Sightseeing Navigation System that Promotes Interaction with Environment by Restricting Information

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***Abstract*— In recent years our lives have become more convenient with the abundant information being provided by our information society. We utilize that abundant information in living more effectively. A similar thing could be said about sightseeing. For example, tourist navigation systems have many features that allow the most suitable route to a destination to be displayed, similar to car navigation systems. However, there is a need to incorporate accidental encounters so that walking type sightseeing can be reviewed. This study does not support effective sightseeing but instead supports sightseeing that can be leisurely enjoyed. This study emphasizes "a sense of fun" and suggests a tourist navigation system that intentionally limits route information and induces accidental encounters. Or more concretely a navigation system was experimentally created in which the map around you disappears with movement. The effectiveness of it was then tested in assessment experiments utilizing a subject.**

***Keywords*—Tourist navigation system, Sightseeing, Route, Accidental encounter and hiding information.**

I. INTRODUCTION

A. Background

In modern capitalist society time has been recognized to be a limited resource and "efficiency" important. The variety of machinery that exists in modern society originated in the pursuit of increased efficiency. In a similar manner streamlining of movement being is demanded. Car navigation systems are currently available on the market with the aim of promoting the streamlining of time. Car navigation systems save people time through simple operation and can inform them of the shortest route to their destination while ignoring useless routes. In addition, tourist navigation systems made available over the Internet and on mobile phones provide a type of search and scheduling function. They are currently in the pursuit of how to enable users to do sightseeing more efficiently using the same algorithm as car navigation systems utilize.

However, with recent sightseeing the pursuit is not merely efficiency but also enjoying a town by slowly walking around it. Sightseeing can be looking at the view, and coming in contact with local nature and the climate, or meeting the local people. In recent studies regarding sightseeing support there have been many topics on increasing movement efficiency, but anything directed at helping to look for the feel of the land have been rare.

In the case of anybody with limited time tours that make visiting tourist attractions more efficient by providing a route are convenient. However, there is the enjoyment to sightseeing of deviating from the route and enjoying taking in the view, even if it does take more time and you do not even arrive at a destination.

This study therefore aims at supporting leisurely sightseeing, and the realization of a new type of tourism industry. More concretely a sightseeing navigation system is being suggested that promotes interacting with the ambient environment by not displaying the route to a destination and actually deleting the map. It aims to support accidental encounters occurring through creating opportunities to take in the area by including the chance of getting lost.

The study will introduce the new sightseeing navigation system in Chapter 2, reports upon an evaluation experiment in Chapter 3, and provide a conclusion in Chapter 4.

B. Sightseeing

Over recent years sightseeing has started to be considered important in promoting local industries, and has come to be recognized to have a significant influence on employment and local economies. Sightseeing is of a significant economic scale as it accounted for 10.2% of global total production at the end of the 20th century, with the number of people engaged in the tourism industry totaling 240,000,000, and spending on sightseeing accounting for 10% of total global consumption [1]. Actions being taken to realize being a sightseeing nation are being performed in Japan too, with sightseeing being a major industry accounting for 23,500,000,000,000 yen by 2006 [2].

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Research known as “tourism research” is a relatively new field that has recently been gaining attention. It is interdisciplinary and involves studying the many facets of sightseeing, with systematization of the research still young. It has increased in popularity to where departments and subjects advocating “tourist research” have sprung up at universities throughout the entire country. The "Kyoto sightseeing academy" was established in Kyoto in 1999, and the intention of the country can be seen in that it is an attempt to make “tourist study” mainstream around Kyoto [3].

Recently it is growing popular among people to go on “urban street walks with atmospheres such as romantic Taisho or retro Showa”, or “trips to enjoy urban streets (walking) “[4]. It can be said that these are trips that are leisurely enjoyed and time ignored, and have a different atmosphere to conventional trips where tourist attractions are viewed in the shortest possible time and distance. People are starting to tend to like trips that they can enjoy more leisurely. However, current tourist navigation systems do not attend to these needs.

