Daily Tracker

Smartphone Computing Term Project (Autumn, 2017)

Group

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Mentor

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1. Problem Statement

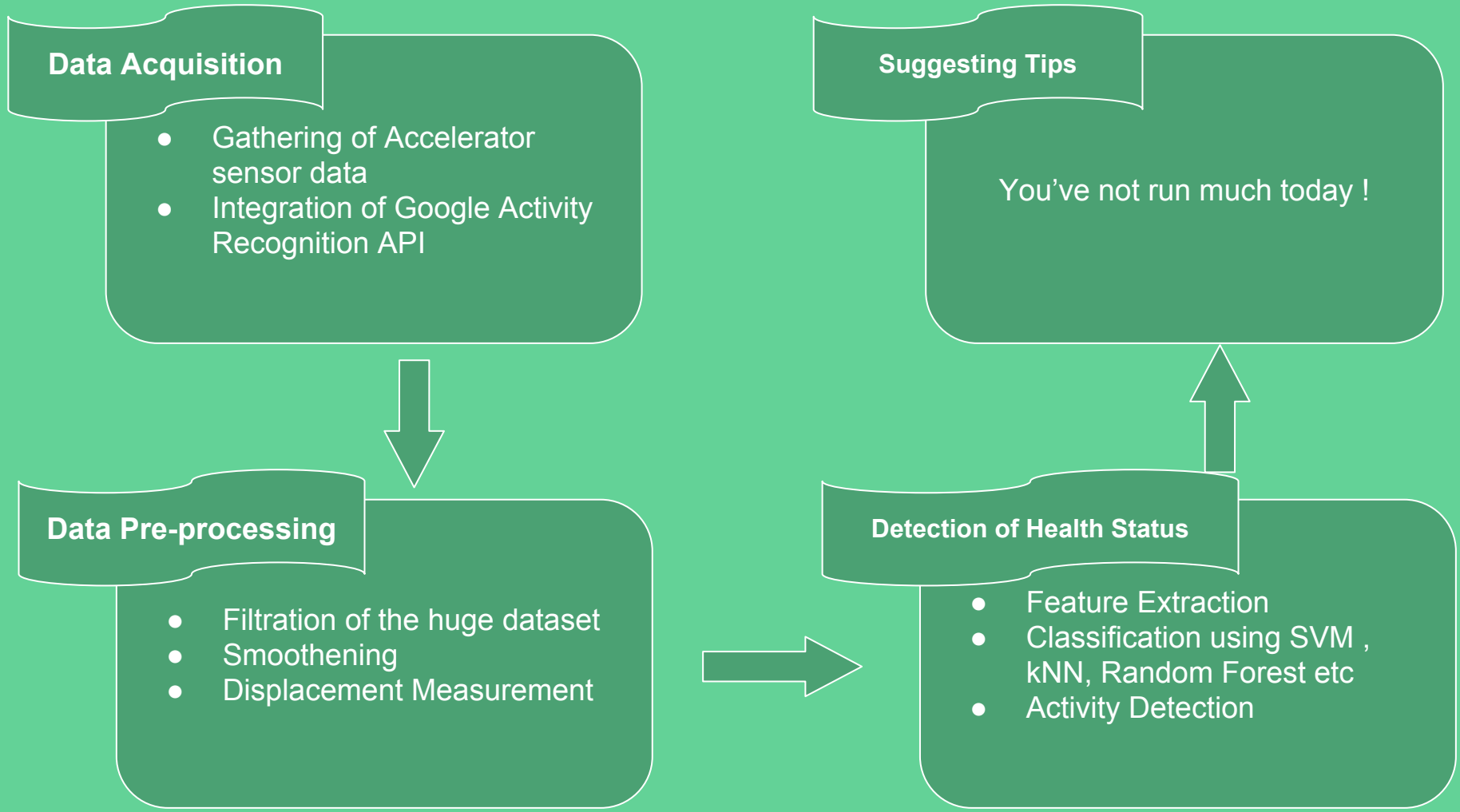
Monitoring daily activity routine to know your

