

Daily Tracker

Smartphone Computing Term Project (Autumn, 2017)

Group

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1. Problem Statement

Monitoring
daily activity
routine
to know your
**HEALTH
STATUS**



2. Motivation

Analysis of human daily activities is an important method for **physical as well as mental health status monitoring and disease prevention**



3. Road Map

Data Acquisition

- Gathering of Accelerator sensor data
- Integration of Google Activity Recognition API

Suggesting Tips

You've not run much today !

Data Pre-processing

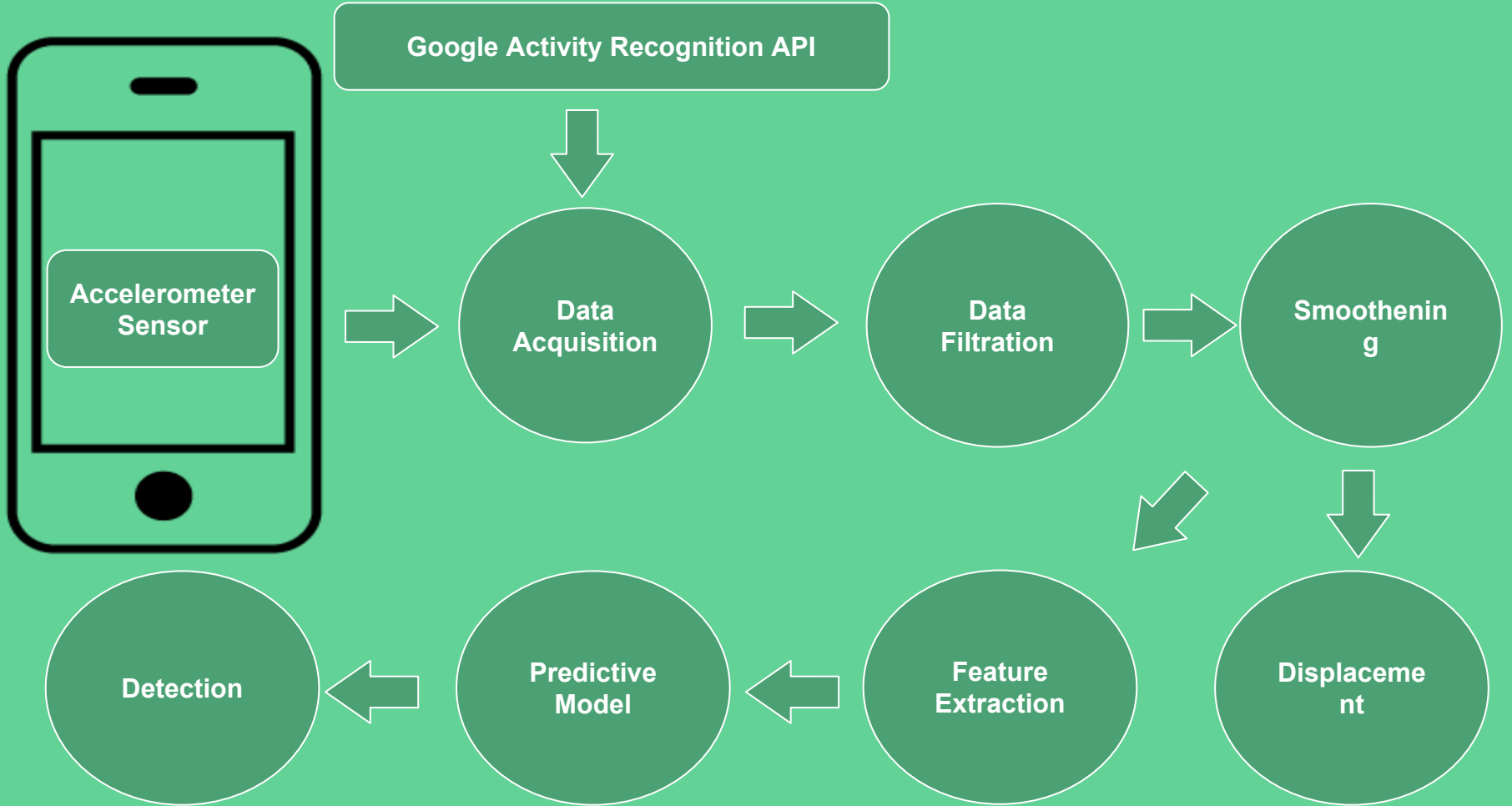
- Filtration of the huge dataset
- Smoothing
- Displacement Measurement

