PROJECT REPORT
(Digital Signal Processing)

Activity Identification using ADL Dataset

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BEE – 4B

Submitted to:

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Project Description

We have chosen data set ADL [activities of daily life]. The data set contains output of a smart phone's accelerometer. We have used this data to predict the activity of the person at that time.

Brief Description of Algorithm

Accelerometer's output consists of values of acceleration in three dimensions (x y z). We have processed this data of known activities to form standard models for some activities. We extract five properties of data to compute standard model of an activity. These five properties are

- mean value of acceleration in x and z direction
- we computed Fourier transform of data and recorded the values of frequencies at which peak value was detected in x y z directions

  Now we have a model with five parameters. When we input a file our program computes these five parameters of that data and compares them with the standard models and gives a decision according to that.

Summary of Test Results

Test No.	Model		Result
1	Climb_stairs	Male	**Passed**
2		Female	Failed
3	Drink_glass	Male	**Passed**
4		Female	Failed
5	Getup_bed	Male	**Passed**
6		Female	**Passed**
7	Pour_water	Male	**Passed**
8		Female	**Passed**
9	Sitdown_chair	Male	**Passed**

10		Female	**Passed**
11	Standup_chair	Male	**Passed**
12		Female	**Passed**
13	Walk	Male	**Passed**
14		Female	Failed

$$\boldsymbol{Success\ Ratio} = \frac{\mathbf{11}}{\mathbf{14}} = \mathbf{78.5\%}$$

Detailed output of each test result

Test 1 (Climb Stairs-Male)

```
>> trial = 'Climb_stairs\Accelerometer-2012-06-06-09-44-02-climb_stairs-m6.txt';

>> TestInput( trial );


xmean =


   -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


zmean =


    8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


meanfreq =


  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000

  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
```

183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

avg_x =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

avg_z =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000

182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000

183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

100 percent chance is that the input is from: 'Climb_stairs_MODEL'

Test Passed

Test 2 (Climb Stairs-Female)

```
>> trial = 'Climb_stairs\Accelerometer-2011-03-24-10-24-39-climb_stairs-f1.txt';
>> TestInput( trial );

xmean =

  -1.0965  -8.7950  -6.8632  -2.4390  -4.8412   2.7849  -9.1181


zmean =

   8.1258   0.4908   3.3771   6.9289   4.4689   8.1042   1.0226


meanfreq =

 182.1333  86.0000  85.0000  77.6667 131.0000 135.8000 126.0000
 182.6667  86.0000  85.0000  78.0000 130.6667 135.7333 126.0000
 183.0000  85.0000  84.9333  78.0000 131.0000 136.0000 126.0000
```

avg_x =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

avg_z =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000
183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

60 percent chance is that the input is from: 'Drink_glass_MODEL'

Test failed

Test 3 (Drink Glass-Male)

>> trial = 'Drink_glass\Accelerometer-2011-06-02-17-52-26-drink_glass-m1.txt';

>> TestInput(trial);

xmean =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

zmean =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

meanfreq =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000
183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

avg_x =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

avg_z =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000

183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

60 percent chance is that the input is from: 'Drink_glass_MODEL'

Test Passed

Test 4 (Drink Glass-Female)

```
>> trial = 'Drink_glass\Accelerometer-2011-03-24-10-07-02-drink_glass-f1.txt';
>> TestInput( trial );

xmean =

  -1.0965  -8.7950  -6.8632  -2.4390  -4.8412   2.7849  -9.1181


zmean =

   8.1258   0.4908   3.3771   6.9289   4.4689   8.1042   1.0226


meanfreq =

  182.1333  86.0000  85.0000  77.6667 131.0000 135.8000 126.0000
  182.6667  86.0000  85.0000  78.0000 130.6667 135.7333 126.0000
  183.0000  85.0000  84.9333  78.0000 131.0000 136.0000 126.0000
```

avg_x =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

avg_z =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000
183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

80 percent chance is that the input is from: 'Pour Water'