HEALTH STATUS

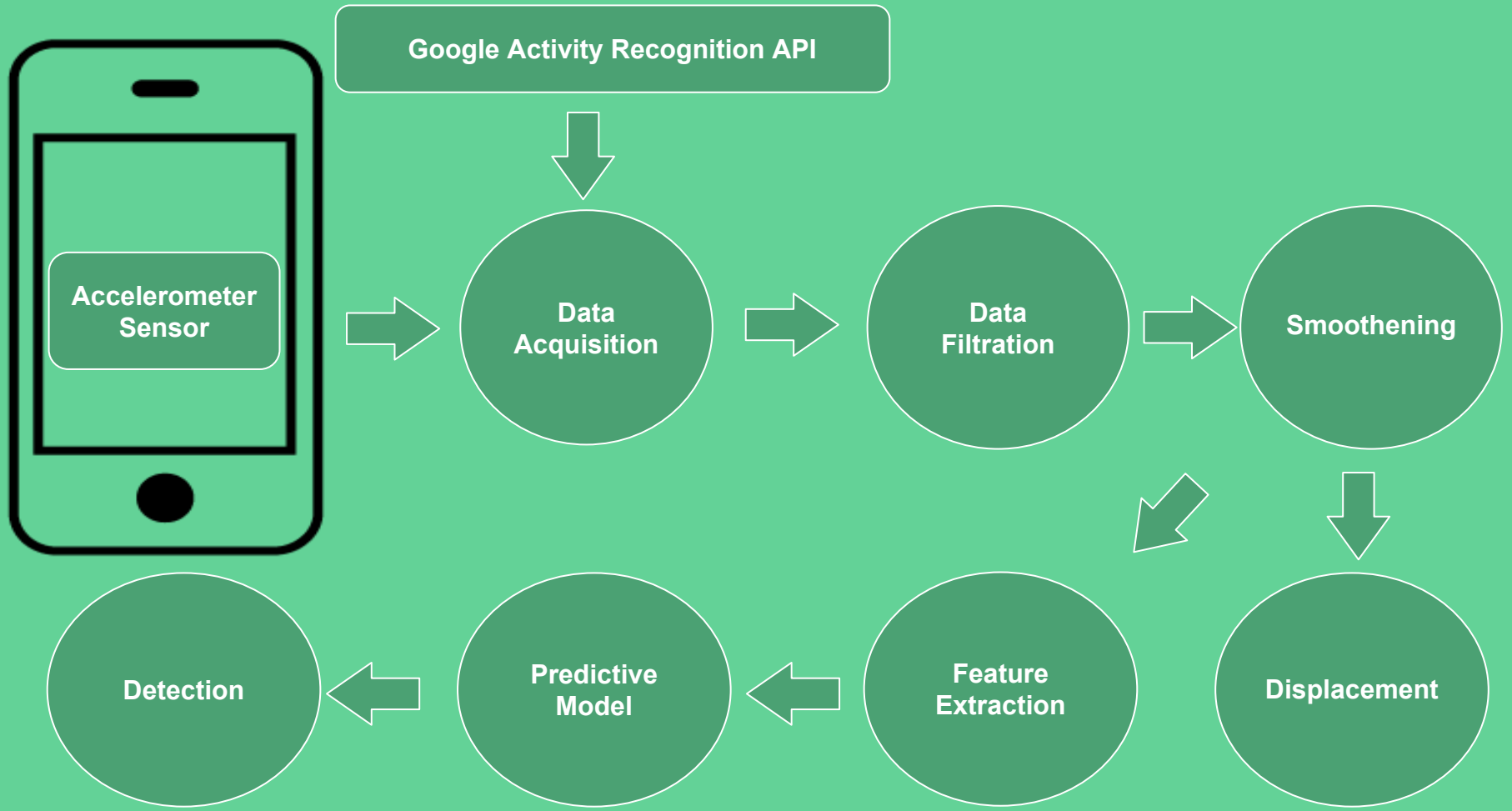
2. Motivation

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

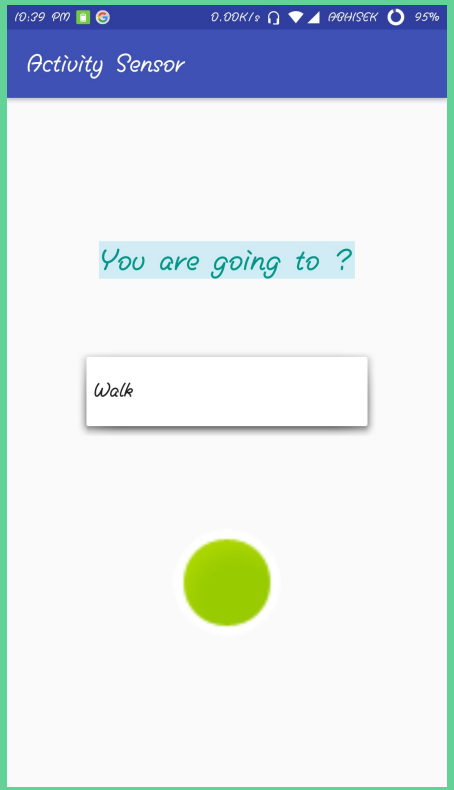
3. Road Map

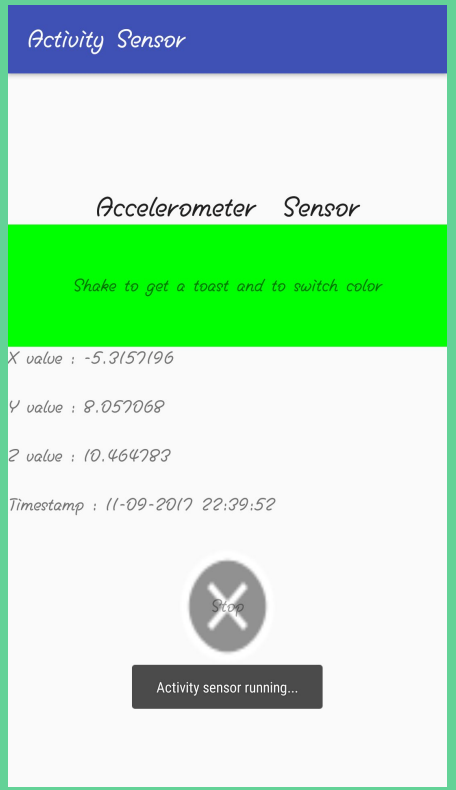

Data Acquisition
Gathering of Accelerator sensor data
Integration of Google Activity Recognition API
Suggesting Tips
You've not run much today !
Data Pre-processing
Filtration of the huge dataset
Smoothening
Displacement Measurement
Detection of Health Status
Feature Extraction
Classification using SVM , kNN, Random Forest etc
Activity Detection

4. Framework


Google Activity Recognition API
Accelerometer Sensor
Data Acquisition
Data Filtration
Smoothening
Displacement
Feature Extraction
Predictive Model
Detection

Data Acquisition





Data Filtration and Smoothening

ALGO FILTRATION

for each tuple $tp(x_i, y_i, z_i, t_i, l_i)$

threshold$_{acc} \leftarrow 2$

acceleration $\leftarrow \sqrt{ (x_i^2 + y_i^2 + z_i^2)}$

if (acceleration > threshold$_{acc}$)

$filter\_tp(x_i, y_i, z_i, t_i, l_i) \leftarrow tp(x_i, y_i, z_i, t_i, l_i)$

ALGO SMOOTHENING

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

$smooth\_tp(x_i, y_i, z_i, min(t_i), l_i) \leftarrow filter\_tp(mean(x), mean(y), mean(z), t_i, l_i)$