Detection of Health / Mental Status

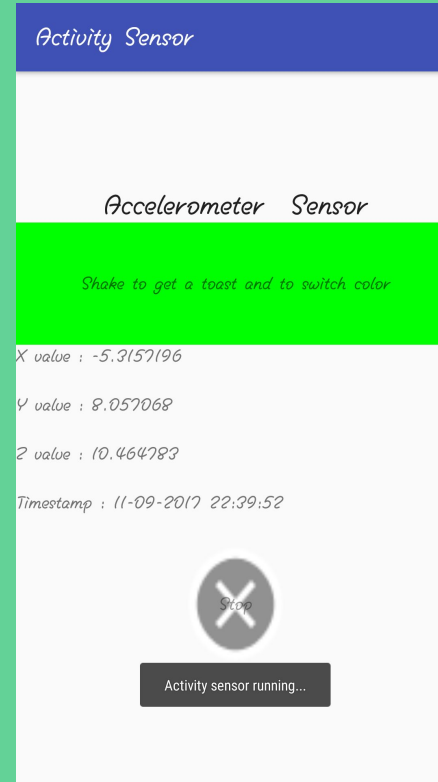
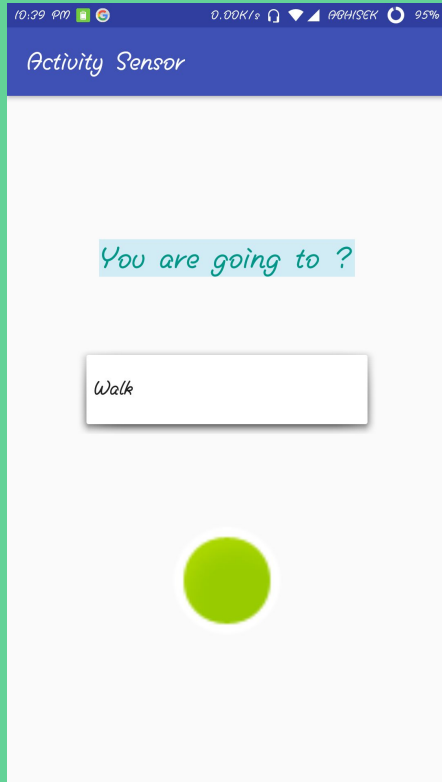
- Feature Extraction
- Classification using SVM
- Activity Detection



4. Framework



Data Acquisition



Data Filtration and Smoothing

ALGO FILTER

```
for each tuple tp( $x_i$ ,  $y_i$ ,  $z_i$ ,  $t_i$ ,  $l_i$ )  
     $acc_{th} = 2$   
    calculate acceleration =  $\sqrt{(x_i^{**2} + y_i^{**2} + z_i^{**2})}$   
    if (acceleration >  $acc_{th}$ )  
        filter_tp(i) <- tp( $x_i$ ,  $y_i$ ,  $z_i$ ,  $t_i$ ,  $l_i$ )
```

ALGO SMOOTHING

```
for every min( $t_i$ ) in each tuple filter_tp( $x_i$ ,  $y_i$ ,  $z_i$ ,  $t_i$ ,  $l_i$ )  
    calculate mean(x), mean(y), mean(z)  
    for every min in  $t_i$   
        smooth_tp( $x_i$ ,  $y_i$ ,  $z_i$ , min( $t_i$ ),  $l_i$ ) <- filter_tp(mean(x), mean(y), mean(z),  $t_i$ ,  $l_i$ )
```

Displacement Measurement

$$\text{Displacement} = \iint_0^t \text{acceleration}$$

ALGO DISPLACEMENT

```
for each tuple smooth_tp(xi, yi, zi, min(ti), li)  
  init u <- 0 , t <- 60  
  acceleration <-  $\sqrt{x_i^{**2} + y_i^{**2} + z_i^{**2}}$   
  displacement <-  $\iint_0^t \text{acceleration}$ 
```

