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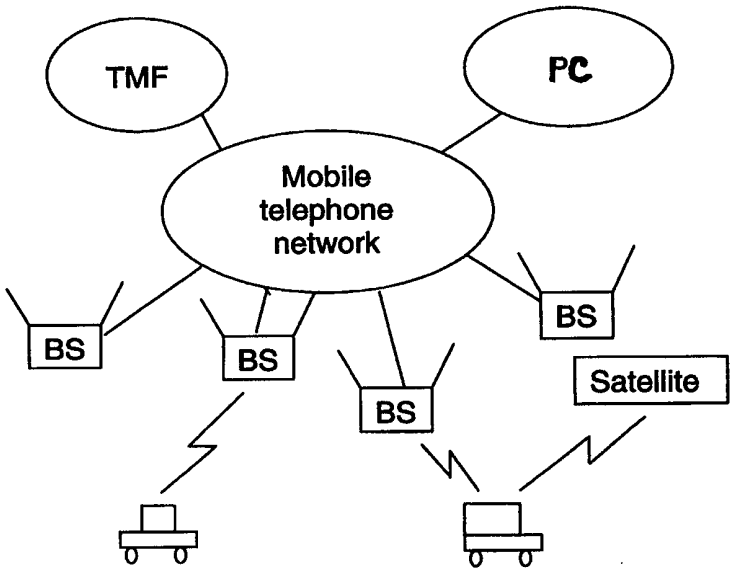
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(54) Title: METHOD FOR COLLECTING INFORMATION ABOUT TRAFFIC SITUATIONS



(57) Abstract

The present invention relates to a method for collecting information about traffic situations, i.e. about the current traffic situation and the optimum routes between any start position and any target, and for the purpose of utilising a mobile phone network in a more efficient and expedient manner, it is according to the present invention suggested a method characterized by using information about motion and position of mobile phones or mobile communication equipment as input in the calculations thereof.

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METHOD FOR COLLECTING INFORMATION ABOUT TRAFFIC SITUATIONS

Field of the invention

The present invention relates to a traffic measurement system.

More specifically, the present invention relates to a method for collecting information about traffic situations, i.e. about the current traffic situation and the optimum routes between any start position and any target.

Technical background

The Problem Areas

The invention is solving the following three problems:

P1. Knowledge of traffic situation e.g. traffic jam

Vehicles (ambulances, trucks, taxis etc.) need to get as fast as possible from a current position to a target position. The driver needs to find the best route to reach the target. The best route is depending on the current traffic situation, e.g. traffic jam on the various roads.

P2. Collection of traffic information

Road authorities need information regarding traffic patterns and density to be able to plan new roads. Information regarding the start addresses and the destination addresses for the cars are useful data for road planning.

P3. Areas with no electronic maps

Electronic maps do not cover all geographic areas. Electronic maps are e.g. used to calculate the best route to a target position.

Known solutions

P1. Knowledge of traffic situation e.g. traffic jam

There exist today databases containing geographical maps, road information and addresses. By using GPS information these systems can provide information about which vehicle is closest to the target address and about the shortest route from the vehicle to the target address. Current traffic situation can be detected by cameras and fixed detectors.

P2. Collection of traffic information

Collection of traffic information for road planning is done today by counting cars using sensors on the roads.

P3. Areas with no electronic maps

No solution is known.

Further prior art

US 5 564 079 (Olsson) relates to a method for locating mobile stations in a digital telephone network, especially the GSM network. The object of the prior art method is to improve the measuring accuracy in a positioning system, reference measurements being carried out on relevant traffic routes with the aid of a measuring mobile in order to provide position information related to measured signals. Use of an adaptive neural network provides a more accurate position determination than earlier systems which were only based on the TA (Timing Advance) value.

US 5 418 843 (Stjernholm) relates to a method for estimating traffic density in mobile telephone networks, a specialised measuring mobile unit which is capable of determining its own position independently of the system, being allowed to pass through relevant traffic routes during which time the measuring mobile station transmits a radius signal as well as its position to the various fixed measuring station. However, no mentioning is given this publication about measuring road traffic, i.e. the traffic situation related to the vehicles, but only to the traffic density in the telephone network itself.

US 5 396 253 (Chia) relates to a system and method for speed estimation for a cellular radio network, comprising a number of speed estimation units. Each unit comprises an averaging window of a different duration, a buffer store and variants calculator, the duration of each window being equivalent to the time taken by a mobile unit to traverse a distance of 20 wavelengths of the received signal at a particular speed. However, this publication is silent about collecting information from a mobile telephone, and is still more silent about suggesting the registration of an alternation of the mobile telephone's position, so as to be able to calculate movement, velocity and traffic density on a road.

US 5 657 487 (Doner) relates to a system for determining the location of a mobile station based upon measurable mobile data values, such as those provided by mobile-assisted hand off (MAHO) procedures. This system suggests a more accurate way of determining the positioning of a mobile telephone, but is silent about suggesting collecting information about traffic situations, i.e. about the current traffic situation on a road.

