MyoGym –read me first

When using the data set, please refer to article: Koskimäki, H., Siirtola, P. & Röning, J. (2017). MyoGym - Introducing a Novel Gym Data Set for Activity Recognition Collected Using Myo Armband, HASCA 2017.

Data set

The data were collected using a Myo Armband. Myo includes 8 electromyogram (EMG) sensors and a nine-axis IMU containing three-axis gyroscope, three-axis accelerometer, three-axis magnetometer (magnetometer data not available within data set). In our study, the Myo was located at the right forearm positioned so that the IMU was on the top of the forearm while the 8 EMG sensors located evenly distributed around the arm. In this study the frequency of 50 Hz were used in data collection. The data set and features are provided as matlab-file through http://www.oulu.fi/bisg/node/40364

1. MyoGym.mat includes
    a. raw_data 2017041 x 17 double
        i. columns 1, 10, and 14 are timestamps (ms)
        ii. columns 2-9 are emg signals
        iii. columns 11-13 acceleration signals
        iv. columns 15-17 are angular velocity (gyro signals)
    b. raw_data_labels
        i. column 1, exercise labels 1-30, 99 (see below)
        ii. column 2, person labels 1-10
    c. features as Matlab code
        i. for acceleration and angular velocity, see box 1
        ii. for emg, see box 2

For contacts: heli.koskimaki@oulu.fi

More detail on exercises can be found by following the links

Class	Name (click the link)	**Muscle group**	**Posture**	**One-arm, both or alternate**	**Equipment**
1	Seated Cable Rows	Middle Back	Seated	Both	Cable
2	One-Arm Dumbbell Row	Middle Back	Bent Over	One-arm	Dumbbell
3	Wide-Grip Pulldown Behind The Neck	Lats	Seated	Both	Cable
4	Bent Over Barbell Row	Middle Back	Bent Over	Both	Barbell
5	Reverse Grip Bent-Over Row	Middle Back	Bent Over	Both	Barbell
6	Wide-Grip Front Pulldown	Lats	Seated	Both	Cable
7	Bench Press	Chest	On back	Both	Barbell
8	Incline Dumbbell Flyes	Chest	Seated inclined	Both	Dumbbell
9	Incline Dumbbell Press	Chest	Seated inclined	Both	Dumbbell
10	Dumbbell Flyes	Chest	On back	Both	Dumbbell
11	Pushups	Chest	On hands & toes/knees	Both	Own weight
12	Leverage Chest Press	Chest	Seated	Both	Machine
13	Close-Grip Barbell Bench Press	Triceps	On back	Both	Barbell
14	Bar Skullcrusher	Triceps	On back	Both	Barbell
15	Triceps Pushdown	Triceps	Standing	Both	Cable rope
16	Bench Dip / Dip	Triceps	Weight on hands	Both	Own weight
17	Overhead Triceps Extension	Triceps	Standing	Both	Barbell Plate
18	Tricep Dumbbell Kickback	Triceps	Bent over	One-arm	Dumbbell
19	Spider Curl	Biceps	Seated	Both	E-Z Curl Bar
20	Dumbbell Alternate Bicep Curl	Biceps	Standing	Alternate	Dumbbell
21	Incline Hammer Curl	Biceps	Seated inclined	Both	Dumbbell
22	Concentration Curl	Biceps	Seated	One-arm	Dumbbell
23	Cable Curl	Biceps	Standing	Both	
24	Hammer Curl	Biceps	Standing	Alternate	Dumbbell
25	Upright Barbell Row	Shoulders	Standing	Both	
26	Side Lateral Raise	Shoulders	Standing	Both	Dumbbell
27	Front Dumbbell Raise	Shoulders	Standing	Alternate	Dumbbell
28	Seated Dumbbell Shoulder Press	Shoulders	Seated	Both	Dumbbell
29	Car Drivers	Shoulders	Standing	Both	
30	Lying Rear Delt Raise	Shoulders	On stomach	Both	Dumbbell
99	NULL				

```
X=(abs(fft(x_accel, 200))) ;
Y=(abs(fft(y_accel, 200))) ;
Z=(abs(fft(z_accel, 200))) ;


X=(X - mean(X))/std(X);
Y=(Y - mean(Y))/std(Y);
Z=(Z - mean(Z))/std(Z);


Features in this order:

HjorthParameters(x_accel);
HjorthParameters(y_accel);
HjorthParameters(z_accel);
std(x_accel);
std(y_accel);
std(z_accel);
mean(x_accel);
mean(y_accel);
mean(z_accel);
min(x_accel);
min(y_accel);
min(z_accel);
max(x_accel);
max(y_accel);
max(z_accel);
median(x_accel);
median(y_accel);
median(z_accel);
prctile(x_accel, 25);
prctile(y_accel, 25);
prctile(z_accel, 25);
prctile(x_accel, 75);
prctile(y_accel, 75);
prctile(z_accel, 75);
prctile(x_accel, 10);
prctile(y_accel, 10);
prctile(z_accel, 10);
prctile(x_accel, 90);
prctile(y_accel, 90);
prctile(z_accel, 90);
prctile(x_accel, 95);
prctile(y_accel, 95);
prctile(z_accel, 95);
prctile(x_accel, 5);
prctile(y_accel, 5);
prctile(z_accel, 5);
corr(x_accel,y_accel);
corr(x_accel,z_accel);
corr(y_accel,z_accel);
sum(((x_accel(2:end)>=0)&(x_accel(1:end-1)<=0)));
sum(((y_accel(2:end)>=0)&(y_accel(1:end-1)<=0)));
sum(((z_accel(2:end)>=0)&(x_accel(1:end-1)<=0)));          sum(((x_accel(2:end))>=mean(x_accel)&(x_accel(1:end-
1))<=mean(x_accel)));
sum(((y_accel(2:end))>=mean(y_accel)&(y_accel(1:end-1))<=mean(y_accel)));
sum(((z_accel(2:end))>=mean(z_accel)&(z_accel(1:end-1))<=mean(z_accel)));
sum(X(1));
sum(Y(1));
sum(Z(1));
sum(X(1:5));
sum(Y(1:5));
sum(Z(1:5));
sum(X(6:10));
sum(Y(6:10));
sum(Z(6:10));
entropy(x_accel);
entropy(y_accel);
entropy(z_accel);
```

Box 1: Features calculated from acceleration and angular velocity data

For every channel separately

Features:

std(data)';
mean(data)';
min(data)';
max(data)';
median(data)';
prctile(data, 25)';
prctile(data, 75)';
prctile(data, 10)';
prctile(data, 90)';
prctile(data, 95)';
prctile(data, 5)';
sum(data>25)';
sum(data>50)';
sum(data>100)';
sum(data>150)';
sum(data>200)';

Box 2: Features calculated from emg data