	A	B	C	D	E
1	x-value	y-value	z-value	timestamp	travel_mc
2	5.568634	29.42409	-0.97112	7/9/2017 10:01	Biking
3	-1.76418	13.06555	4.343353	7/9/2017 10:01	Biking
4	1.101227	20.59097	-0.4758	7/9/2017 10:01	Biking
5	-0.70773	14.25478	3.088318	7/9/2017 10:02	Biking
6	0.465942	15.17841	0.872559	7/9/2017 10:02	Biking
7	0.465942	15.17841	-0.04628	7/9/2017 10:02	Biking
8	1.383591	18.30225	0.081726	7/9/2017 10:02	Biking
9	0.6801	13.8468	0.958694	7/9/2017 10:02	Biking
10	-0.59767	15.0827	3.545334	7/9/2017 10:02	Biking
11	1.004318	13.90782	0.123611	7/9/2017 10:02	Biking
12	0.053177	16.12238	0.896484	7/9/2017 10:02	Biking
13	-0.89796	13.82646	1.439652	7/9/2017 10:02	Biking
14	1.632446	16.78639	-0.54997	7/9/2017 10:02	Biking
15	1.766434	14.19377	-0.07858	7/9/2017 10:02	Biking
16	-3.96916	-15.8433	-0.89334	7/9/2017 10:03	Biking
17	-2.41142	-15.6304	-2.96793	7/9/2017 10:03	Biking
18	-1.30116	-13.6934	-4.13802	7/9/2017 10:03	Biking
19	1.393158	-15.9414	-2.99304	7/9/2017 10:03	Biking

Data Acquisition

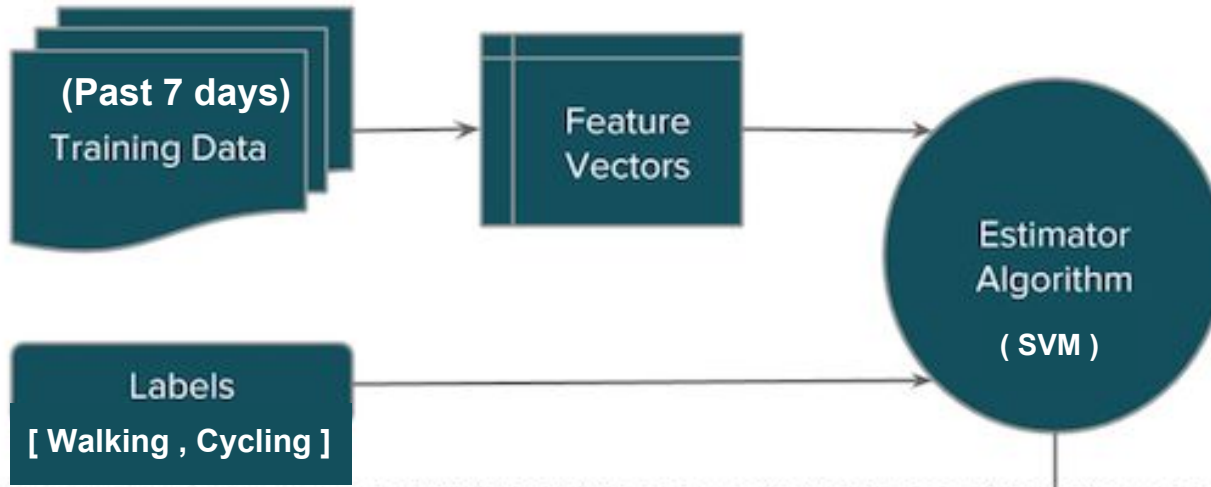
	A	B	C	D	E	
1	x-value	y-value	z-value	timestamp	travel_mode	
2	7.090394	-5.9873	13.54592	7/9/2017 9:57	Biking	
3	10.4464	8.637634	13.58801	7/9/2017 9:58	Biking	
4	3.419159	10.77203	9.686996	7/9/2017 9:59	Biking	
5	0.613098	15.05638	-0.32445	7/9/2017 10:01	Biking	
6	0.875107	14.69507	0.36528	7/9/2017 10:02	Biking	
7	0.856689	17.07473	1.52843	7/9/2017 10:03	Biking	
8	0.951088	16.02367	1.382828	7/9/2017 10:04	Biking	
9	-0.41791	15.21311	2.11832	7/9/2017 10:05	Biking	
10	1.869092	21.68641	1.739478	7/9/2017 10:06	Biking	
11	-0.33147	16.82826	1.933777	7/9/2017 10:07	Biking	
12	0.384927	15.10731	1.231995	7/9/2017 10:08	Biking	
13	0.053177	16.12238	0.896484	7/9/2017 10:09	Biking	
14	0.833639	14.93554	0.270365	7/9/2017 10:10	Biking	
15	-0.92378	-15.0781	-0.88617	7/9/2017 10:11	Walk	
16	-3.93853	-13.759	-0.01303	7/9/2017 10:12	Walk	
17	-2.69458	-13.9913	0.371262	7/9/2017 10:13	Walk	
18	-4.55779	-14.5875	0.776047	7/9/2017 10:14	Walk	
19	-2.45689	-20.7076	0.930671	7/9/2017 10:15	Walk	

