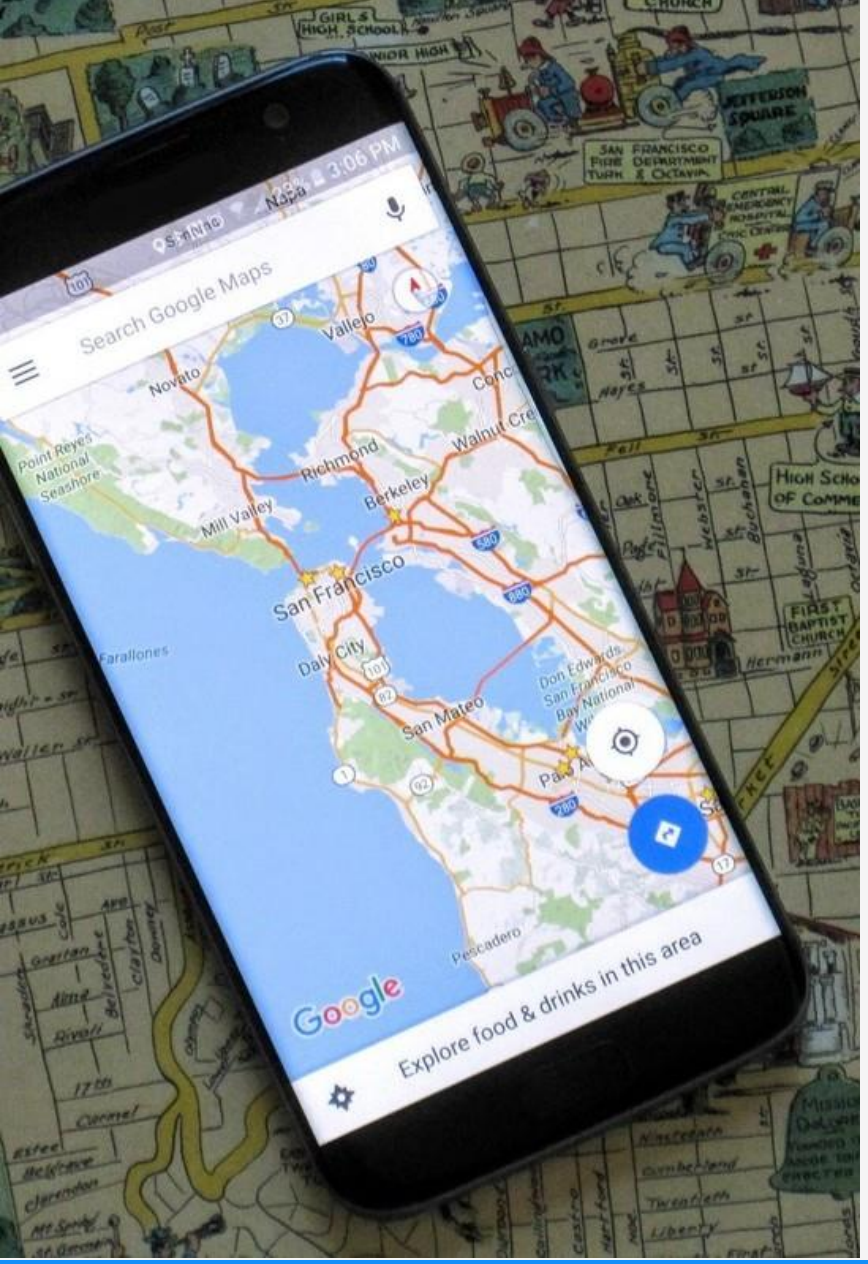


MIU
MISR INTERNATIONAL UNIVERSITY

Amelio-rater

Detection of Driving Abnormal Behavior for Automated Ratings and Real Time Monitoring

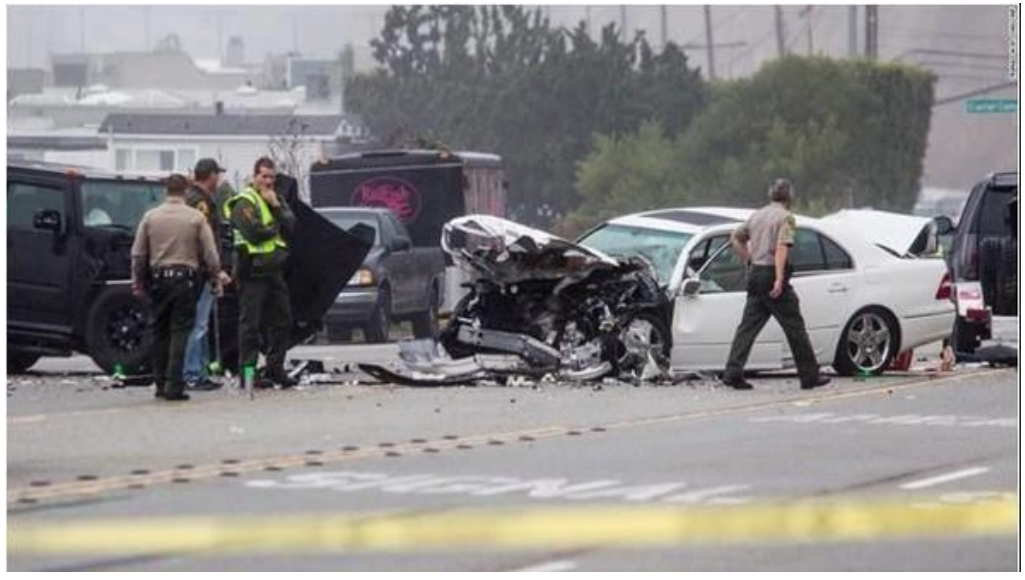
By Mariam El Ashram, Noha AlMasry, and Passant El-Dorry
(Computer Science Senior Students)

Supervised by **Dr. Ayman Ezzat** and Eng. Huda ElTouny

OCTOBER 18, 2016

Introduction

- Road traffic injuries are a leading cause of **preventable** death. [1]
- **In Egypt:**
- More than 12 000 **fatalities** each year from road traffic crashes. [2]



[1] Global Status Report on Road Safety by who 2015
[2] ROAD SAFETY IN TEN COUNTRIES by who 2013

Introduction - Abnormal Behavior

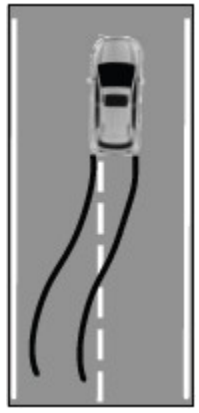
- Most traffic accidents are caused by human factors such as driving behavior[3]

Driving abnormal behavior varies in type

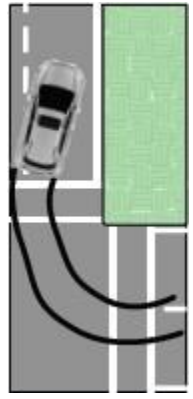
Sudden Braking

Fast UTurn

Weaving



Changing Lanes



Turn with Wide Radius

[3]Zhongyang Chen et al. “D 3: Abnormal driving behaviors detection and identification using smartphone sensors”. In: Sensing, Communication, and Networking (SECON), 2015 12th Annual IEEE International Conference on. IEEE. 2015, pp. 524–532.