Test Failed

Test 5 (Getup Bed-Male)

>> trial = 'Getup_bed\Accelerometer-2012-05-30-21-53-05-getup_bed-m2.txt';
TestInput(trial);

xmean =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

zmean =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

meanfreq =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000
183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

avg_x =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

avg_z =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000

182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000

183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

100 percent chance is that the input is from: 'Getup_bed_MODEL'

Test Passed

Test 6 (Getup Bed-Female)

```
>> trial = 'Getup_bed\Accelerometer-2012-06-12-15-56-41-getup_bed-f3.txt';
TestInput( trial );

xmean =

  -1.0965  -8.7950  -6.8632  -2.4390  -4.8412   2.7849  -9.1181


zmean =

   8.1258   0.4908   3.3771   6.9289   4.4689   8.1042   1.0226


meanfreq =

  182.1333  86.0000  85.0000  77.6667 131.0000 135.8000 126.0000
  182.6667  86.0000  85.0000  78.0000 130.6667 135.7333 126.0000
```

```
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000


avg_x =

   -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


avg_z =

    8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


avg_Freq_Pos =

  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000

100 percent chance is that the input is from:    'Getup_bed_MODEL'
```

Test Passed

Test 7 (Pour Water-Male)

```
>> trial = 'Pour_water\Accelerometer-2012-05-30-19-57-40-pour_water-m3.txt';
>> TestInput( trial );
```

xmean =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

zmean =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

meanfreq =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000
183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

avg_x =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

avg_z =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000

182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000

183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

100 percent chance is that the input is from: 'Pour Water'

Test Passed

Test 8 (Pour Water-Female)

```
>> trial = 'Pour_water\Accelerometer-2011-03-24-10-51-12-pour_water-f1.txt';
>> TestInput( trial );

xmean =

  -1.0965  -8.7950  -6.8632  -2.4390  -4.8412   2.7849  -9.1181


zmean =

   8.1258   0.4908   3.3771   6.9289   4.4689   8.1042   1.0226


meanfreq =

 182.1333  86.0000  85.0000  77.6667 131.0000 135.8000 126.0000
```

```
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000


avg_x =

   -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


avg_z =

    8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


avg_Freq_Pos =

  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000

80 percent chance is that the input is from:    'Pour Water'
```

Test Passed

Test 9 (Sit-down Chair-Male)

```
>> trial = 'Sitdown_chair\Accelerometer-2012-03-23-03-45-26-sitdown_chair-m9.txt';
```

```
>> TestInput( trial );

xmean =

  -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


zmean =

   8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


meanfreq =

  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000


avg_x =

  -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


avg_z =

   8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226
```

avg_Freq_Pos =

182.1333	86.0000	85.0000	77.6667	131.0000	135.8000	126.0000
182.6667	86.0000	85.0000	78.0000	130.6667	135.7333	126.0000
183.0000	85.0000	84.9333	78.0000	131.0000	136.0000	126.0000

60 percent chance is that the input is from: 'Sitdown_chair_MODEL'

Test Passed

Test 10 (Sit-down Chair-Female)

>> trial = 'Sitdown_chair\Accelerometer-2012-05-25-18-36-06-sitdown_chair-f4.txt';
TestInput(trial);

xmean =

-1.0965	-8.7950	-6.8632	-2.4390	-4.8412	2.7849	-9.1181

zmean =

8.1258	0.4908	3.3771	6.9289	4.4689	8.1042	1.0226

meanfreq =

```
  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000


avg_x =

   -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


avg_z =

    8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


avg_Freq_Pos =

  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000

80 percent chance is that the input is from:    'Sitdown_chair_MODEL'
```

Test Passed

Test 11 (Standup Chair-Male)

```
trial = 'Standup_chair\Accelerometer-2011-12-11-08-23-15-standup_chair-m2.txt';
TestInput( trial );

xmean =

  -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


zmean =

   8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


meanfreq =

  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000


avg_x =

  -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


avg_z =

   8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226
```

avg_Freq_Pos =

182.1333	86.0000	85.0000	77.6667	131.0000	135.8000	126.0000
182.6667	86.0000	85.0000	78.0000	130.6667	135.7333	126.0000
183.0000	85.0000	84.9333	78.0000	131.0000	136.0000	126.0000

