NEW RAILWAY TRANSFER SEARCH PROPOSAL

The Development of the Interactive Design Tool using the Graph Visualization of Railway Transfer Process

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Abstract: While individual needs are diversified, the information which railway users search for is also diversified. But if we cannot offer the information which the users want, there is a possibility that the opportunity loss of "transfer" and "consumption". Train transfer search engine web services let us know only information of transfer route consisted by departure stations and arrival stations. It is difficult to satisfy user's demands. On this paper, we discuss the way of the railway promotion with visualization of train transfer process using railway diagram.

1 INTRODUCTION

In Japan the most of railway companies keep the accurate time in each every station with only a minute delay, and the most frequent time in the railway operation they conduct is only within a few minutes interval. So the most railway users in Japan can plan an accurate schedule. And the users can get on the railway without waiting because of almost no delay of train.

For the accuracy and convenience of railway, Japanese station has the power of gathering people. At the biggest station in Japan 3 million people is gathering there in a single day. The station in Japan takes the lead in town. If many people get off the station more, the worth of town around station is increasing more. However many railway users consider the train to be a mere transportation device from departure station to arrival station. Therefore we consider it important to promote a stopover in order to raise worth of the area along railroad. We aim the promotion of stopping over using the graph visualization of railway transfer process.

2 RESEARCH BACKGROUND

Japanese railway service is controlled by the minute and has almost no delay but only several seconds. So Japanese railway users can plan schedule per minute. The most of people search train transfer time using mobile phone web service while taking a train. The web services have three methods of searching. The first one is the way to get arriving earliest time from departure station to arrival station. The second one is the way to get arriving one with the cheapest fare from departure station to arrival station. The last one is the way with least number of times of changing from departure station to arrival station. The search engine web services offer the information on transportation of only two points of departure station and arrival station. And these method has used ever since the search engine web services were developed. The users of smartphones such as iPhone and Android phone are increasing in Japan. And the new search engine web services for smartphone are developed. However they are developed on the basis of three methods mentioned above. In short a new information web service is hard to be not developed even if smartphones are developed. These web services offer the information on transportation of only two points. In this way there are few opportunities for railway users to get off intermediate stations between departure one and arrival one.

In this paper, we propose the interactive design tool for promoting a stopover paying attention to train transfer search engine web services. Then, we propose the tool for visualizing railway transfer

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process for the purpose of increasing the opportunity stopover during taking trains.

3 PRELIMINARY SURVEY

We conducted the Web survey about the factor that railway users feel uneasy when stopping over. (101 persons, from 10's to 60's) The result is shown in Figure.1. "I feel it uneasy whether it is late for the destination." "I feel it uneasy whether fare become comparatively high-priced." "I feel it uneasy whether it is an attractive station." Therefore it is important to offer at sightseeing tractive information about intermediate stations for promotion of stopping over. And we need to offer the proof which it is not late for arriving at the destination even if railway users stop over intermediate stations. We need to offer the information of transfer process when users stop over.

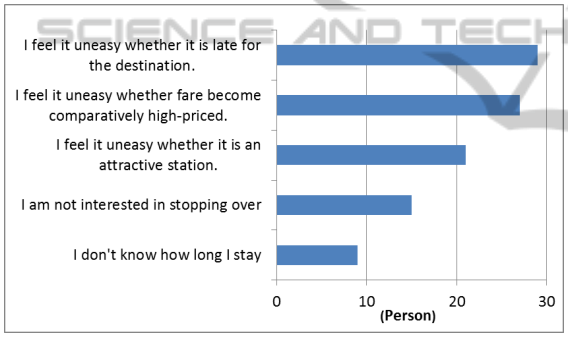

Figure 1: Web survey (the factor that railway users feel uneasy when stopping over).

4 THE FEATURE OF THIS SYSTEM

4.1 Visualizing Railway Transfer Process with Diagram

In this research, we propose to offer "the time to stay at the station which the user dropped in" and "the time the users arrive at the final destination" in order to visualize railway transfer process. Then we decided to use the diagram (related figure of distance and time) used by railway operation management. We can express the transfer process for railway users in smartphone screen using railway diagram. The transfer process with diagram is shown in Figure 2.

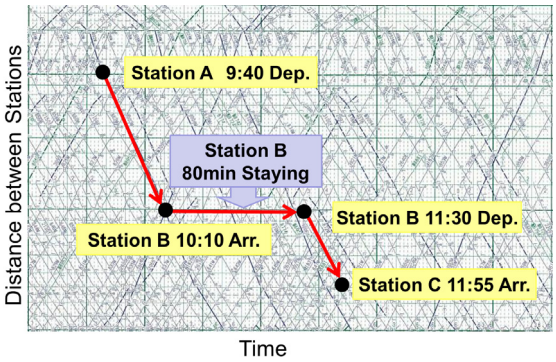

Figure 2: The transfer process with diagram.

4.2 Visualizing Sightseeing Information about Intermediate Stations

We consider it important to offer sightseeing information about intermediate stations which users can stop over. The present search engine web services display advertisements related to the departure station and arrival station which the users input. Utilizing this technology, we have discussed the way of visualizing sightseeing information. So we decided to express the information on the station between departure station and arrival station when users search transfer process with mobile phone. The sightseeing information of recommended station is displayed according to the station names which users input on the top page. This idea is shown in Figure 3.

