop. The sample video had larger differences between frames so it required a smaller alpha to compensate for that difference between the images and find similar frames.

Resources

- https://ffmpeg.org/

Inputs and outputs for the assignment can be found here:

- https://drive.google.com/open?id=1yLNY8X2nnG3l-lPyU3hwOZnnSPVS4txZ