

CAPSTONE PROJECT

CSC 59866 - DD1

Hand Signals with Visual Data

Progress Report

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OVERVIEW

For our final capstone project our team would like to build a software that could allow for hand gestures to control a computer with the use of a camera in a way similar to the mouse. Deep learning would allow for the recognition of hand gestures and would be customizable by allowing to pick any combination of number of fingers and detectable gestures.

CHALLENGES

1. Training a CNN or RNN to be able to detect gestures like:
 - a. Scroll
 - b. Pinch (zooming in and out)
 - c. Wave
 - d. Rotate
2. Real-time detection of fingers
 - a. Should be able to count number of fingers
 - b. (Optional) Detect different states of fingers like half fold or straight
3. Gathering large training dataset

PROGRESS

As of May 10th, we have started trying and testing the available libraries. We also started looking for pre-trained models and datasets that have been compiled by other projects. Our main reference as a working example is the "Handtrack.js" library - they have an available web demo that uses a server side trained model that then reflects the output from tensorflow in almost real-time. We are still searching for appropriate datasets and have found a few options on Kaggle

Combining the references listed below under "Gesture Recognition" we believe that we will be able to achieve our goal of being able to determine the number of fingers along with determining a specific gesture.

From our team discussions we are leaning towards creating a desktop app using Electron JS that is based on Node.js and React JS this also gives us the option to run Python scripts on the users end without introducing any latency by removing any dependency on a pre-trained model on server side.

REFERENCES

1. Handtrack.js
<https://github.com/victordibia/handtrack.js/>
Library for prototyping real-time hand detection
2. Gesture Recognition
<https://github.com/asingh33/CNNGestureRecognizer>
<https://github.com/avidLearnerInProgress/hand-gesture-recognition>
Projects with examples for gestures recognition
3. TensorFlow Examples
<https://github.com/tensorflow/examples>
https://github.com/tensorflow/examples/.../gesture_classification
General examples from tensorflow on gesture classification and object recognition
4. Kaggle Dataset
<https://www.kaggle.com/.../hand-gesture-recognition-database-with-cnn/>
Database is composed by 10 different hand-gestures