Filtration and Smoothing

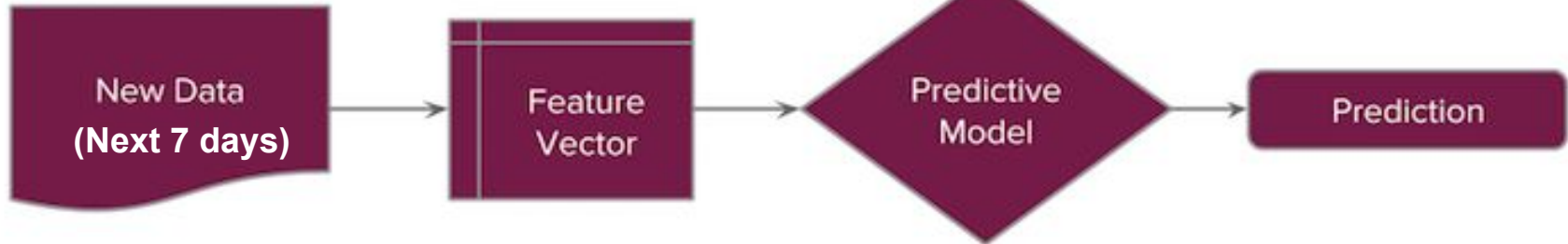
	A	B	C	D	E	F
1	x-value	y-value	z-value	timestamp	travel_mode	disp(m)
2	7.090394	-5.9873	13.54592	7/9/2017 9:57	Biking	280.21
3	10.4464	8.637634	13.58801	7/9/2017 9:58	Biking	291.5965
4	3.419159	10.77203	9.686996	7/9/2017 9:59	Biking	310.4425
5	0.613098	15.05638	-0.32445	7/9/2017 10:01	Biking	322.5362
6	0.875107	14.69507	0.36528	7/9/2017 10:02	Biking	313.3628
7	0.856689	17.07473	1.52843	7/9/2017 10:03	Biking	355.5822
8	0.951088	16.02367	1.382828	7/9/2017 10:04	Biking	341.0557
9	-0.41791	15.21311	2.11832	7/9/2017 10:05	Biking	352.6828
10	1.869092	21.68641	1.739478	7/9/2017 10:06	Biking	332.9181
11	-0.33147	16.82826	1.933777	7/9/2017 10:07	Biking	327.4711
12	0.384927	15.10731	1.231995	7/9/2017 10:08	Biking	319.5812
13	0.053177	16.12238	0.896484	7/9/2017 10:09	Biking	288.0737
14	0.833639	14.93554	0.270365	7/9/2017 10:10	Biking	210.4806
15	-0.92378	-15.0781	-0.88617	7/9/2017 10:11	Walk	30.56619
16	-3.93853	-13.759	-0.01303	7/9/2017 10:12	Walk	31.15578
17	-2.69458	-13.9913	0.371262	7/9/2017 10:13	Walk	27.12662
18	-4.55779	-14.5875	0.776047	7/9/2017 10:14	Walk	25.65132
19	-2.45689	-20.7076	0.930671	7/9/2017 10:15	Walk	29.4368

Displacement

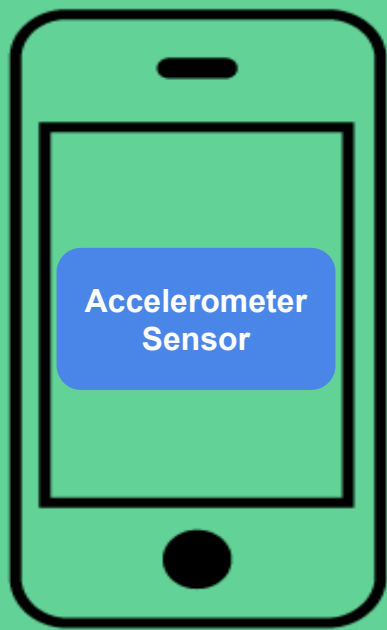
Build Phase



Operational Phase



5. Progress Made



Google Activity Recognition API



Data Acquisition



Data Filtration



Smoothing



Displacement

Feature Extraction



Predictive Model



Detection

6. Related Works

7. Contribution

8. Remaining Task

- Use of SVM for classification
- And End to End system for monitoring of physical and mental health status.



Thank You !