80 percent chance is that the input is from: 'Standup_chair_MODEL'

Test Passed

Test 12 (Standup Chair-Female)

trial = 'Standup_chair\Accelerometer-2012-05-25-18-33-08-standup_chair-f4.txt';

>> TestInput(trial);

xmean =

-1.0965	-8.7950	-6.8632	-2.4390	-4.8412	2.7849	-9.1181

zmean =

8.1258	0.4908	3.3771	6.9289	4.4689	8.1042	1.0226

meanfreq =

182.1333	86.0000	85.0000	77.6667	131.0000	135.8000	126.0000
182.6667	86.0000	85.0000	78.0000	130.6667	135.7333	126.0000
183.0000	85.0000	84.9333	78.0000	131.0000	136.0000	126.0000

avg_x =

-1.0965	-8.7950	-6.8632	-2.4390	-4.8412	2.7849	-9.1181

avg_z =

8.1258	0.4908	3.3771	6.9289	4.4689	8.1042	1.0226

avg_Freq_Pos =

182.1333	86.0000	85.0000	77.6667	131.0000	135.8000	126.0000
182.6667	86.0000	85.0000	78.0000	130.6667	135.7333	126.0000
183.0000	85.0000	84.9333	78.0000	131.0000	136.0000	126.0000

60 percent chance is that the input is from: 'Standup_chair_MODEL'

Test Passed

Test 13 (Walk-Male)

```
>> trial = 'Walk\Accelerometer-2012-05-30-22-03-52-walk-m2.txt';
TestInput( trial );

xmean =

  -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


zmean =

   8.1258    0.4908    3.3771    6.9289    4.4689    8.1042    1.0226


meanfreq =

  182.1333   86.0000   85.0000   77.6667  131.0000  135.8000  126.0000
  182.6667   86.0000   85.0000   78.0000  130.6667  135.7333  126.0000
  183.0000   85.0000   84.9333   78.0000  131.0000  136.0000  126.0000


avg_x =

  -1.0965   -8.7950   -6.8632   -2.4390   -4.8412    2.7849   -9.1181


avg_z =
```

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

avg_Freq_Pos =

182.1333 86.0000 85.0000 77.6667 131.0000 135.8000 126.0000
182.6667 86.0000 85.0000 78.0000 130.6667 135.7333 126.0000
183.0000 85.0000 84.9333 78.0000 131.0000 136.0000 126.0000

60 percent chance is that the input is from: 'Walk_MODEL'

Test Passed

Test 14 (Walk-Female)

>> trial = 'Walk\Accelerometer-2011-03-24-09-51-07-walk-f1.txt';
>> TestInput(trial);

xmean =

-1.0965 -8.7950 -6.8632 -2.4390 -4.8412 2.7849 -9.1181

zmean =

8.1258 0.4908 3.3771 6.9289 4.4689 8.1042 1.0226

meanfreq =

182.1333	86.0000	85.0000	77.6667	131.0000	135.8000	126.0000
182.6667	86.0000	85.0000	78.0000	130.6667	135.7333	126.0000
183.0000	85.0000	84.9333	78.0000	131.0000	136.0000	126.0000

avg_x =

-1.0965	-8.7950	-6.8632	-2.4390	-4.8412	2.7849	-9.1181

avg_z =

8.1258	0.4908	3.3771	6.9289	4.4689	8.1042	1.0226

avg_Freq_Pos =

182.1333	86.0000	85.0000	77.6667	131.0000	135.8000	126.0000
182.6667	86.0000	85.0000	78.0000	130.6667	135.7333	126.0000
183.0000	85.0000	84.9333	78.0000	131.0000	136.0000	126.0000

60 percent chance is that the input is from: 'Pour Water'

Test Failed