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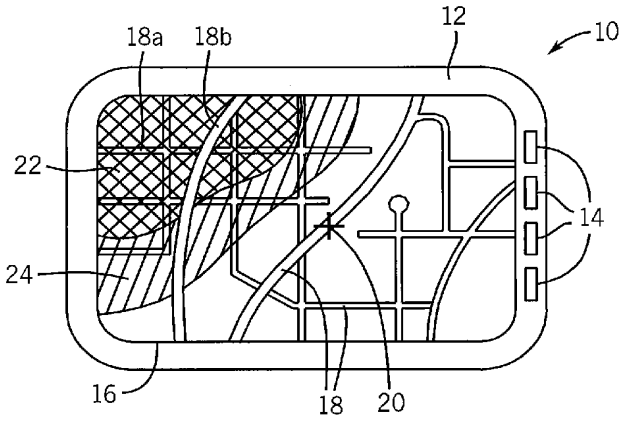

FIG. 1

(57) Abstract: A navigation system for mobile use includes street map data used for creating a dynamic map display tracking movement of the vehicle and includes crime data used to provide an overlay on the dynamic display indicating a risk of crime to the vehicle's occupants from the surrounding area. Crime data may be harvested from police websites and/or generated using statistical correlation techniques from other proxy information. Presented crime data indicate crime risk, type of crime, crime date or time of occurrence, and linkage to environmental conditions such as type of weather, temperature, and moonlight.

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MOBILE NAVIGATION SYSTEM WITH GRAPHIC CRIME-RISK DISPLAY

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

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CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. provisional application 60/913,894 filed April 25, 2007 and the U.S. provisional application 60/999,113 filed November 26, 2007 both hereby incorporated by reference

BACKGROUND OF THE INVENTION

[0002] The prcsent invention relates to navigation devices for use by travelers and in particular to a navigation system which provides the user with a graphic representation of the crime risk in the immediate environment.

[0003] GPS and other navigation systems for portable use may contain digital maps of specific areas and may superimpose a user's location determined by the GPS on a graphical representation of the map. While the maps used in GPS systems currently are relatively static, it is also known to provide an ability to download updated or new maps with the GPS system to keep the loaded map system current, to load new maps for new areas or use wireless or cellular technology to exchange map information. The maps may include points of interest, restaurants, and other data likely to be useful to the traveler.

[0004] Such systems are in particular demand by users who are unfamiliar with the roads in an area, and for this reason are particularly attractive to travelers and offered as a feature in rental cars. A traveler with a GPS system and an updated map, however, may have a false sense of security based on a knowledge of their location on the map but an ignorance about the safety of that location.

SUMMARY OF THE INVENTION

[0005] The present invention provides a GPS system that provides a graphical display of the risk of criminal activity in the area to put a traveler to an unfamiliar city on a more equal footing with those more familiar with the area. Such data, by giving travelers a more complete picture of

their surroundings, can assist the traveler in making informed decisions about travel routes, stopping points, and schedules. The graphical display of criminal activity risk can distinguish between different types of criminal activities, the severity of the risk, the geographic scope of the risk, and even the risk as a function of time of day.

[0006] Significantly, the present invention also provides a method of obtaining detailed crime data on a contemporaneous basis from diverse public sources and for using that crime data for route planning purposes and informational display.

[0007] Specifically then the present invention provides a method and apparatus for improving traveler safety comprising in which a GPS receiver is used to obtain substantially real time location information related to a position of the vehicle holding the GPS receiver. A dynamic display of a street map following the position of the vehicle using stored street map data is together with multiple shaded zones in the dynamic display of the street map, the multiple shaded zones depicting the crime data in the locations of the shaded zones using stored crime data linked to locations. The data may also be displayed with points of interest with accompanying information about crimes in that area.

[0008] It is thus one object of the invention to provide a traveler who is new to the area a guide respect to crime danger associated with particular locations.