Related Work 1: MyDrive: Drive Behavior Analytics Method and Platform

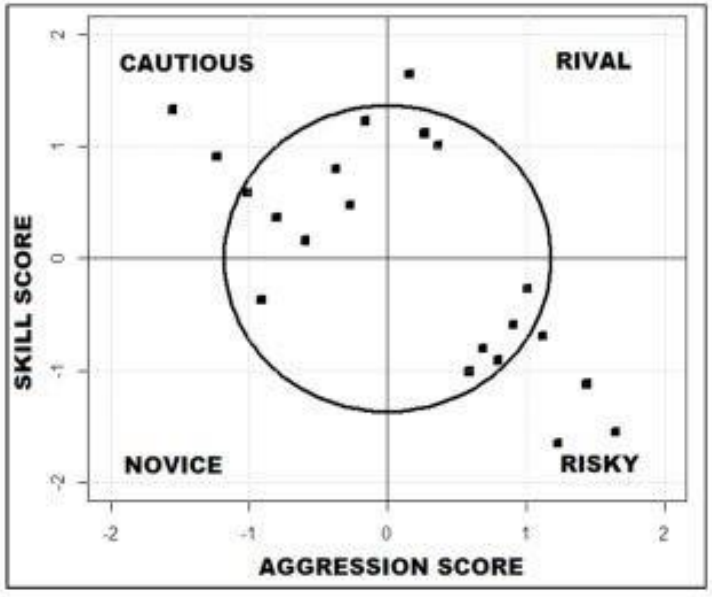


Figure 5: Skill-Aggression Plane

- Proposed and used the algorithm SAQ.
- Worked on acceleration and deceleration.

Tanushree Banerjee, Arijit Chowdhury, and Tapas Chakravarty. \My Drive: Drive Behavior Analytics Method And Platform". In: Proceedings of the 3rd International on Workshop on Physical Analytics. ACM. 2016,pp. 712.

Related work 2: D3: Abnormal Driving Behaviours Detection and Identification Using Smartphone Sensors

TABLE III: Accuracy evaluation

Behavior	Accuracy(%)	Precision(%)	Recall(%)	FPR(%)
Normal	99.84	98.80	100.00	0.19
Abnormal	94.81	100.00	99.80	0.00
Weaving	98.43	92.55	87.87	0.63
Swerving	97.94	92.29	94.15	1.39
Sideslipping	98.60	87.96	71.43	0.37
Fast U-turn	98.49	85.71	76.00	0.54
Turning with a wide radius	98.68	89.30	92.72	0.86
Sudden braking	95.74	97.88	99.04	1.93

- The identification of those behaviors was not so precious.

Zhongyang Chen et al. \D 3: Abnormal driving behaviors detection and identification using smartphone sensors". In: Sensing, Communication,and Networking (SECON), 2015 12th Annual IEEE International Conference on. IEEE. 2015, pp. 524{532.

Market Motivation 1/2

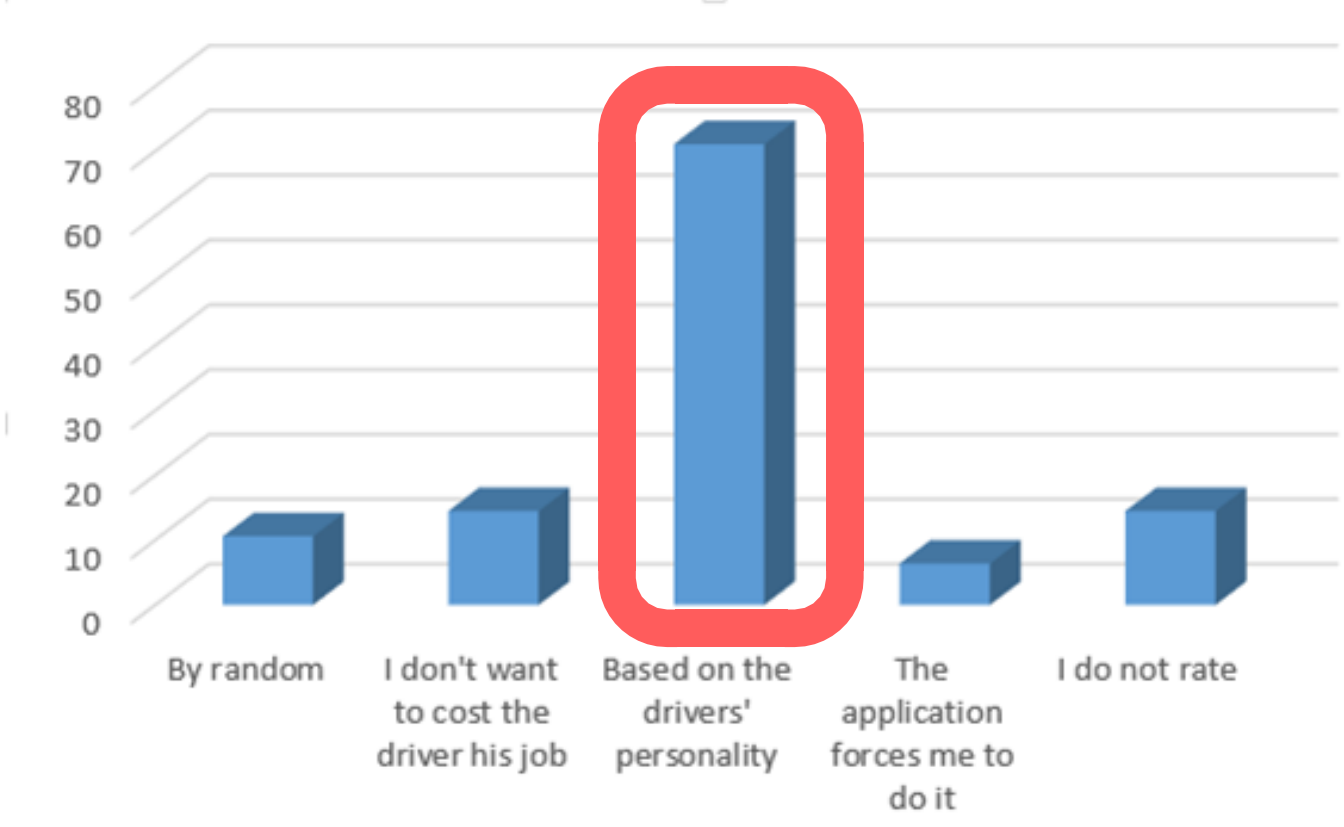
The market motivation has arised according to the conducted results from the survey we have done. The survey has been filled by **235** persons.

