**Midterm Report**

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CSE 535: Mobile Computing

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November 7, 2021

Problem Statement

To develop the python application classifying smart home gestures used in the Assignment 2. By training the practice hand gestures videos, testing the given video with the given CNN model. In order to learn more about the machine learning models.

Objective:

1. Developed a python application that classifies specific gestures
2. Train and test a CNN model

Technology Requirement:

* TensorFlow
* Python 3.6.9
* OpenCV for Python
* Keras

Approach to the problem:

1. First we will generate the penultimate layer for the training videos
2. Then we will generate the penultimate layer for the testing videos
3. Then gesture recognition of the test data

Solution:

1. In first place I will take training data and extract the middle frames by taking the still frames from the practice gestures video recorded by us in the Assignment 2. Once the frames are being extracted for each hand gesture video then I used HandShapeFeatureExtractor to call get\_Instance() method to get an instance of the CNN model and extract feature vectors from the extracted frames.
2. Then, did the same for the test data given by the professor.
3. Then, in order to predict the class label applied the cosine similarity between the vector of the gesture video and the penultimate layer of the training set and did same with the testing set. Then, for each iteration, determine the cosine similarity between each pair of training and testing features, store those similarities in a list, and find the class label with the highest similarity. I also kept track of the maximums from each iteration in a result list.
4. The formula for determining similarity for each feature vector pair A,B was:

Text

Description automatically generated with low confidence

1. The similarity function returns a result between -1 and 1, where -1 indicating complete dissimilarity and 1 indicating perfect similarity.
2. Then, I stored the results in a "Results" csv file.