EE371R: Project Proposal

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Overview

I'd like to implement the techniques described in the paper Eulerian Video Magnification for Revealing Subtle Changes in the World in a real-time web application that accepts video input from a user's web camera and outputs processed video that makes the user's pulse visible on the screen.

Motivation

I believe you mentioned in class the work of your colleague which involved making the pulse of a baby visible to the naked eye. Coincidentally, I discovered the work of the colleague which you described just a couple weeks before the start of the semester. Having only recently completed EE 313 this past spring, I was very impressed by the results obtained in their work through direct application of Fourier analysis techniques to video processing. I hope to follow the steps outlined in their paper and reproduce similar results in a web application, which would potentially make their work more visible to the public as well as deepen my understanding of Fourier analysis.

Requirements and Plans

I plan to complete the following project requirements using the corresponding technologies described:

- Deploy a project website (e.g. http://myproject.url) using GitHub pages
- Accept video input stream from user web camera with WebRTC Web API
- Output processed video stream to screen using Video and Canvas Web APIs
- Attain real-time frame rates (>30 fps):
  - Write the video processing algorithm in C or C++
  - Compile C/C++ code to a WebAssembly module with Emscripten
  - Interface with WebAssembly module in web application with Javascript APIs
- Write an analysis of the web application's effectiveness, comparing with results in the paper

Challenges / Major Steps

- Thoroughly understand the theory and results of the 8-page paper
- Learn how to use the various Web APIs mentioned above (WebRTC, Video, Canvas, and WebAssembly) by reading online documentation and examples
- Read and understand the paper's source code and reimplement it in C/C++
- Set up Emscripten to compile C/C++ to WebAssembly
- Set up GitHub pages to deploy the website
- Design the website user interface in CSS/HTML