Results:

- 119 Males & 116 Females.
- **83.8%** has reported that they use private taxi companies

Survey Question

- **If you do rate, On what basis do you rate the driver?**



Market Motivation 2/2

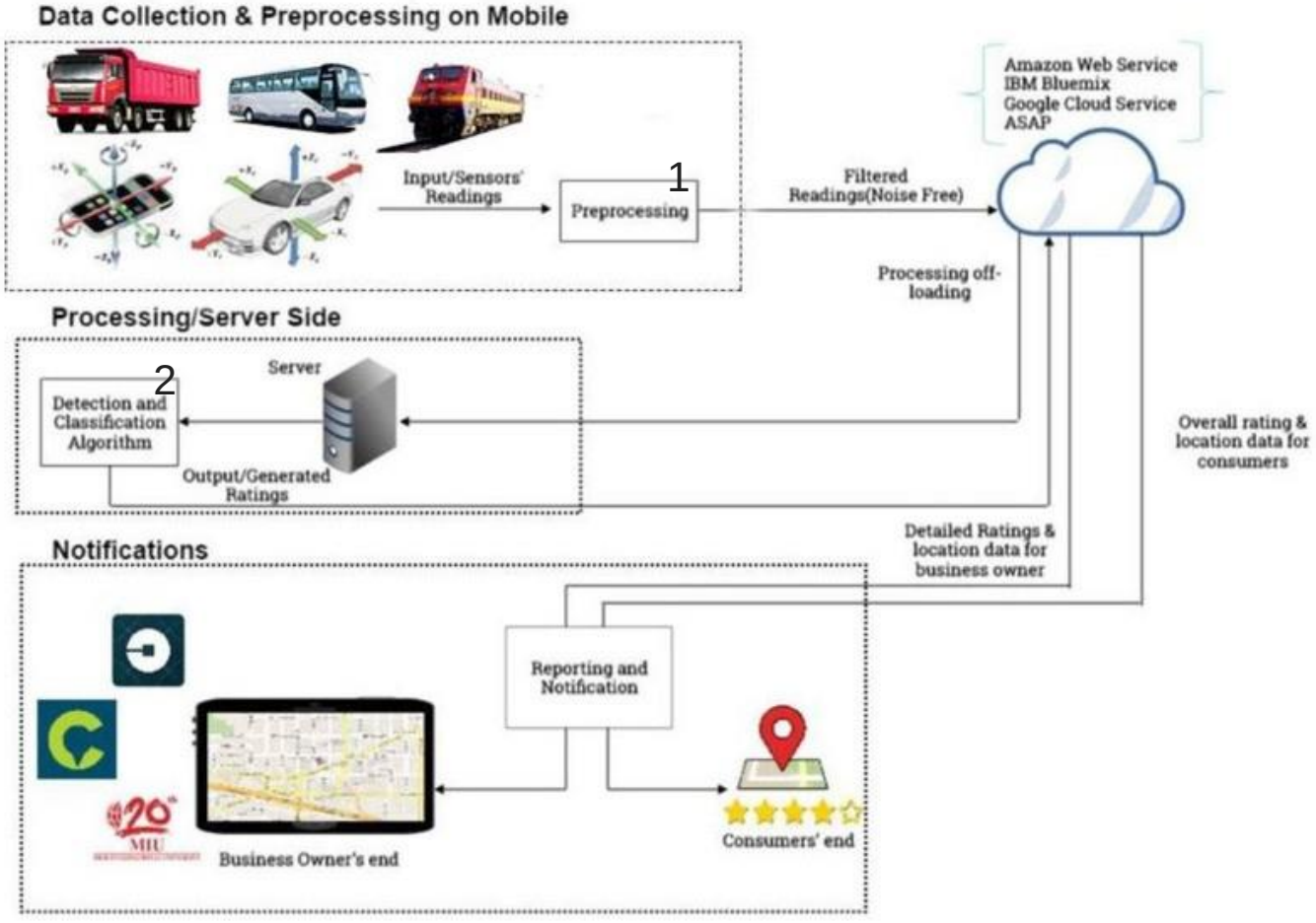
Problem Statmenent

Detection and IMPROVEMENT OF CLASSIFICATION ACCURACY of Driving Abnormal Behaviors and Road Conditions to AUTOMATICALLY Generate RATINGS in REAL-TIME.

Table of Comparisons

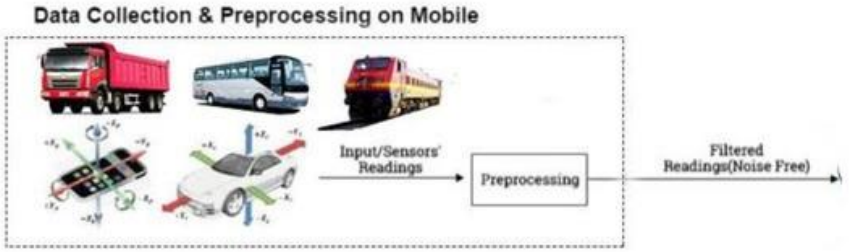
Points of Comparison	Algorithm Used	Accuracy Achieved (%)	Gesture Types	Smart Phone Orientation	Real Time	Training Samples
D3	SVM	95.36	6 driving patterns	Horizontal	Online	Up to 4029
MyDrive	Skill-Aggression Quantifier(SAQ)	Not Mentioned	Velocity only	-	Offline	-
A Comparative Study for Accelerometer Based Gesture Recognition Algorithm	KNN,DTW	99.7,99.8	Human Gestures	Horizontal	Offline	At least 1
Our Proposed System	**KNN+DTW**	-	**Driving Behaviors + Road Condition**	-	**Online**	**At least 1**