US 5 610 821 (Gazis et al.) relates to an optimal and stable route planning system, comprising a plurality of fixed computers, linked by a wide area network, which can

communicate seamlessly with all vehicles in a region via a wireless communication system. However, this system is silent about suggesting the use of mobile telephone network for determining position of mobile telephones and related vehicles, i.e. the publication is silent about the utilisation of mobile terminals giving information about traffic velocity, traffic jam and any traffic pattern.

Objects of the invention

The main object of the present invention is to make it possible to calculate information about traffic speed and density on the roads in a far more expedient and efficient manner.

Another object of the present invention is to utilise a mobile telephone network in a far more efficient manner.

Still another object of the present invention is to utilise the positions of mobile telephones in order to collect information about road traffic, road density and future road planning.

Summary of the invention

The above objects are achieved by the present invention which is characterized by using information about motion and position of mobile phones or mobile communication equipment as input in the calculations of a traffic measurement.

In other words, the present invention suggests a measuring system for measurement of moving vehicles by using the geographical position information of mobile telephones or other mobile equipment. The position data of the moving equipment are collected in intervals. This information are used to calculate the path and the velocity of the vehicle. This data is presented as:

1) Traffic situation information, e.g. congestion.

2) Traffic path information for road planning.

3) Stored as electronic map over positions where vehicle moves e.g. road maps.

Further features and advantages of the present invention will appear from the following description taken in conjunction with the enclosed drawings, as well as from the appending patent claims.

Brief disclosure of the drawing

Fig. 1 is a schematical diagram illustrating an embodiment of the present invention.

Detailed description of embodiments

The solution provided by the present invention will make it possible to calculate information about traffic speed and density on the roads.

The main idea behind the present invention is to use information about motion and position of mobile phones or mobile communication equipment as input in the calculations thereof.

This information might also be stored to obtain experience database. The traffic measuring and calculating

function - TMF - described in connection with the enclosed Fig. 1, will be used as a means for solving the previously discussed three problems.

1. TMF gets the identification of mobile phones or other mobile cummunication equipments from a register, e.g. from Mobile Phone Register (MPR), or directly from the mobile phones and equipment.
2. TMF collects the position of all or a selection of the mobile phones or moble equipment in an area, e.g. from a Positioning Centre (PC), from equipment in the Base Station (BS) or from the mobile phone/equipment if position data is available from the phone/equipment (e.g. connected satellite position system).
3. The mobile phones/equipment positions are repeatedly collected at different times (as described in 2 above).
4. The movements of the mobile phones/equipment are calculated based on the measurements from 2 and 3 above. Traffic data as car positions, motion paths, speeds and phone (car) density are calculated.

Solution for P1. Knowledge of traffic situation e.g. traffic jam

The calculations and data from 3 and 4 above is used to establish data regarding current traffic situation, e.g. traffic jam, and can for example be used for optimal route calculation and public traffic information services.

Solution for P2. Collection of traffic information

By measurements as described above it is possible to calculate a complete overview of the traffic pattern and the source and destination addresses/locations for the cars. This information is useful when planning roads.

Solution for P3. Areas with no electronic maps

If no electronic maps exist the solution of P2 can also be used to establish electronic information about the geographical positions of the roads. This can be used to calculate optimal routes.

Advantages

The invention:	*Known solutions:*
- Provides information about the current traffic situation on the roads in an area	- Cameras and detectors at fixed points
- Provides road planning data. Both traffic density, and source and destination points for cars are presented	- Detectors at fixed points detects the traffic density at this point
- The traffic data can be used to establish electronic information regarding where the roads are located without any map information	- No known solutions exist

Broadening

- Traffic density (queue) information service.

- Traffic information service for efficient transport route calculation.

- Road planning information service.

- Electronic map design.

Important features of the present invention

1) Measuring system for measuring of moving vehicles characterised by using mobile telephones or other mobile equipment as sensors and collection of the geographical

position and the movement of the of the sensor. The position is collected at different intervals, and the velocity of the vehicle is calculated.

1.1) Traffic congestion measuring system collecting data as described in 1) characterized by a calculation unit using the data from 1) to establish information regarding traffic congestion.

1.2) Vehicle path measuring system collecting data as described in 1) characterised by a calculation unit using data from 1) to establish the movement path of vehicles.

1.3) Electronic map data collection unit using data collected as described in 1) characterised by a calculation and storage module calculating and storing the position of moving vehicles to establish information about the path on which the vehicles are moving.

Patent claims

1. Method for collecting information about traffic situations, i.e. about the current traffic situation and the optimum routes between any start position and any target,
characterized by using information about motion and position of mobile phones or mobile communication equipment as input in the calculations thereof.

2. Method as claimed in claim 1,
characterized in that said information about motion and position is used as on-line calculation data to calculate current optimum routes.