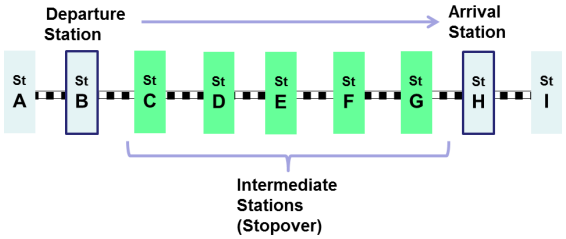

Figure 3: The idea of visualizing sightseeing information about intermediate stations.

5 THE OUTLINE OF THIS SYSTEM

We developed the new search engine web service of a part of Tokaido line (from Tokyo to Odawara). Tokaido Line is the main railway route which connects the big city such as Yokohama, Hiratsuka, and Odawara to Tokyo. As Tokaido line is used by many people, we developed the system with this line. The structure of this system is shown in Figure 4. And the system for Japanese railway users is shown

in Figure 5.

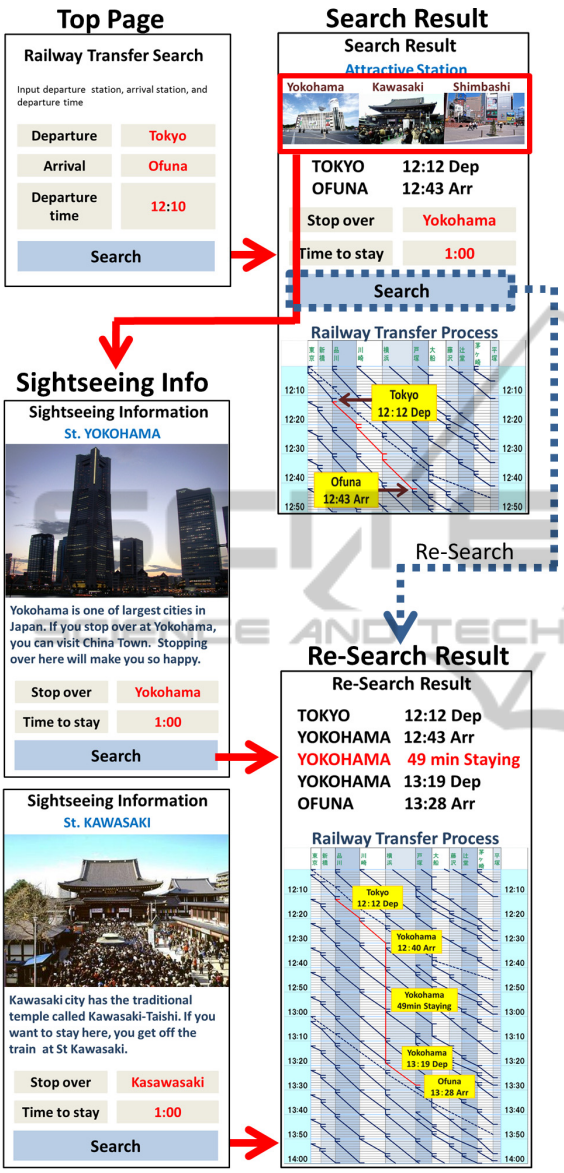

Figure 4: The structure of this system.

The railway users input the departure station, the arrival station and departure time on the screen of a smartphone. The system shows the information on the station between departure station and arrival station. And with attractive station information it shows the railway transfer process with diagram. And the users can search the transfer again for stopping over on the search-result screen. The system re-creates the diagram including stopover time. We added the function which users re-search on the attractive station information screen. This system is a tool for promotion of stopover by visualizing the railway transfer process and the attractive station information.

This system consists of timetable database and station database. The timetable database consists of the data of the departure time and the arrival time in each station. It is distinguished on the weekday and the holiday. The station database consists of station names and the distance between stations.

These databases are read by SQL programming. We enabled the route search and the display of diagram using PHP programming.

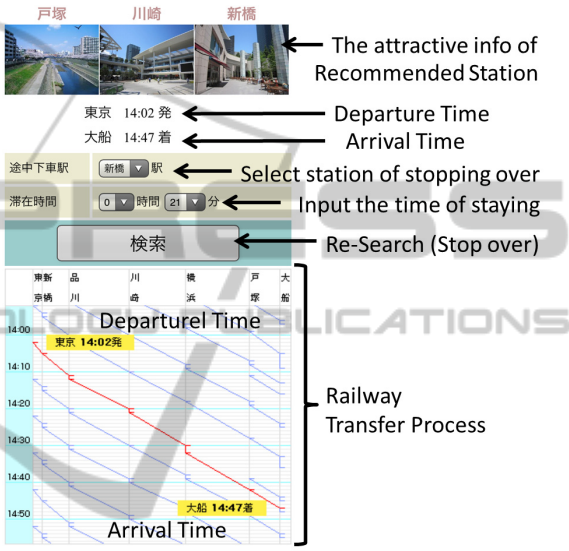

Figure 5: The system for Japanese railway users.

6 DISCUSSION

We got some persons to use this system. Some of the users answered that it was useful tool if they understand the meanings and structure of railway diagram once. And some of them are to enjoy railway transfer by dropping in lots of stations. We succeeded in raising the probability of stopping over using the graph visualization of railway transfer process.

7 CONCLUSIONS

In this research we succeeded in visualizing railway transfer process and attract sightseeing station information on the smartphone as a new interactive tool. We will add the new information such as shopping and tourism to this system in order to attract railway users. Offering the appropriate

information during taking trains makes it higher the possibility of stopping over. Not only development of railway service but it is necessary for us to offer the information and advertising for the purpose of railway promotion. We will propose new interactive tool for railway users.

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