System Overview



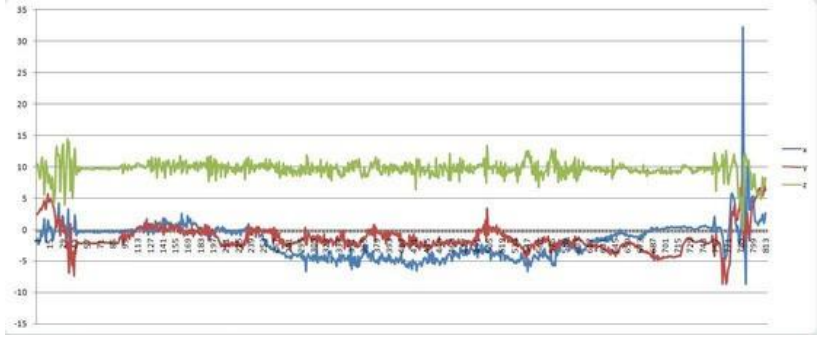
[1] Low Pass Filter
[2]DTW and KNN

System Overview- Preprocessing

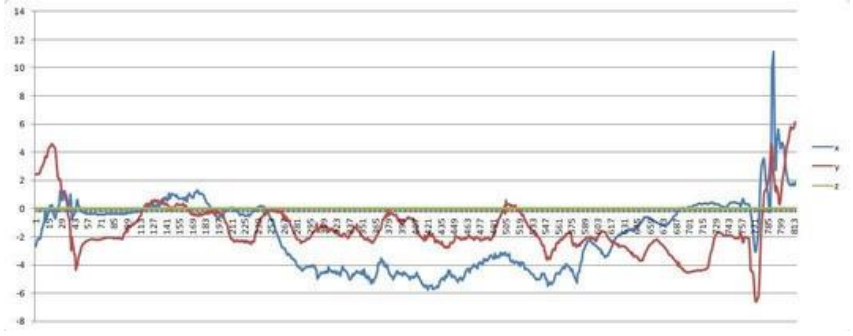


- Takes place on the mobile.
- Uses low pass filter.

Before

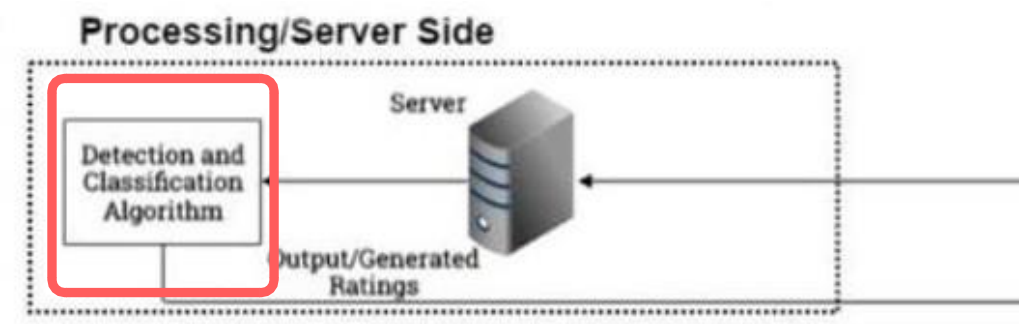


After



Aya Hamdy Ali, Ayman Atia, and Mostafa Sami. “A comparative study of user dependent and independent accelerometerbased gesture recognition algorithms”. In: International Conference on Distributed, Ambient, and Pervasive Interactions. Springer. 2014, pp. 119–129.

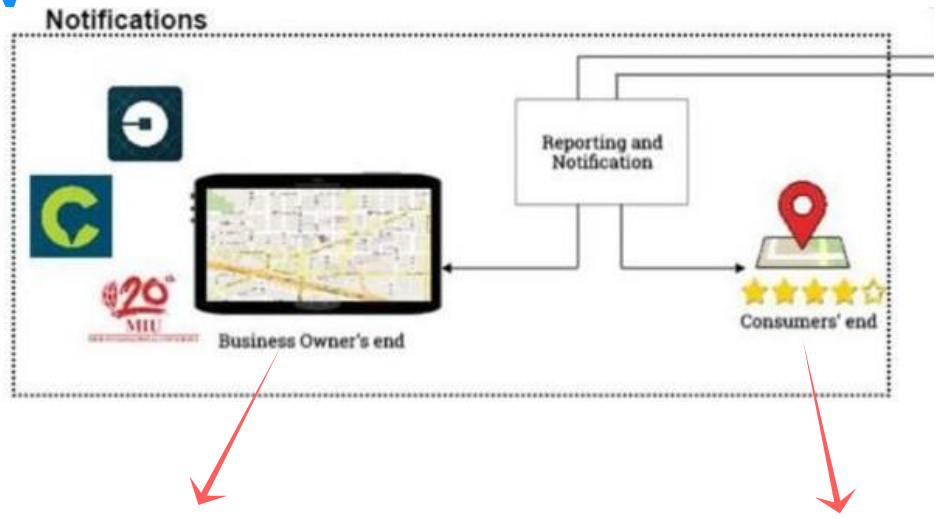
System Overview - Classification



- Uses KNN and DTW algorithms.
- Generated Ratings are stored for further use.
- Driving Behavior Stored then analysed and ratings are generated.

Aya Hamdy Ali, Ayman Atia, and Mostafa Sami. “A comparative study of user dependent and independent accelerometerbased gesture recognition algorithms”. In: International Conference on Distributed, Ambient, and Pervasive Interactions. Springer. 2014, pp. 119–129.