C. *Sightseeing Navigation System*

A lot of research on sightseeing navigation has been performed. For example, it has involved making route guidance to destinations available along with neighboring information, sound navigators, and sound guidance for foreigners. 「P-tour」 [5], 「Rakuraku Scheduler」 [6], and 「EZ navi-walk」 [7] are particularly famous.

P-tour is a personal navigation system developed by Mr. Maruyama. It calculates a course and a schedule that provide the most satisfaction in a limited time by setting a departure place and departure time, arrival place and arrival time, plural candidate cities for sightseeing, and their importance and time limitations.

These can be used to smoothly navigate go to the place that the user wants to go and make sightseeing more efficient if they are used prior to the actual sightseeing. In addition, the navigator project experiment of the "Hikone city play mobile phone" made available by the Ministry of Land, Infrastructure and Transport and tourism performed in Hikone-shi, Shiga and the trial of the "O-jyouka navigator" performed in Kochi have contributed to local activation through being easy to use and available on for example mobile telephones.

D. *Problems*

However, conventional tourist navigation systems are route guidance systems that offer the most suitable route to take, similar to car navigation systems. It is difficult to say that they increase the joy of sightseeing because they provide the shortest route to a destination and promote efficiency by speeding things up. In addition people’s attention gets concentrates on a terminal screen, and thus they have poor contact with their surrounding environments and do not make any accidental encounters or discoveries because the user is moving around while watching a route map displayed on a handheld unit. Our modern information-intensive society has made our lives more convenient and comfortable through providing an abundance of information, but too much information can have a contrary effect on leisurely sightseeing.

II. METHOD

A. *Suggestions*

This study is promoting forcible interactions with neighboring environments by intentionally not providing a map to users, and supporting new discoveries and encounters being made because there is no map, and in fact relies on “chance”. Unlike conventional tourist navigation systems this study aims at a tourist navigation system that incorporates a sense of fun.

B. *Sightseeing as exploration*

Children like to explore unknown forests and mountains. They like to look for a secret base for themselves, and enjoy the thrill of going to a place that no one else knows. The pleasure of discovering unknown worlds and “chance” are encounters that provide a taste of childhood. The curiosity of children positively enables the opportunity to encounter “chance”, but adults find it difficult to provide themselves with this opportunity. This study therefore involves supporting them in encountering “chance” from the system side by helping them to explore while sightseeing.

C. *Invisible map*

In addition this study ignores the common sense of a map being essential to sightseeing, and actually hides the map around the current position of the user. The thought is that it can support sightseeing through a search without being tied to a map by making the map invisible on purpose but without them losing their way.

D. *Past achievement*

Last year it was confirmed what interactions with the environment would be promoted by drawing up a sightseeing plan on an electronic map before doing the actual sightseeing, and then deleting the electronic map before the sightseeing day, and only showing a rough sightseeing plan and the current position via GPS (Global Positioning System) (Fig. 1) [8].

Because creating “chances” was the goal of this system users do not make a sightseeing plan and the map is invisible around their current position, which is managed with GPS in this system.

Fig 1 Tourist Navigation System with invisible map

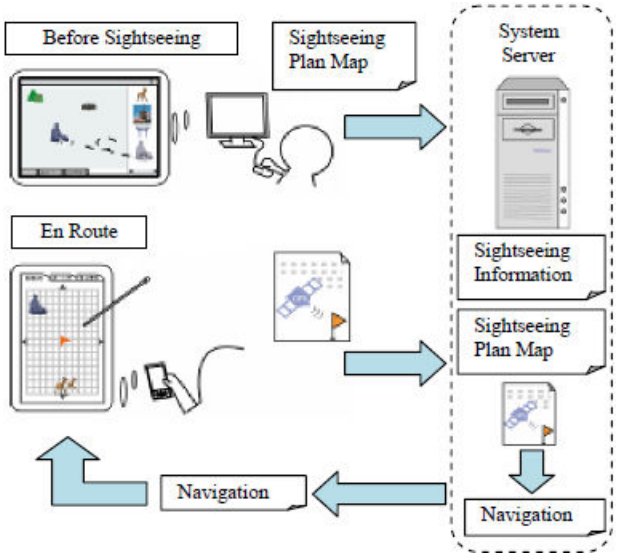

Fig 2 System Architecture

E. Constitution

First the system prepares destinations using XML form files. The destination file stores the position information of a plurality of destinations beforehand. This file is then used in the tourist navigation system. Position information acquired via GPS during movement is then displayed on the tourist navigation system. The position information acquired via GPS is input into the XML file prepared beforehand, which is then saved as "user sightseeing trace data". After the sightseeing has finished the "user sightseeing trace data" can be used by and displayed on Google Map.