[0009] The crime data may be derived from crime data provided on publicly accessible websites operated by governmental entities or from publicly available data sources or websites which collect data from public sources or individual reports

[0010] It is thus another object of the invention to provide a method of obtaining accurate crime data in a cost-effective manner.

[0011] The crime data may be derived from non-crime data correlated to crime data provided on publicly accessible websites

[0012] It is thus another object of the invention to provide for proxy crime data for areas where crime date is not currently collected by governmental entities. Use of other information which has a proven link to crime rates may be used.

[0013] The crime data may include severity of crime and a shading of the shaded zones maps to different degrees of crime severity. Theshadingmay be implimented by a density of POI markers (point of interest) depending on the density of crime.

[0014] It is thus an object of the invention to allow the user to make a personalized risk assessment.

[0015] The crime data may be linked to time of day and the multiple shaded zones may depict the crime data only for a current predetermined time range. The crime data and map overlays may change color schemes to reflect the crime within that time of day.

[0016] It is thus an object of the invention to provide a realistic indication of crime that distinguishes between day and night time crime rates.

[0017] The crime data may be further linked to date and the multiple shaded zones may depict the crime data only for a current range of dates.

[0018] It is thus an object of the invention to provide an accurate assessment of seasonal type crimes.

[0019] The crime data may further be linked to environmental conditions including at least one of: air temperature, phase of the moon, precipitation and wherein the multiple shaded zones depict the crime data only for corresponding environmental conditions.

[0020] It is thus an object of the invention to improve the predictive power of the crime assessment by considering factors other than location

[0021] The shaded zones provide a shading reflecting an aerial density of a particular crime type.

[0022] It is thus an object of the invention to provide a multidimensional portrayal of crime risk.

[0023] The street map may identify limited access highways and the shading of the shaded zones may exclude a predetermined distance from limited access highways.

[0024] It is thus an object of the invention to reflect the lower risks to a traveler of traveling along a limited access highway to a high crime zone.

[0025] The street map magnification may be reduced when crime statistics are displayed to provide for any meaningful statistical crime sample.

[0026] It is thus an object of the invention to provide an accurate representation of crime risk to unsophisticated users.

[0027] These and other object of the invention may apply to only some embodiments described herein and thus should not be used to define the scope of the invention.

[0028] Often on location based devices each road segment is given a unique code used for routing purposes. The invention also provides the ability to establish a threshold for what is

unsafe and code each road segment as a 0 or 1 (or some other flag) to indicate whether that road is safe. In this way safety based routing can be determined and a user can be presented with the option to take the most safe route or when routing be presented with the information that their route would take the person through areas with high crime.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] Fig. 1 is a simplified figure of a display of a GPS device per the present invention showing by shaded areas a graphical representation all of criminal risk;

[0030] Fig. 2 is a block diagram of the components of the GPS system of Fig. 1 including map and crime data memories;

[0031] Fig. 3 is a figure similar to that of Fig. 1 showing the GPS display at a first time of day;

[0032] Fig. 4 is a figure similar to that of Fig. 3 showing the GPS display at a later time of day; and

[0033] Fig. 5 is a set of graphical representations of the transformation of point crime data into the crime mapping of the present invention;

[0034] Fig. 6 is a flow chart showing statistical development all of crime data from crime proxies;

[0035] Fig. 7 is a block diagram of an extraction system for collecting comprehensive crime data on a real-time basis;

[0036] Fig. 8 is a flow chart of the program executed by the extraction system of Fig. 7;

[0037] Fig. 9 is a flowchart of a map creator program used with the extraction system of Fig. 7;

[0038] Fig. 10 is a schematic diagram of a shape file created by the map creator program of Fig. 9;

[0039] Fig. 11 is a figure similar to that of Fig. 1 showing accommodation of limited access highways in the display of the present invention; and

[0040] Fig. 12 is a flowchart of a program using the crime data developed by the present invention for route planning purposes.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0041] Referring now to Fig. 1, a mobile navigation device 10 of a type that may be mounted in a car or the like may provide a housing 12 supporting one or more user controllable buttons 14

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