



Cairo University

DEVELOPMENT OF AN ADVANCED TRAVELER INFORMATION SYSTEM USING CROWDSOURCED DATA WITH APPLICATION ON SAMPLE CORRIDORS IN CAIRO

By
Khadiga Hosny Riad Eladly

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Civil Engineering – Public Works

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Title of Thesis:

Development of an Advanced Traveler Information System Using Crowdsourced Data with Application on Sample Corridors in Cairo

Key Words:

ITS; Time prediction; Time dependent shortest path; Travel time; Incident

Summary:

Traffic management is believed as an essential solution for controlling traffic congestion due to the limitation in the road network capacity as a result of resources shortage. The thesis proposed using GPS integrated in the smart phone for managing the traffic efficiently which is considered as one of the wide spreaded crowdsourced data and from the cheapest ITS technologies. The traffic congestion decreasing is achieved through providing register users periodically with the time dependent shortest path taking into consideration different demand pattern and incident occurrence.

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Dedication

I dedicate this thesis to my lovely parents, Hosny Eladly and Amany Said, who have been my role model in hard working and without their support and encouragement I wouldn't be able to achieve my ambitions.

Table of Contents

ACKNOWLEDGMENTS	I
DEDICATION	II
TABLE OF CONTENTS	III
LIST OF TABLES	VI
LIST OF FIGURES	VIII
LIST OF SYMBOLS	XI
LIST OF ABBREVIATIONS	XIII
ABSTRACT	XIV
CHAPTER 1 INTRODUCTION AND RESEARCH OBJECTIVES	1
1.1. BACKGROUND	1
1.2. RESEARCH OBJECTIVES	1
1.3. ORGANIZATION OF THE THESIS	2
CHAPTER 2 LITERATURE REVIEW	3
2.1. INTRODUCTION	3
2.2. DIFFERENT TRAVEL TIME DATA COLLECTION TECHNOLOGIES	3
2.2.1. GPS system	3
2.2.2. Mobile phone Network	5
2.2.3. Bluetooth	7
2.3. LINK TRAVEL TIME FOR THE ROAD NETWORK	7
2.4. TRAVEL TIME PREDICTION METHODS	8
2.4.1. Time series model	8
2.4.2. Data driven method	9
2.5. SHORTEST PATH ALGORITHMS	10
2.6. INCIDENT DETECTION	10
2.7. SIMULATOR	12
2.8. SUMMARY	12
CHAPTER 3 RESEARCH METHODOLOGY ON BUILDING UP SIMULATOR FOR TRAFFIC MANAGEMENT IN CAIRO	13
3.1. INTRODUCTION	13
3.2. METHODOLOGY	13
3.3. DATA PREPARATION STAGE	13
3.4. ROUTE NAVIGATION ASSISTANCE STAGE	15
3.5. ALGORITHM PERFORMANCE STAGE	16
3.6. SIMULATION OUTPUT	16
3.7. ALGORITHM PERFORMANCE EVALUATION	16
3.8. PLANNED EXPERIMENTS FOR MEASURING ALGORITHMS PERFORMANCE	16
3.9. PERFORMANCE MEASURING TOOLS	17