3. Method as claimed in claim 1 or 2,
characterized in that the information about any mobile position is collected at different intervals, and that the velocity of the current vehicle is calculated therefrom.

4. Method as claimed in claim 1,
characterized in that the information about motion and position of mobile phones are collected as off-line calculation data to calculate planned road improvements, or possibly establishing electronically information about geographic positions of existing roads.

5. Method as claimed in claim 1 or 2,
characterized in that said information is collected in a graphic measuring and calculating function (TMF), possible via a register, e.g. a Mobile Phone Register (MPR), or directly from the mobile phones or equipment.

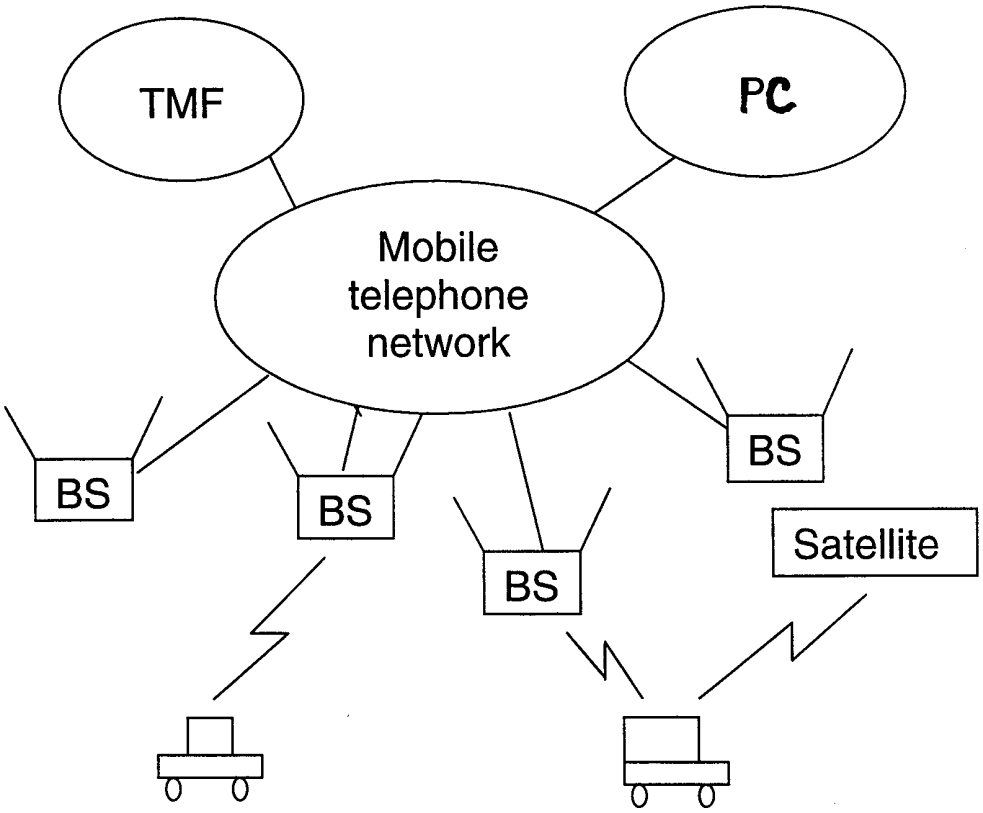
6. Method as claimed in any of the preceding claims,
characterized in that information about motion and position of mobile phones are made from all or

a selection of mobile phones or mobile equipment in an area, e.g. from a Positioning Centre (PC) from equipment in the Base Station (BS) or from the mobile phone/equipment if position data is available from such phone/equipment (e.g. connected satellite position system).

7. Method as claimed in any of the preceding claims, characterized in that information about mobile phones/equipment positions are repeatedly corrected at different times.

8. Method as claimed in any of the preceding claims, characterized in that the movements of the mobile phones/equipment are calculated on the basis of said interval measurements, calculating traffic data such as car positions, motion paths, speeds and phone (car) density.

Figure 1



INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 99/00056

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G08G 1/01
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Compendium of Technical Papers, 64th ITE Annual Meeting, Volume, 1994, (Dallas, Texas), Robinson, JR et al, "CAPITAL IVHS OPERATIONAL TEST", see the whole document --	1-8
X	US 5465289 A (JOSEPH P. KENNEDY, JR.), 7 November 1995 (07.11.95), column 4, line 7 - line 28, abstract --	1-8
X	EP 0763807 A1 (AT&T CORP.), 19 March 1997 (19.03.97), see the whole document --	1-8

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5402117 A (FRANS ZIJDERHAND), 28 March 1995 (28.03.95), column 1, line 59 - column 2, line 28; column 4, line 61 - column 5, line 16 --	1-8
P,X	WO 9812683 A1 (DETERMOBIL DEUTSCHE TELECOM MOBILNET GMBH), 26 March 1998 (26.03.98), see the whole document -- --------	1,3-8

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Information on patent family members

01/07/99

International application No.
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