Chapter 04a - Machine Learning with MATLAB.

Author: Yijie ZHENG (Amy)

Reference files for this chapter:

- ../Test_Data/rawSensorData_train.mat
- ../Test_Data/rawSensorData_test.mat
- Wstd.m
- Wmean.m
- plotRawSensorData.m

Machine Learning with Matlab

Machine learning teaches computers to do what comes naturally to humans: learn from experience. Machine learning algorithms use computational methods to “learn” information directly from data without relying on a predetermined equation as a model. The algorithms adaptively improve their performance as the number of samples available for learning increases.

https://uk.mathworks.com/help/stats/machine-learning-in-matlab.html

Train Classification Models in Classification Learner App

Description of the Data (rawSensorData_train/test.mat)

```
The dataset consists of accelerometer and gyroscope data captured at 50Hz. The activities performed by the subject include: 'Walking', 'ClimbingStairs', 'Sitting', 'Standing',and 'Laying'
```

1. *total_acc_(x/y/z)_train :* Raw accelerometer sensor data
2. *body_gyro_(x/y/z)_train :* Raw gyroscope sensor data
3. *trainActivity :* Training data labels
4. *testActivity :* Test data labels

Load Training Data

Display data summary

Create Table variable

Train a model and assess its performance using Classification Learner

Train on raw data

```
```

Pre-process Training Data: Feature Extraction

Lets start with a simple preprocessing technique. Since the raw sensor data contain fixed-width sliding windows of 2.56sec (128 readings/window) lets start with a simple average feature for every 128 points

```
%% calculate the mean value
%% calculate the std value

%% update the table


```

Train a model and assess its performance using Classification Learner

Train on pre-processed data

```
```

Export trained model

Name: 'trainedModel'

Make Predictions for New Data Using Exported Model

```
%% load test data

% Step 1: Create the table


% Step 2: Extract features from raw sensor data

```

Use Classification Learner App

Use function 'predictFcn'

```
```