3.10.	EXPERIMENTS FRAMEWORK	17
3.11.	SUMMARY	18
CHAPTER 4 DATA PREPARATION FOR ROAD NETWORK SYSTEM.....		20
4.1.	INTRODUCTION.....	20
4.2.	ROAD NETWORK PREPARATION	20
4.3.	ROAD DATABASE PREPARATION	24
4.3.1.	Link Database preparation	24
4.3.2.	Zone and Node database preparation	25
4.4.	HISTORICAL DATABASE PREPARATION	28
4.5.	SUMMARY	29
CHAPTER 5 ROUTE NAVIGATION ASSISTANCE SYSTEM ALGORITHM.		30
5.1.	INTRODUCTION.....	30
5.2.	ROUTE NAVIGATION ASSISTANCE SYSTEM OVERVIEW.....	31
5.3.	MAP-MATCHING	34
5.4.	TIME DEPENDENT SHORTEST PATH	36
5.5.	DATABASE UPDATE	39
5.6.	INCIDENT DETECTION	39
5.7.	ALGORITHM FOR INCIDENT DETECTION, REMOVAL AND CLEARNESS	44
5.8.	SUMMARY	44
CHAPTER 6 ALGORITHM PERFORMANCE EXPERIMENTS		46
6.1.	INTRODUCTION.....	46
6.2.	DATABASE UPDATING PHASE EXPERIMENT	46
6.2.1.	Road Network performance measure - Exp.1	46
6.2.2.	Users Travel Time Estimation Accuracy - Exp.1	47
6.2.3.	Links Travel Time Estimation Accuracy - Exp.1	51
6.3.	DIFFERENT USERS' PERCENTAGES EXPERIMENT – EXP.2.....	54
6.3.1.	Road Network Performance Measure - Exp.2	54
6.3.2.	Users Travel Time Estimation Accuracy - Exp.2.....	55
6.3.3.	Links Travel Time Estimation Accuracy - Exp.2.....	60
6.4.	DIFFERENT DEMAND LEVELS EXPERIMENT – EXP.3	63
6.4.1.	Road Network performance measure - Exp.3	63
6.4.2.	Users Travel Time Estimation Accuracy - Exp.3.....	64
6.4.3.	Links Travel Time Estimation Accuracy - Exp.3.....	69
6.5.	DIFFERENT SHORTEST PATH REQUEST INTERVALS EXPERIMENT - EXP.4	72
6.5.1.	Road Network Performance Measure - Exp.4	72
6.5.2.	Users Travel Time Estimation Accuracy - Exp.4.....	72
6.5.3.	Links Travel Time Estimation Accuracy - Exp.4.....	78
6.6.	INCIDENT SCENARIO EXPERIMENT – EXP.5	81
6.6.1.	Different users' percentages during incident scenario	81
6.6.2.	Different demand levels during incident scenario	82
6.7.	SUMMARY	86
CHAPTER 7 SUMMARY AND CONCLUSIONS		88

7.1.	SUMMARY	88
7.2.	CONCLUSIONS.....	88
7.3.	RECOMMENDATIONS FOR FUTURE WORK	90
REFERENCES		91

List of Tables

Table 4.1: Free flow Speed and capacity.....	25
Table 6.1: Percentage number of travelers for average percentage travel time error range considering database updating phase	48
Table 6.2: Percentage number of travelers for average percentage travel time error range difference of successive runs considering database updating phase.....	50
Table 6.3: Percentage number of links updated during each run	51
Table 6.4: Average percentage travel time error between updated database and simulation for database updating phase	52
Table 6.5: Average percentage travel time error between two successive databases for database updating phase	53
Table 6.6: Percentage number of updated links with respect to initial database for database updating phase	53
Table 6.7: Average travel time for different percentage shortest path request.....	54
Table 6.8: Average percentage travel time error for different users' percentages	55
Table 6.9: Percentage number of travelers that changed their path for different users' percentages	57
Table 6.10: Average percentage number of travelers for average percentage travel time error range considering different users' percentages	58
Table 6.11 Average percentage number of travelers for average percentage travel time error range difference of successive runs considering different users' percentages	59
Table 6.12: Average percentage travel time error between updated database and simulation for different users' percentages	61
Table 6.13: Average percentage travel time error between two successive databases for different users' percentages	61
Table 6.14: Percentage number of updated links with respect to initial database for different users' percentages	62
Table 6.15: Average travel time for different demand	63
Table 6.16: Average percentage travel time error for different demand	64
Table 6.17: Percentage number of travelers that changed their path for different demand	66
Table 6.18: Average percentage number of travelers for average percentage travel time error range considering different demand	67
Table 6.19: Average percentage number of travelers for average percentage travel time error range difference of successive runs considering different demand	68
Table 6.20: Average percentage travel time error between updated database and simulation for different demand	70
Table 6.21: Average percentage travel time error between two successive databases for different demand	71
Table 6.22: Percentage number of updated links with respect to initial database for different demand	71
Table 6.23: Average travel time for different shortest path request intervals	73

