CSE 535 Assignment 2 report Group 09

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1. Overview

   In this assignment, we have designed an online RESTful application service that can classify American Sign Language(buy, fun, hope, really, communicate, mother). After comparing the prediction accuracy between different classifiers, we finally choose the four with the highest accuracy, they are Random Forest, Decision Tree, multilayer perceptron (MLP) and k-nearest neighbors(KNN).

   Our service: http://18.236.65.205/postjson (port: N/A or default 80)

2. Data processing

   The training dataset provided ranges from 39 frames to 174 frames, each frame contains 52 different values in different positions. We have several steps to format our features for training.

   - Select some values from significant positions, 12 features for one frame.

     'leftShoulder_x', 'leftShoulder_y', 'rightShoulder_x', 'rightShoulder_y', 'leftElbow_x', 'leftElbow_y', 'rightElbow_x', 'rightElbow_y', 'leftWrist_x', 'leftWrist_y', 'rightWrist_x', 'rightWrist_y'

   - While the frames for the dataset range from 39 to 174, we extract 30 frames by taking the mean of them, for example, 150 frames, taking the mean of each 5 frames, so each sample we have 12*30=360 features.

3. Performance

   Applied with several classifiers like SVM, Naïve Bayes, Random Forest, Decision Tree, MLP, KNN and logistic Regression, we found that Random Forest, Decision Tree, MLP and KNN classifiers have higher accuracy, so we choose these four as our final classifiers.

   1 denotes Random Forest classifier, 2 denotes decision tree classifier, 3 denotes MLP classifier, 4 denotes KNN classifier.

   We used k fold cross validation to train these 4 models and 20 percent of the original data set to test the prediction accuracy, and we have the result shown below.

```
Best model is:0.8554216867469879
Best model is:0.6987951807228916
Best model is:0.7951807228915663
Best model is:0.7831325301204819
```

The accuracy for each classifier shown in table below.

Random Forest	85.5%
Decision Tree	69.9%
MLP	79.5%
KNN	78.3%

4. Debug on service

   We debug our service with http://10.218.107.121:5432/, and we have the right result shown below.