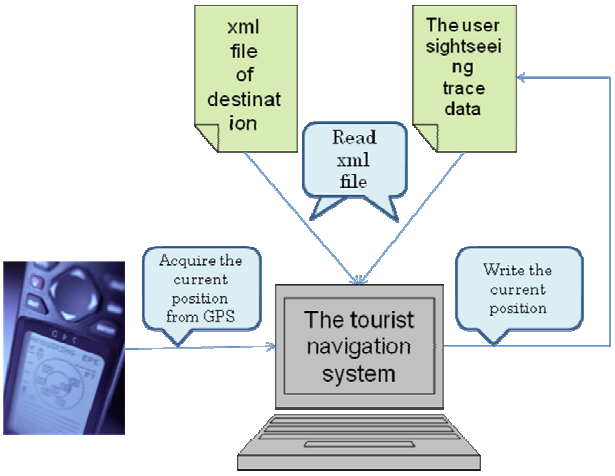

Fig 3 System Constitution

In actual sightseeing the system deletes about 100m of the information around the current position, which is acquired via GPS. Position information is stored in "user sightseeing trace data" whenever the current position is updated. After the sightseeing has been completed users can examine the route they took, and reconsider their experience there by displaying the "user sightseeing trace data". Storing and arranging the memory a person's sightseeing trip allows the system to use it by linking the memory to a support system that we are developing separately, with the expectation being that it will support more effective making of memories.

F. System detail

The system assumes case of difficulty with movements and hence has the 2 screens of a "Main" screen (Fig. 4) and a "Help" screen (Fig. 5).

(1) "Main" screen

As a premise of the information offered on the system screen the system does not provide complete map information. Or in other words the system screen is in the form of not merely displaying a map and showing the current position acquired via GPS in the center of the screen but instead completely deletes the information about a radius of 100m around the displayed current position. Because a marker is displayed for the destination that the user has chosen they can move around while watching it and their relative position to, and ask people in the area for the way if they get lost while wandering around.

While a user moves position their current position information is regularly read from GPS and displayed on a Google map. The positional information was written as an XML file prepared beforehand, along with reading their current position. After the sightseeing has been completed the XML file in which the position information can be used and displayed as a sightseeing trace for users on Google Map. Expressing the sightseeing trace of a user visually is expected to be part of a "sense of fun," or something which the user did not experience during their movements and lead to new discoveries being made.

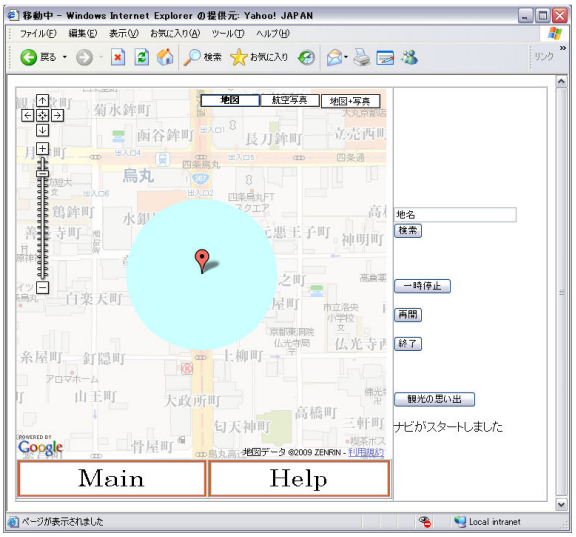

Fig 4 “Main” screen

(2) “Help” screen

If the movement with the "Main" screen becomes difficult and the user completely loses their way this screen can be used. Moving around can be made easier by exposing the parts deleted from the "Main" screen. However, the system supports this service by not immediately revealing the map because a user lost their way but by changing the transparency of the part deleted. A method of support being thought about at the personal level was necessary in case users lose their way too often and therefore cannot enjoy their sightseeing. The system has the goal of supporting "a sense of fun," which it would not fulfill if users find the system a pain to use. The “Help screen” was therefore prepared to ensure that all users can enjoy their sightseeing. The other functions are the same as with the "Main" screen.