Table 6.24: Average percentage travel time error for different shortest path request intervals	73
Table 6.25: Percentage number of travelers that changed their path for different shortest path request intervals	75
Table 6.26: Average percentage number of travelers for average percentage travel time error range considering different shortest path request intervals	76
Table 6.27: Average percentage number of travelers for average percentage travel time error range difference of successive runs considering different shortest path request intervals	77
Table 6.28: Average percentage travel time error between updated database and simulation for different demand shortest path request intervals.....	78
Table 6.29: Average percentage travel time error between two successive databases for different shortest path request intervals	80
Table 6.30: Percentage number of updated links with respect to initial database for different shortest path request intervals	80
Table 6.31: Average travel time for different percentage shortest path request for presence of incident and absence of incident	83
Table 6.32: average travel time for different demand before and after incident	86

List of Figures

Figure 2.1: Position using Global Positioning Triangulation	4
Figure 2.2: Google Traffic	4
Figure 2.3: Cell Phone Handover	5
Figure 2.4: TOA Location Method	5
Figure 2.5: AOA Location Method	6
Figure 2.6: AirSage system	6
Figure 2.7: INRIX community reporter.....	11
Figure 3.1: Thesis Methodology	13
Figure 3.2: Study area.....	14
Figure 3.3: Trip information.....	14
Figure 3.4: Simulation interface	15
Figure 3.5: Route Navigation Assistance Experiments framework	19
Figure 3.6: Embedded Incident Scenario Experiment Framework	19
Figure 4.1: study area on open street map	21
Figure 4.2: study area in ArcGIS	21
Figure 4.3: Selected road classification in ArcGIS	22
Figure 4.4: study area shapefile on Google Earth	22
Figure 4.5: Measuring width of lane	23
Figure 4.6: Missing road name in ArcGIS	23
Figure 4.7: Missing road name on Google Earth.....	24
Figure 4.8: core area in green color	25
Figure 4.9: Link database sample	26
Figure 4.10: Node location on ArcGIS.....	26
Figure 4.11: Node database sample	27
Figure 4.12: Zone location.....	27
Figure 4.13: Zone database sample	27
Figure 4.14: Historical Database Sample	28
Figure 5.1: System Structure	30
Figure 5.2: Route navigation assistance system	31
Figure 5.3: Activation of the request and collecting data of users	32
Figure 5.4: Storing, Updating Data of Users and Travel Time Estimation	33
Figure 5.5: Updating scenario based travel time database	34
Figure 5.6: Step 1 in Map-Matching	36
Figure 5.7: Step 2 in Map-Matching	36
Figure 5.8: A Network Sample for Explaining Time Dependent Shortest Path.....	38
Figure 5.9: Newton-Raphson Method Explanation	40
Figure 5.10: Relation between flow and incident phases	40
Figure 5.11: Kpercentage value	42
Figure 5.12: Incident Explanation	43
Figure 5.13 Incident detection Algorithm	45
Figure 6.1: Average travel time for database updating phase	46
Figure 6.2: Average percentage travel time error for database updating phase	47

Figure 6.3: percentage number of travelers that changed their path for database updating phase	47
Figure 6.4: Percentage number of travelers for average percentage travel time error range considering database updating phase	49
Figure 6.5: Percentage number of travelers for average percentage travel time error range difference of successive runs considering database updating phase.....	49
Figure 6.6: Percentage number of links updated during each run	51
Figure 6.7: Average percentage travel time error between updated database and simulation for database updating phase	52
Figure 6.8: Average percentage travel time error between two successive databases for database updating phase	53
Figure 6.9: Percentage number of updated links with respect to initial database for database updating phase	54
Figure 6.10: Average travel time for different percentage shortest path request	55
Figure 6.11: Average percentage travel time error for different users' percentages	56
Figure 6.12: Average of average percentage travel time error for different users' percentages	56
Figure 6.13: percentage number of travelers that changed their path for different users' percentages	57
Figure 6.14: Average percentage number of travelers for average percentage travel time error range considering different users' percentages	58
Figure 6.15: Average percentage number of travelers for average percentage travel time error range difference of successive runs considering different users' percentages	60
Figure 6.16: Average percentage number of updated links for different users' percentage.....	61
Figure 6.17: Average percentage travel time error of updated links respect to simulation for different percentage shortest path request.....	62
Figure 6.18: Average percentage travel time error between two successive databases for different users' percentages	62
Figure 6.19: Percentage number of updated links with respect to initial database for different users' percentages	63
Figure 6.20: Average travel time different demand	64
Figure 6.21: Average percentage travel time error for different demand	65
Figure 6.22: Average of average percentage travel time error for different demand	65
Figure 6.23: percentage number of travelers that changed their path for different demand.....	66
Figure 6.24: Average percentage number of travelers for average percentage travel time error range considering different demand	67
Figure 6.25: Average percentage number of travelers for average percentage travel time error range difference of successive runs considering different demand	69
Figure 6.26: Average percentage number of updated links for different demand	70
Figure 6.27: Average percentage travel time error between updated database and simulation for different demand	70