System Overview - Feedback



For Example: MIU Bus Department

For Example: MIU Students

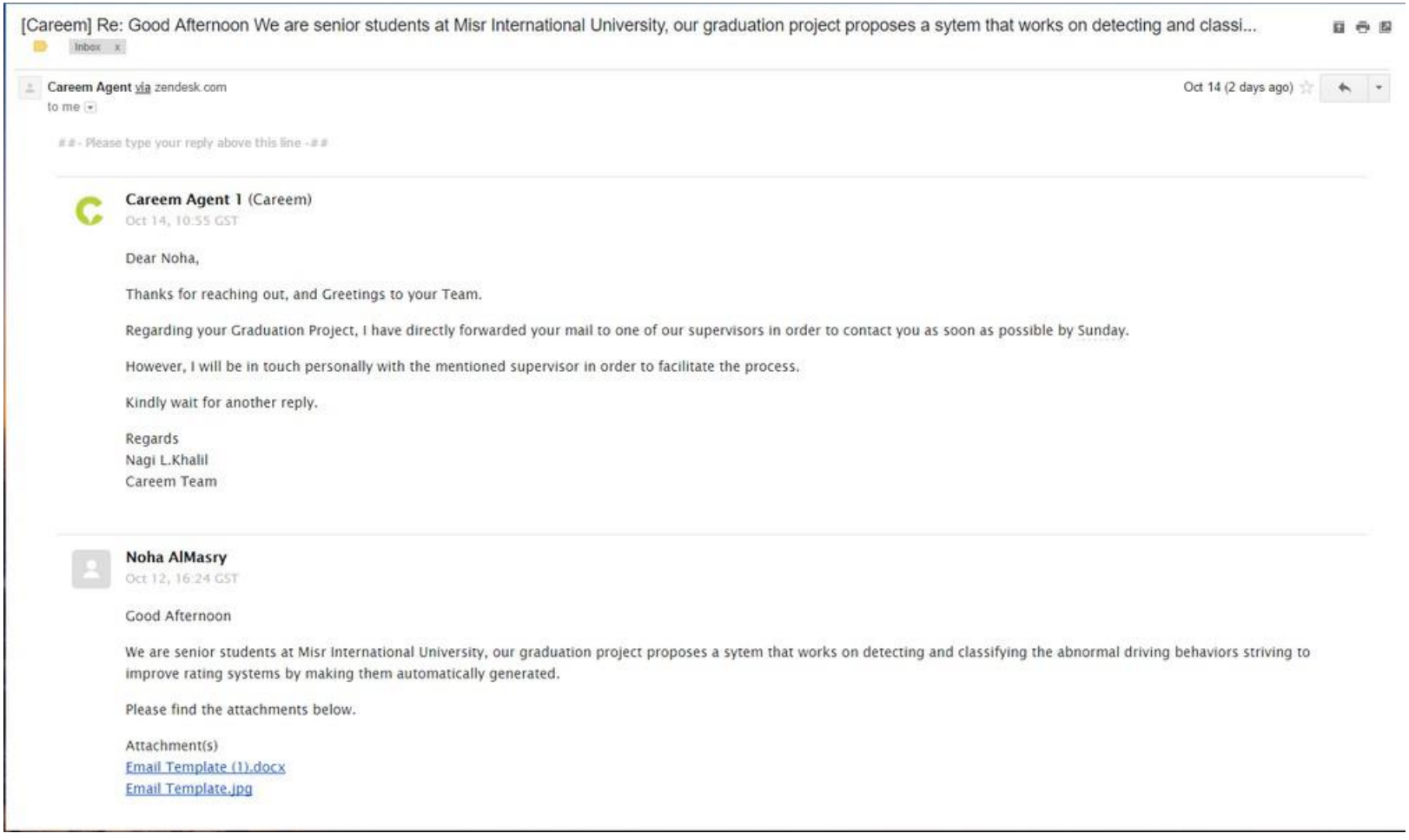
- The Types of Users: Business Owners and Consumers.
- Each type of user retrieves data in a different manner.

Expected Results

- A real time monitoring system.
- Improving detection and classification accuracy.
- Automatically generated ratings.

Supportive Documents 1/2

CAREEM



[Careem] Re: Good Afternoon We are senior students at Misr International University, our graduation project proposes a sytem that works on detecting and classi...

Inbox x

Careem Agent via zendesk.com
to me

Oct 14 (2 days ago)

- Please type your reply above this line -##

Careem Agent 1 (Careem)
Oct 14, 10:55 GST

Dear Noha,

Thanks for reaching out, and Greetings to your Team.

Regarding your Graduation Project, I have directly forwarded your mail to one of our supervisors in order to contact you as soon as possible by Sunday.

However, I will be in touch personally with the mentioned supervisor in order to facilitate the process.

Kindly wait for another reply.

Regards
Nagi L.Khalil
Careem Team

Noha AlMasry
Oct 12, 16:24 GST

Good Afternoon

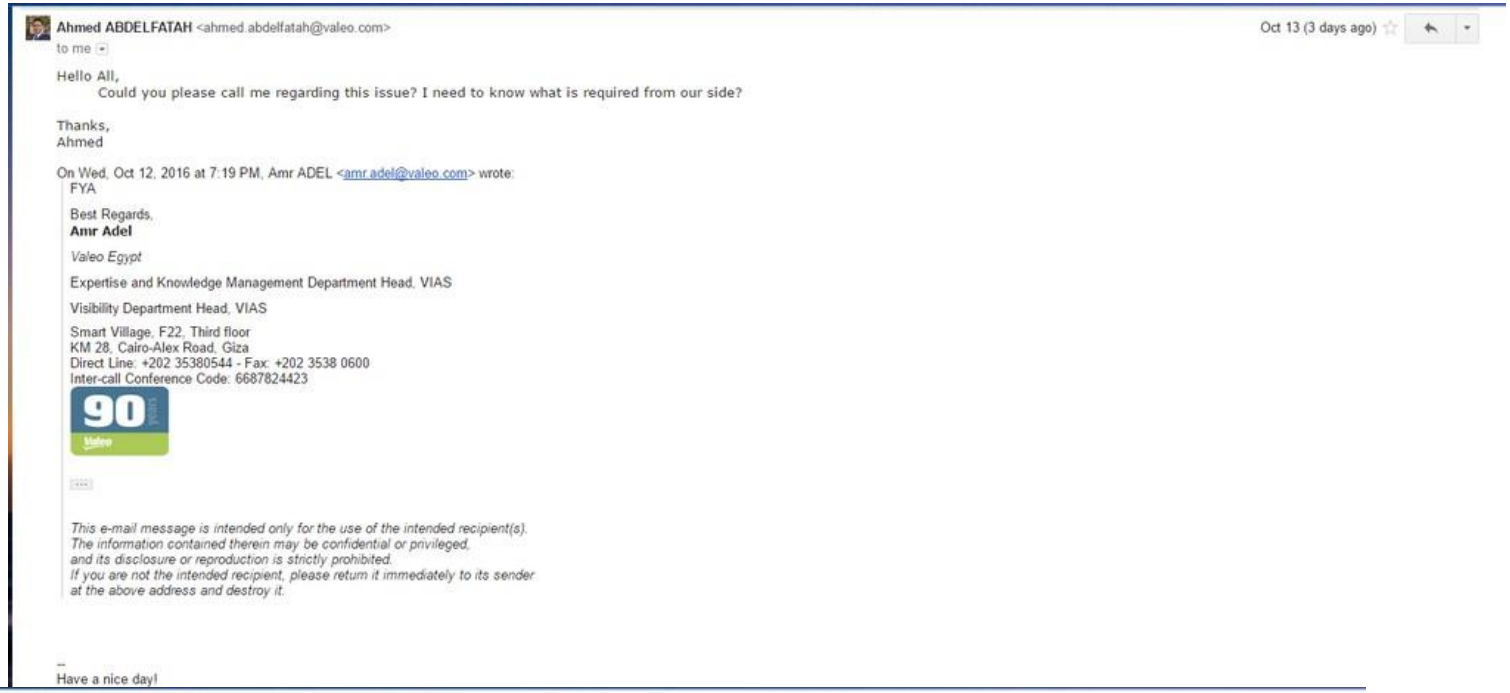
We are senior students at Misr International University, our graduation project proposes a sytem that works on detecting and classifying the abnormal driving behaviors striving to improve rating systems by making them automatically generated.