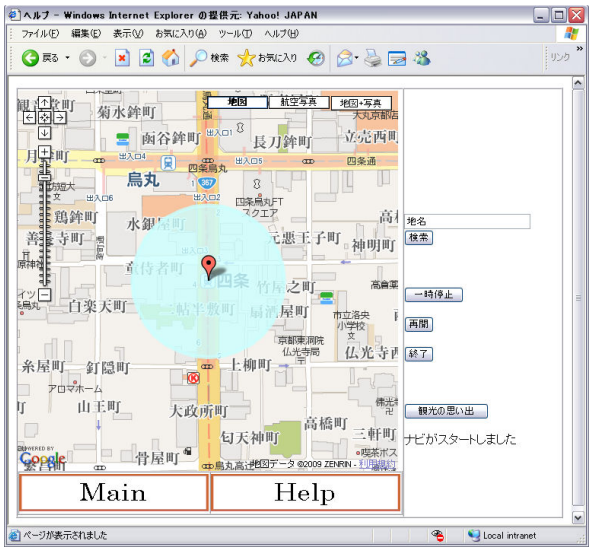

Fig 5 “Help” screen

G. Experimental

The subject population included 6 males and 4 females in their 20’s who were attending university in Kyoto and Shiga for a total of 10 people. We experimented by dividing those 10 people into 3 groups graded by their experience in Kyoto sightseeing.

A subject can use the system to really get a feel for Kyoto city. The destination of the sightseeing was selected beforehand. Users carried around and used a GPS kit and small note PC (Sony VAIO type-U) with a wireless communication module (b-mobile). After they had used the system subjects were requested to answer a questionnaire.

Table 1 Property of subject

	Group A	Group B	Group C
People	2	4	4
Male : female	1 : 1	2 : 2	3 : 1
Sightseeing in Kyoto	A lot	A little	Very little

III. RESULTS

A. Report

This chapter reports on the results of each of the groups.

(1) Group A

Moving around proved to be no problem and sightseeing took place smoothly. The opinion was expressed that “the route was passed a number of times but that they felt uneasy when the map disappeared” in a questionnaires. They had a mental map in their brain and generally would have move around without using the map. However, users depend on maps if they have one in front of their eyes. It is considered that the user became uneasy because they could not access the map when it disappeared and their mental map was not quite as detailed. We were able to confirm that deleting the map was also effective with people who knew the lay of the land.

(2) Group B

The number of times they had been sightseeing in Kyoto was a few with this group, but a user still lost their way around SANJYO KEIHAN station. The effect of the system was fully revealed because a user said they had “lost their way at a crossroads when the map completely disappeared”. It would appear that it affected the mental map of the subject when the map was intentionally deleted because of the answer “I think anyone not watching the system screen doesn’t lose their way”. This group had a lively conversation caused by “the user sightseeing trace data” seen after the experiment. It would appear a collaborative memory was recalled while watching the marker displayed on a Google map.

(3) Group C

This group changed to the “Help” screen on the way because many of the members hadn’t been sightseeing in Kyoto, or only once, and moving around was too difficult using the “Main” screen with its completely deleted map. A support method that reveals the direction of the destination is being considered because of the answer “I lost my way because there wasn’t any information on the destination”. We were able to examine the relationship between a pleasant experience and losing their way in the answer of “I felt it was a pleasant experience even though I had lost my way”.

Fig 6 Group A

Fig 7 Group B

Fig 7 Group C

B. Evaluation

We compiled the rate at which a subject lost their way from the experiment results and provide it below in a table. It is expressed as a Marker that is the number of markers from “the user sightseeing trace data” of each group, with the Separation Marker being number of markers of the point where each group lost their way, and the Separation Rate being the rate at which they lost their way $\left(\frac{Separation Mar\,ker}{Mar\,ker}\times 100\right)$.