Figure 6.28: Average percentage travel time error between two successive databases for different demand	71
Figure 6.29: Percentage number of updated links with respect to initial database for different demand	72
Figure 6.30: Average travel time for different shortest path request intervals	73
Figure 6.31: Average percentage travel time error for different shortest path request intervals	74
Figure 6.32: Average of average percentage travel time error for different shortest path request interval	75
Figure 6.33: percentage number of travelers that changed their path for different shortest path request intervals.....	75
Figure 6.34: Average percentage number of travelers for average percentage travel time error range considering different shortest path request intervals	76
Figure 6.35: Average percentage number of travelers for average percentage travel time error range difference of successive runs considering different shortest path request intervals	78
Figure 6.36: Average percentage number of links updated for different shortest path request intervals	79
Figure 6.37: Average percentage travel time error between updated database and simulation for different shortest path request intervals	79
Figure 6.38: Average percentage travel time error between two successive databases for different shortest path request intervals.....	80
Figure 6.39: Percentage number of updated links with respect to initial database for different shortest path request intervals	81
Figure 6.40: Average travel time for different percentage shortest path request shortest path at incident.....	83
Figure 6.41: Average travel time for different percentage shortest path request for presence of incident and absence of incident	83
Figure 6.42: Percentage number of users that changed their path between with	84
Figure 6.43: The minimum average percentage change in the speed for 3% shortest path request.....	84
Figure 6.44: The minimum average percentage change in the speed for 10% shortest path request.....	85
Figure 6.45: The minimum average percentage change in the speed for 15% shortest path request.....	85
Figure 6.46: average travel time for different demand before and after incident	86

List of symbols

Symbol	Description
POC	The percentage of change
NV	New value
OV	Original value
T_u	Updated time
T_a	The actual time user spent on the link
T_d	Stored time in the database
t	Time stamp
v	Speed
SN	Start node
EN	End node
D	Perpendicular distance.
P	Vehicle position received from GPS receiver
h	GPS longitude
k	GPS latitude
x	Perpendicular projection of point h
y	Perpendicular projection of point k
b	Value that looking for its square
S	Source node
t_s	Starting time
k	Vertices
Y_k	Temporal label of vertices
X_k	Permanent labels of vertices
$pred(k)$	Predecessor for permanent labeled vertices k
$w_{ij}(t)$	Time spent on a link
$f'(x)$	Derivative of function of $f(x)$
x_n	Proposed result for the root of $f(x)$
$V_{IL-C.Averg}$	Current average velocity of investigated link
$V_{IL-C.Database}$	Stored current average velocity in database
V_{IL-GPS}	Speed detected from GPS on investigated link
D_{IL}	Distance of investigated link
$T_{IL-C.Database}$	Stored current average time in database of investigated link
$V_{IL-Thre}$	Current average velocity of investigated link
$C_{IL-Thre}$	A coefficient which will be equal 20 if there is no incident occurred in network, while it will be equal 50 if there is incident already exist.
V_n	Normal average speed which is the normal speed of the link from historical database without new updates.
$K_{percentage}$	A certain percentage value of normal speed
L_{min}	Link with the least speed