**Research Project Proposal**

**ECE 515**

**Name:** Gesture Recognition System Through Key Frames Extraction

**Team #:** 2

**Members:** Jake Zeisel & Afeef Akhtar

**Description:**

We are proposing to build a hand gesture recognition system by means of the algorithm laid out in [1]. The process is split up into the following steps: edge detection, subtraction of background, contour extraction, and feature recognition. To do feature recognition, [1] uses Convex Hull to draw a perimeter around the hand, and then extracts the number of fingers in the gesture by computing points from the center of the shape to the perimeter. However, this paper does not discuss how to choose frames from a video to process. It would be overly compute intensive to process every single frame of a video to find what gestures are being performed, and would lead to many wrong answers. [2] outlines a unique system of finding “key” frames within a video stream, where gestures may be taking place so that we will be able to process only the important parts of the video. We hope to combine these two approaches to build a gesture recognition system that is fast and performs with high accuracy. Ideally, we will be able to build a small application that responds to certain gestures. We plan to use Python as the programming language. Specific libraries that will be helpful for gesture recognition would be MediaPipe, Tensorflow, and OpenCV.

Relevant Academic Papers

[1] Al Saedi, Ahmed & Hanon Al Asadi, Abbas. (2020). A new hand gestures recognition system. Indonesian Journal of Electrical Engineering and Computer Science. 18. 49. 10.11591/ijeecs.v18.i1.pp49-55.

[2] Tang, H., Liu, H., Xiao, W., & Sebe, N. (2019). Fast and Robust Dynamic Hand Gesture Recognition via Key Frames Extraction and Feature Fusion. arXiv. https://doi.org/10.48550/ARXIV.1901.04622

Possible Dataset

**Cambridge Hand Gesture Dataset:**

<https://labicvl.github.io/ges_db.htm>

**Northwestern Hand Gesture Dataset:**

<https://www.sciencedirect.com/science/article/abs/pii/S0262885611001193>

**Kaggle Hand Gesture Dataset:**

<https://www.kaggle.com/code/gauravduttakiit/hand-gesture-recognition-with-python>

**\*we will also likely want to use our own dataset gathered from captured video**