	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
	0.465942	15.17841	0.872559	7/9/2017 10:02	Biking
	0.465942	15.17841	-0.04628	7/9/2017 10:02	Biking
	1.383591	18.30225	0.081726	7/9/2017 10:02	Biking
	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	-3.90910	-15.8455	-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
	0.875107	14.69507	0.36528	7/9/2017 10:02	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 Smoothening

Displacement Measurement

$$\text{displacement} = \iint_0^T \text{acceleration}$$

ALGO DISPLACEMENT

for each tuple smooth_tp(x_i, y_i, z_i, min(t_i), l_i)

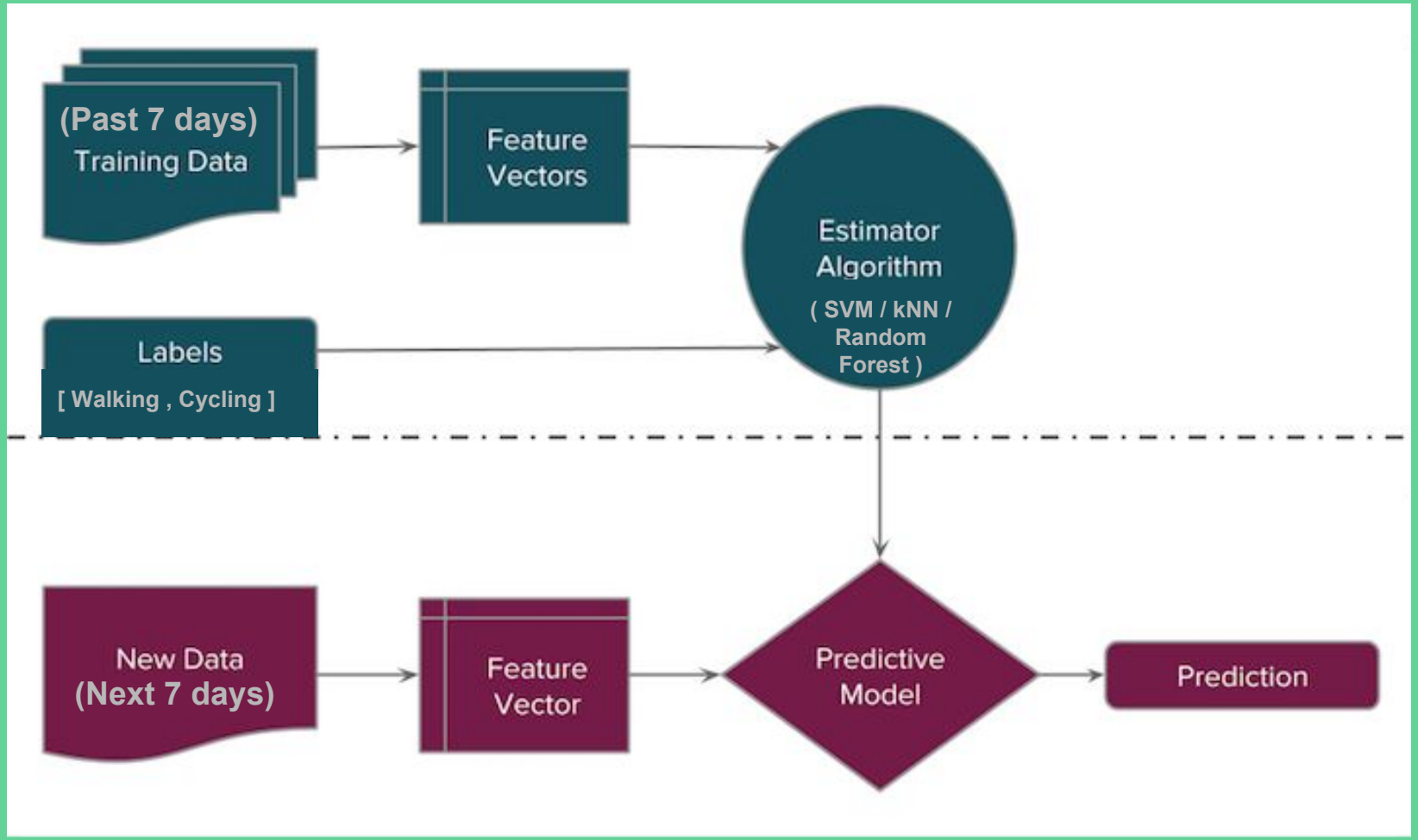
init t ← 60

$\text{acceleration}_i \leftarrow \sqrt{(x_i^2 + y_i^2 + z_i^2)}$

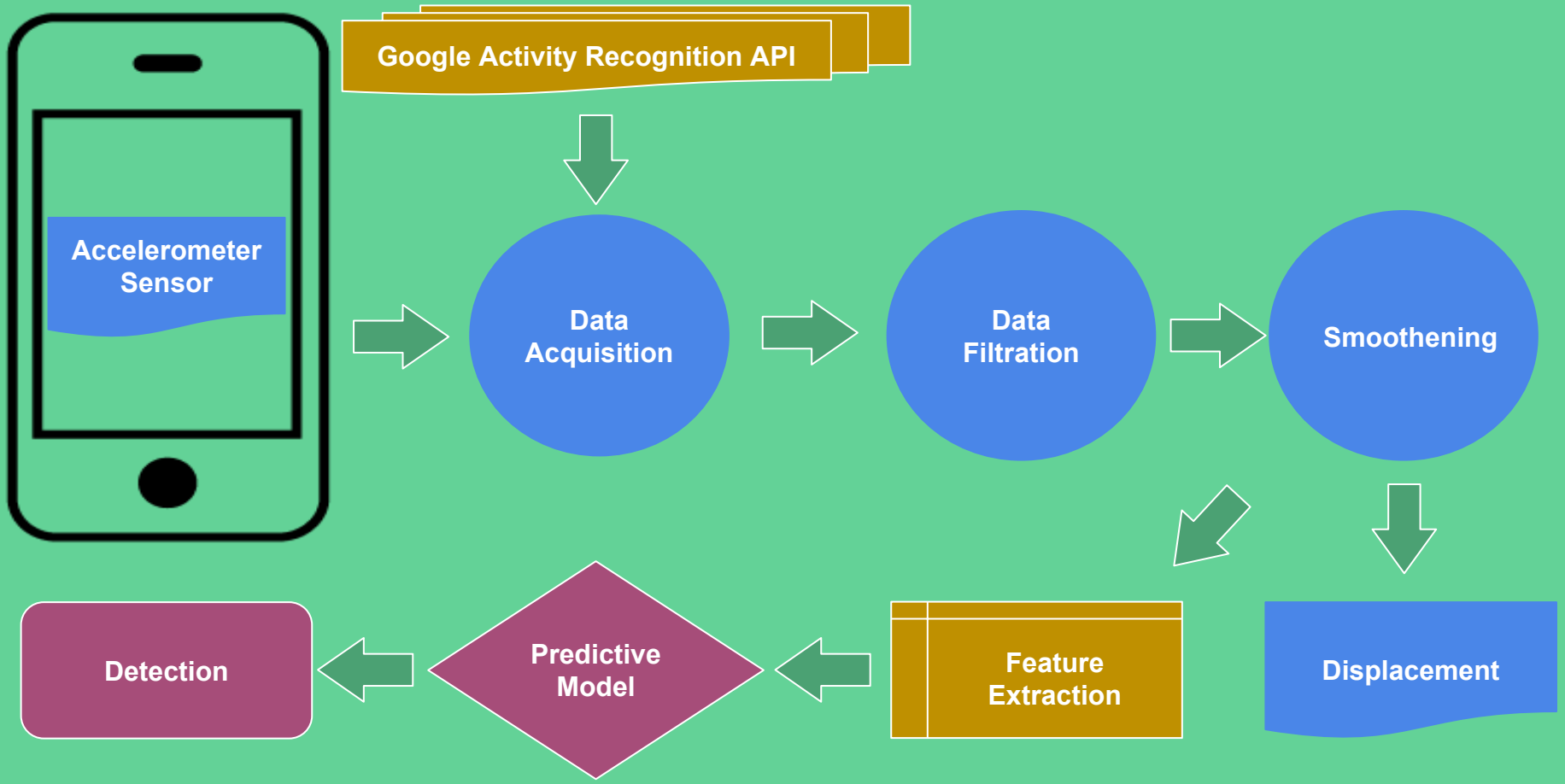
$\text{displacement}_i \leftarrow \iint_0^t \text{acceleration}_i$

