

Machine Learning 2 Group Project Proposal

For our project, we will create a neural network to classify short video clips of humans making various gestures. The classification of human gestures could be used to help create virtual systems that humans can easily interact with. Virtual reality software or robotic assistants are two things that could potentially use a gesture classification system. This will be an interesting and challenging problem that will require us to incorporate several different techniques we have learned about in class.

We will be using the 20BN-jester dataset. This dataset consists of 148,092 videos (stored as sequences of images) of humans making various gestures in front of a webcam. There are 27 different gesture labels, including things like “thumb up”, “thumb down”, “swiping left”, “turning hand clockwise”, etc. This dataset should be large enough to train our network.

There are several types of networks that we plan on trying on this problem. One approach is to use 3D convolution layers. We will be using PyTorch for our network, because we have some experience using it, and because PyTorch has built-in modules for 3D convolution layers. Our implementation will probably require some customization. There are some papers, code, and other information online about using convolution networks for classifying videos. [This is one code example](#), with [this associated paper](#). [This paper](#) also discusses using similar methods for video classification.

We will evaluate our network’s performance using a loss function designed for multiclass classification problems like [cross entropy loss](#) or multi-class hinge loss (margin-based loss). While training and tuning the model different hyperparameter values will be used to select the best performing model. Confusion matrix, precision and recall values will be used to compare the classification results to the ground truth.

Schedule:

Proposal	April 06, 2019
Prepare Environment Define/build Convolutional Neural Network	April 07,2019 - April 13,2019
Train,Tune and test Network	April 14,2019 - April 20,2019
Prepare Deliverable and Presentation	April 21,2019 - April 23,2019
Final Report	April 24, 2016