Please find the attachments below.

Attachment(s)
Email Template (1).docx
Email Template.jpg

Supportive Documents 2/2

VALEO



Ahmed ABDELFATAH <ahmed.abdelfatah@valeo.com> Oct 13 (3 days ago)

to me

Hello All,
Could you please call me regarding this issue? I need to know what is required from our side?

Thanks,
Ahmed

On Wed, Oct 12, 2016 at 7:19 PM, Amr ADEL <amr.adel@valeo.com> wrote:

FYA

Best Regards,
Amr Adel

Valeo Egypt

Expertise and Knowledge Management Department Head, VIAS

Visibility Department Head, VIAS

Smart Village, F22, Third floor
KM 28, Cairo-Alex Road, Giza
Direct Line: +202 35380544 - Fax: +202 3538 0600
Inter-call Conference Code: 6687824423

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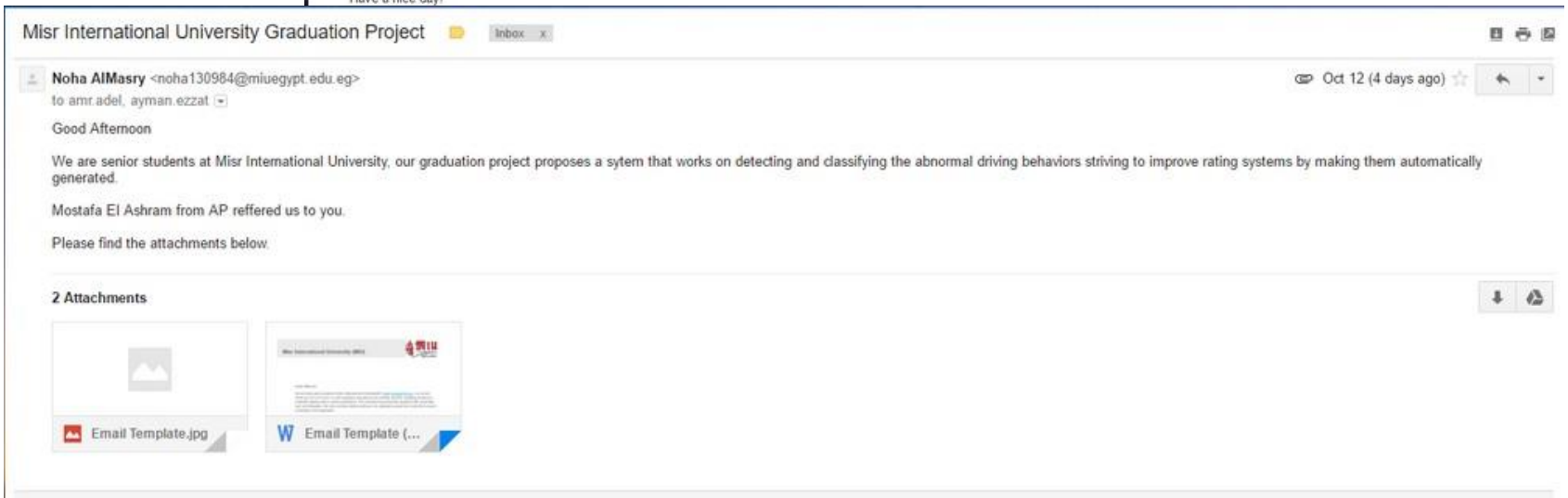
Have a nice day!



Misr International University Graduation Project Inbox x

Noha AlMasry <noha130984@miuegypt.edu.eg> Oct 12 (4 days ago)

to amr.adel, ayman.ezzat

Good Afternoon

We are senior students at Misr International University, our graduation project proposes a sytem that works on detecting and classifying the abnormal driving behaviors striving to improve rating systems by making them automatically generated.

Mostafa El Ashram from AP reffered us to you.