	A	B	C	D	E	F
1	x-value	y-value	z-value	timestamp	travel_mc	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


(Past 7 days)
Training Data
Feature
Vectors
Estimator
Algorithm
(SVM / kNN /
Random
Forest)
Labels
[Walking , Cycling]
New Data
(Next 7 days)
Feature
Vector
Predictive
Model
Prediction

5. Progress Made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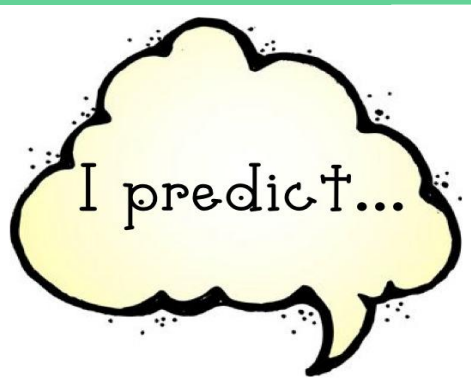
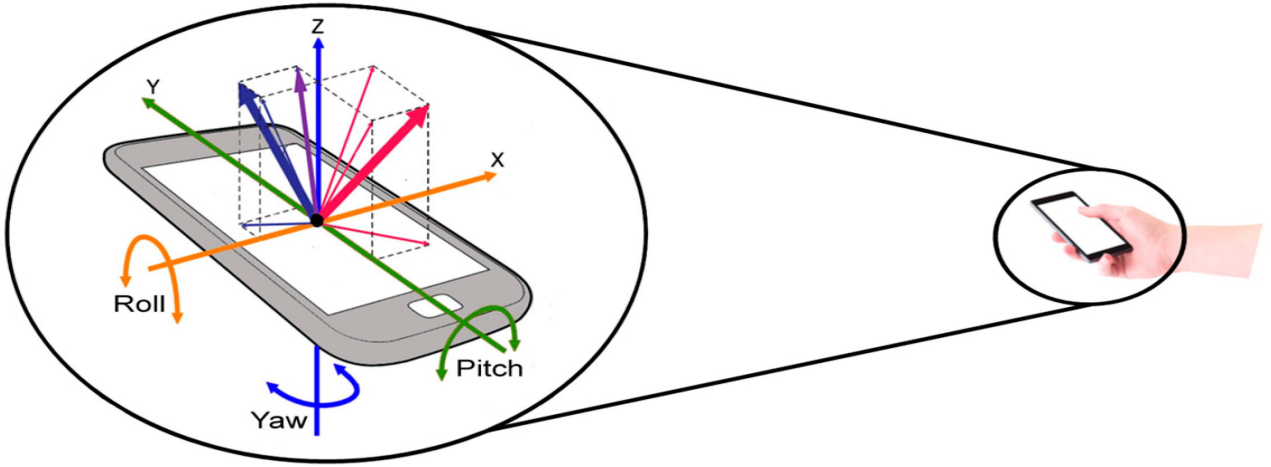
6. Remaining Task



A recommendation system for monitoring and detection of physical and mental health status



Thank You !