Table 2 Separation rate

	Group A	Group B	Group C
Marker	33	30	39
Separation Marker	3	9	14
Separation Rate	9.1	30	35.9

The difference between Group A and Group C is clearly revealed in this table. The reason for this is thought to be that the groups were graded by their experience with sightseeing in Kyoto. Group A didn’t lose their way because they had been sightseeing in Kyoto a lot, and the Separation Marker was high because for Group C because they did lose their way so much. The difference with Group B and Group C was fairly insignificant. The reason for this is considered to be that Group C changed to the “Help screen” from the normal “Main screen” on the way because they had lost their way so much. The difference between these two groups would be more obvious if Group C had not changed to the “Help screen” on the way.

C. Considerations

Although the clear induction of a “chance” was not revealed in “the user sightseeing trace data” that induction of a “chance” was revealed in a questionnaire.

It can also be said that allowing users to lose their way by deleting the map in experiments proved effective. Users would appear to lose their way when they had to move around using only vague information after the map was deleted. The map disappearing caused confusion, and it is thought that users could not then use their mental map, which should have remained intact. The relationship with a user losing their way because the map was deleted and sightseeing becoming a special memory because they did lose their way changed their sightseeing into something that differed from conventional sightseeing. Or in other words deleting the map proved effective.

A clear difference appeared between subjects who had the necessary geographical information and subjects who did not in this experiment. Anybody that understood the geography could supplement the map by using their mental maps when no information was provided because they still had a mental map. However, information on moving around completely

disappears if a person is geographically ignorant they will not have the necessary supplementary information.

Everyone usually hates losing their way. However, users said they found it enjoyable even when they did lose their way with the system in the experiments. It is thought the situation in which people lose their way created by this system brings about new discoveries and encounters, and that users find that contingency interesting.

IV. FUTURE WORK

The knowledge obtained from the evaluation experiment and results of the questionnaire will be used to review the system. In addition to the system discussed in this report a new tourist navigation system is also being developed. More concretely, that system doesn't display a route and instead only the current position and landmarks. In addition we wish to make the system available as an iPhone application.

V. CONCLUSION

In this paper a tourist navigation system incorporating a "sense of fun" was discussed and attention focused on "chance" suggested to support not only sightseeing time usage but also sightseeing that can be enjoyed with no restrictions and spotlighting walking around sightseeing which is relaxed feeling. The system was actually evaluated in Kyoto. The results of the evaluation experiment revealed that users could be induced to lose their way and encounter "chance" by deleting the map around the tourist and that resulted in a pleasure that differed from conventional sightseeing, and it can also be said that the effectiveness of this suggestion was proved.

REFERENCES

[1] Kazuki Iguchi, Jyunichi Ueda, Hiroshi Noda, Yoshihumi Muneda: Advice of Kyoto sightseeing studies, Jimbun shoin, p.14, 2005.

[2] Ministry of Land, Infrastructure, Transport and Tourism: Research about the economic effect of a trip / the tourism industry in 2006.

[3] Kazuki Iguchi, Jyunichi Ueda, Hiroshi Noda, Yoshihumi Muneda: Advice of Kyoto sightseeing studies, Jimbun shoin, p.9~10, 2005.

[4] JTB: Travelers Trends 2007, JTB, 2007.

[5] Atushi Maruyama, Naoki Shibata, Yoshihiro Murata, Keiichi Yasumoto, Minoru Ito: P-tour: A Personal Navigation System with Travel Schedule Planning and Route Guidance Based on Schedule, Thesis magazine of Information Processing Society of Japan, Vol.12, No.45, pp2678-2687, 2004.

[6] NAVIT: "Rakuraku Scheduler" series,

[7] http://www17.pos.to/~navit/hp/mannavi/scheduler01.html, 2008/09/17.

[8] KDDI: EZ navi-walk,

[9] http://www.au.kddi.com/ez_naviwalk/service/tokucho.html, 2008/09/17.

[10] Yoshio Nakatani, Kanako Ichikawa: Tourist Navigation System Which Induces Accidental Encounter, Human Interface Symposium 2008, pp.1033-1038, 2008.