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

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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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.

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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)
$V_{IL\text{-}C.Averg}$	Current average velocity of investigated link
$V_{IL\text{-}C.Database}$	Stored current average velocity in database
$V_{IL\text{-}GPS}$	Speed detected from GPS on investigated link
D_{IL}	Distance of investigated link
$T_{IL\text{-}C.Database}$	Stored current average time in database of investigated link
$V_{IL\text{-}Thre}$	Current average velocity of investigated link
$C_{IL\text{-}Thre}$	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