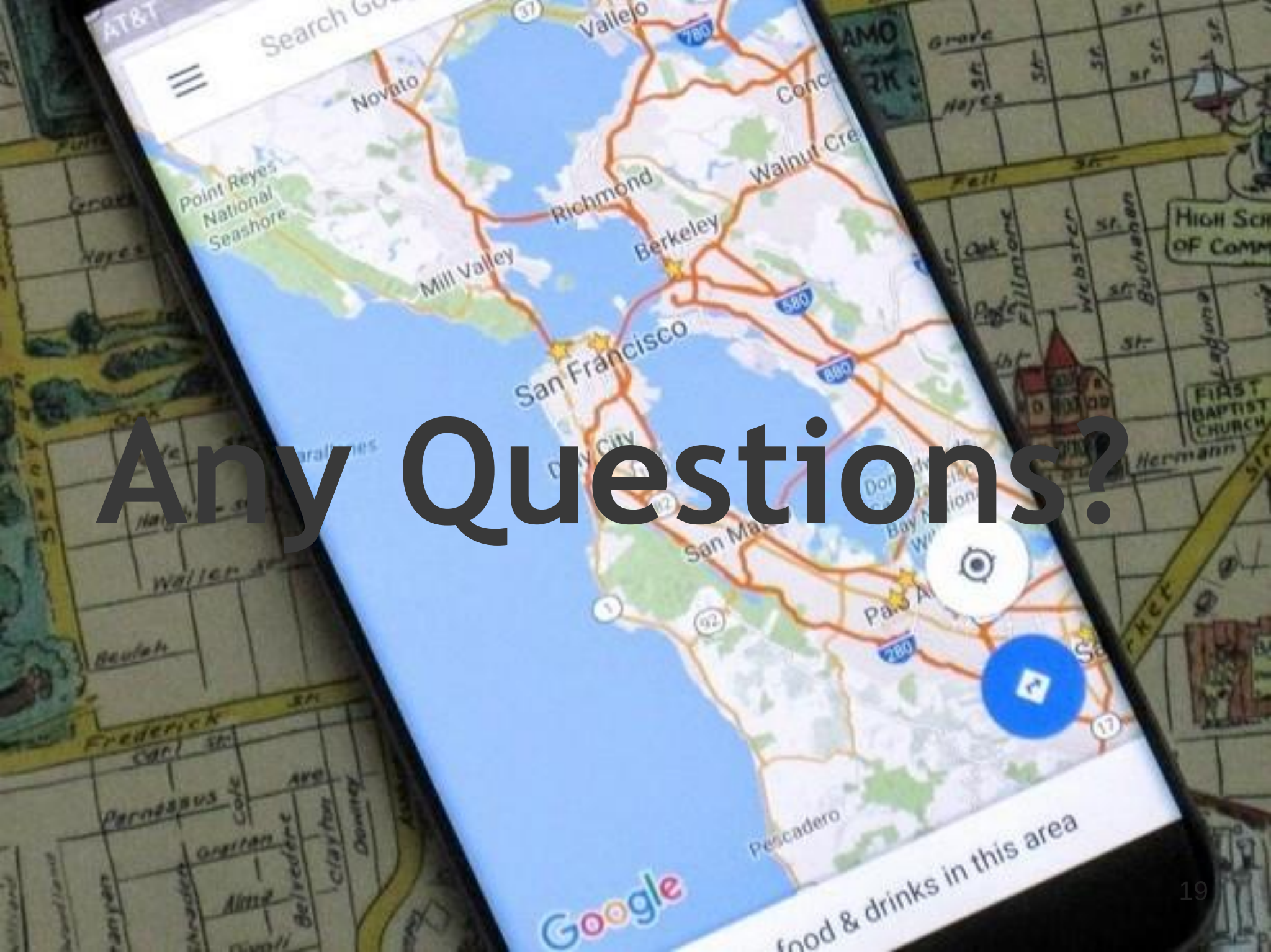
Please find the attachments below.

2 Attachments

Email Template.jpg

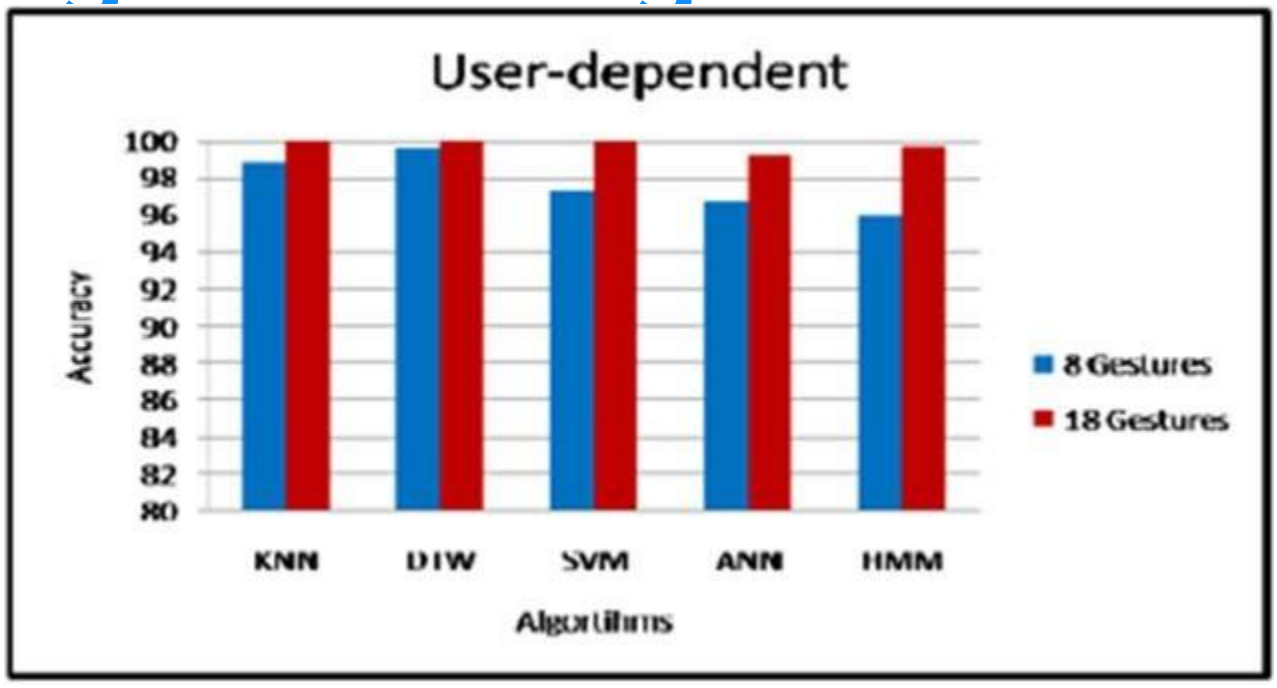
Email Template (...

Demo


Any Questions?

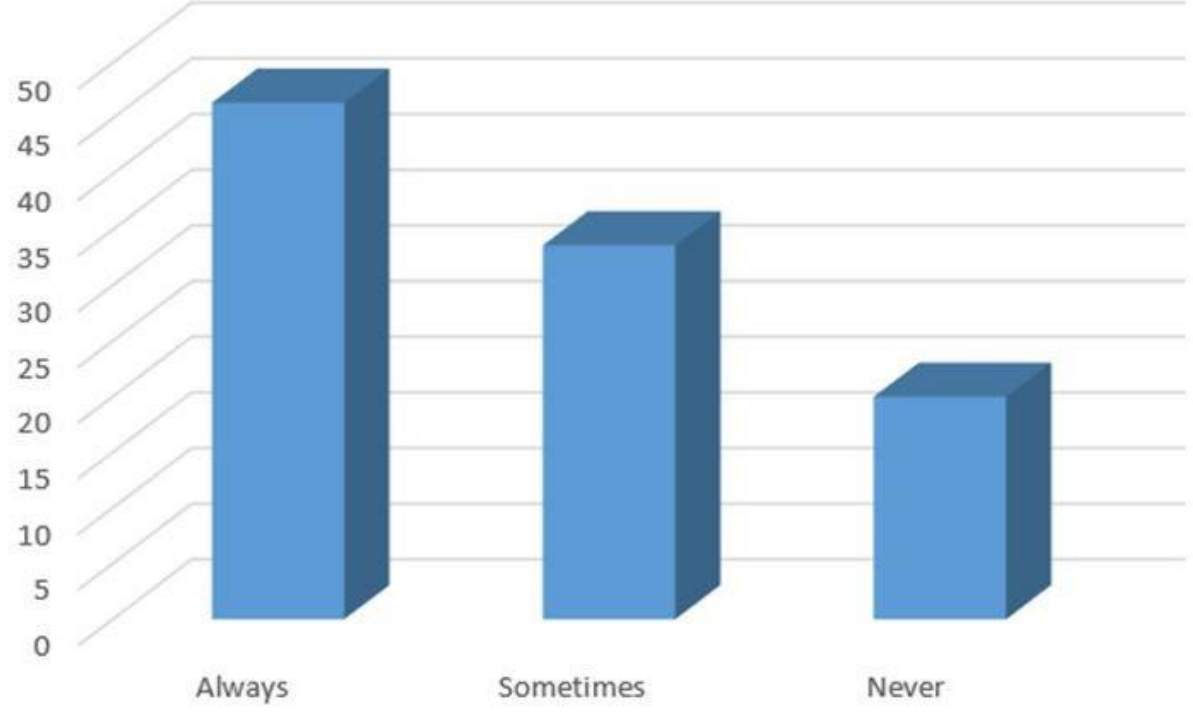

Appendix

A Comparative Study for Accelerometer Based Gesture Recognition Algorithms.

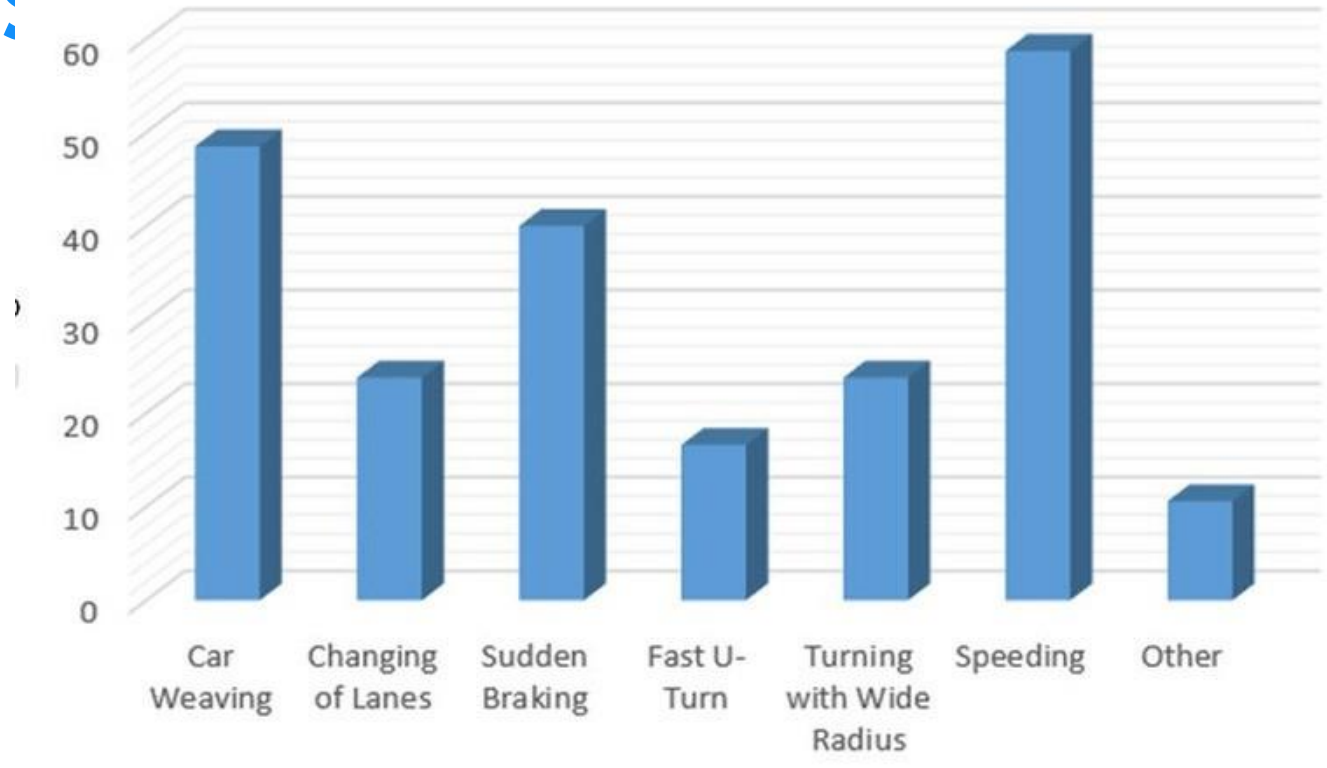


Aya Hamdy Ali, Ayman Atia, and Mostafa Sami. “A comparative study of user dependent and independent accelerometerbased gesture recognition algorithms”. In: International Conference on Distributed, Ambient, and Pervasive Interactions. Springer. 2014, pp. 119–129.

Survey Question: Do you rate the drivers after a ride?(uber, careem etc.)



Survey Question: What do you think causes accidents the most?



Types of users and data they retrieve

Business Owner

- Can view detailed ratings of each individual drivers registered to the system.
- Can view location of all the drivers registered to the system.
- Can view detailed ratings of each individual trip performed by each driver registered to the system.
- Can monitor the driver in real time.

Consumer

- Can view the overall rating of the accessed driver.
- Can view the overall rating of each individual trip that he/she took a part in.
- Can be given permitted by business owner to track location of drivers.