TPO-based Recommendation Service with Personal Situation Model

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Abstract

We came to be able to acquire various information easily by the spread of the portable terminal through the portable terminal regardless of time or the place. The kind of information requested from each user individual is different according to user's preference and situation. Until recently, we guess information matched to the user's preference, and have constructed the system that recommends it.[1] However, the necessity for taking user's situation into consideration comes out when thinking about the characteristic that it is possible to acquire it easily regardless of time or the place of the portable terminal.

In this research, we propose two that constructs the system that recommends information that takes user's situation into consideration.

One is modeling of the mechanism of man's situation assessment. In the research of the situation assessment in the research of the current artificial intelligence, the interpretation of physical data was only one. Therefore, the situation assessment was done by combining physical data. However, the interpretation of physical data is not only one when man does the situation assessment. For instance, there is a method of the time, time zone, and many interpretations when the time data is interpreted. We defined this as a multiple interpretation. The process of man's situation assessment was hierarchized taking this characteristic into consideration, and it proposed the layer model that modeled it.

The second is a proposal of the system to recommend information for the user to take the situation into consideration by using the mechanism modeling. When the system guesses user's situation, and information that exists in user's situation is recommended, the method of presenting the user the recommendation result becomes important. As for the recommendation of the PUSH type, the system one-sidedly sends the user information. With this, the user often feels not the recommendation but order. Moreover, the system can not necessarily judge user's situation always accurately. There is a possibility of one-sidedly sending information for which the user doesn't hope when a wrong situation assessment is done. To solve such a problem, we took the form that advised the user to have information that took a present situation into consideration once in the recommendation method. It proposes the outline of the advisory recommendation system in this research.

1   Introduction

Today, portable device become general. We can easily acquire information with a portable device regardless of time or the place. However, it is difficult to acquire information set to time and the place. Therefore, we cannot use the characteristic well.

For instance, when it is hungry, we can acquire information on a coupon that eats cheaply and a delicious shop from the portable device. However, it is difficult to take out really satisfactory information of a certain information. Moreover, it cannot be noticed even if there is information that finishes being more satisfactory from examined information. Therefore, it needs Recommend Service for the portable device.

Recommend Service is the information delivery service to deliver various information to the user. Social Recommend that Amazon.com offers is one of the typical Recommend Service. However, current Recommend Service doesn't deliver information matched to each one of the user. Therefore, the user doesn't necessarily receive satisfactory information. The portable device can acquire information regardless of time or the place. Therefore, it is

necessary to take not only the preference of the user to the information delivery but also the situation into consideration.

In this research, it proposes the recommendation service system using the mechanism and it that judges user's situation from paying attention to the process of person's situation assessment, and making it to the layer model.

2 Recommendation that takes situation into consideration

Information that the user requests changes greatly by user's situation.

For instance, time when a certain student is walking to about 12:00 on Monday with the class toward the school in Suidobashi in the site in the shopping mall is assumed to be a situation of being going to school. He wants to be likely to eat lunch in this situation because it is time of daytime. However, it is a situation in which the class starts soon in this case. Even if meal information is recommended in such a situation, he will not think that he uses the information.

On the other hand, it thinks about the case where it moves in the site in the shopping mall to 18:00 on Monday as another situation. This situation is defined while going home. At this time, it is dinner and he wants to be likely to eat meal. There is especially no schedule after this because the class has already ended. Therefore, because the stomach has become empty if meal information is recommended at this time, he will use the information.

Thus, the user is different information that is necessary by the situation, and doesn't need desirous information according to the situation occasionally either. If the relevant information matched to user's situation can be presented, the recommendation that user or more satisfaction rating rises becomes possible.

It is thought that there are roughly separately to judge user's situation two factors. One is an external factor to surround me time and the place. Another is user's internal factor. This factor has user's feelings and physical condition, etc. If "What information is the user requesting?" can be judged from the situation based on these two factors, the recommendation that takes user's situation into consideration can be done. We define this, "Situation assessment".

We want to have the system automatically judge user's situation. The user is never looking for information that he needs. Look for by the user, and furthermore the system looks for suitable information for the situation according to the situation when there is a situation assessment system. As for the user, the chance to touch information that I do not notice increases if the system automatically delivers necessary information when the user is not looking for information. As a result, the possibility that information that I need in a necessary situation can be received rises to the user.

We paid attention to the process of man's situation assessment to achieve the mechanism that the system automatically judges user's situation. We thought whether the system did not come to be able to do the situation assessments as much as man by modeling the process that the person judged the situation.
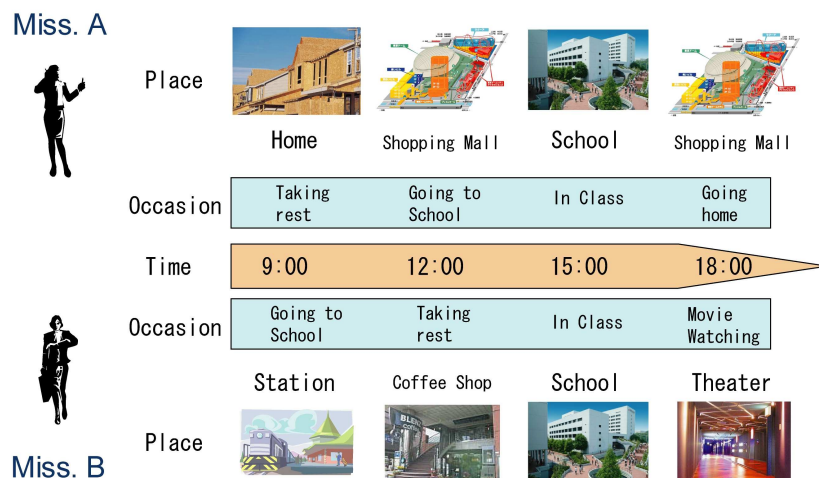

Figure1: User's flow during a day

3　Mechanism of situation assessment

3.1　Multiple interpretation

　　When the situation is judged, the person uses as it is and is not judging data like time and the place, etc.How to judge the situation is different according to user's knowledge structure, the sensibility, and the state at that time even in case of being at the same place and the same time depending on the person. We paid attention to the point of multiple interpretation of the situation to involve such person's knowledge structure and sensibility to the mechanism of the situation assessment.

　　When a present situation is judged, the person is using an environmental element that surrounds internal time like my physical condition and feelings, etc. besides the one and them the place for the criteria. However, various interpretations are generated by how to catch in an environmental element. Please refer to Figure 2. For instance, it can be interpreted, "About daytime", and can interpret at time it if the element at time "12:00" is time zone, "12:00". We define the multiple interpretation from one element like this, "Multiple interpretation".

　　Multiple interprets is according to person's sensibility and knowledge. The method of the interpretation is different at the same time even in case of being in the same place depending on the person. For instance, it is assumed that Mr. A was in facilities named LaQua. In this case, the result of the interpretation from there is "Shopping Mall" "Amusement park" "Restaurant street". However, the result of the interpretation even if Mr. B is in the same time and place becomes "Shopping Mall" "in Tokyo Dome site" "Bunkyoku Tokyo". The result of Mr. A and Mr. B is different. Thus, a multiple interpretation is done by the person and the result is different.

　　Moreover, it is thought that a multiple interpretation is generated only in an environmental element that surrounds me. Because my internal element is a result that has already been interpreted as necessary shape, and doesn't have the necessity for the multiple interpretation. However, after it is looked by eyes and ears, etc. , heard because it is as objective existence, and it takes it for myself internally, an environmental element should interpret it. It is therefore because of the idea that a multiple interpretation is generated.
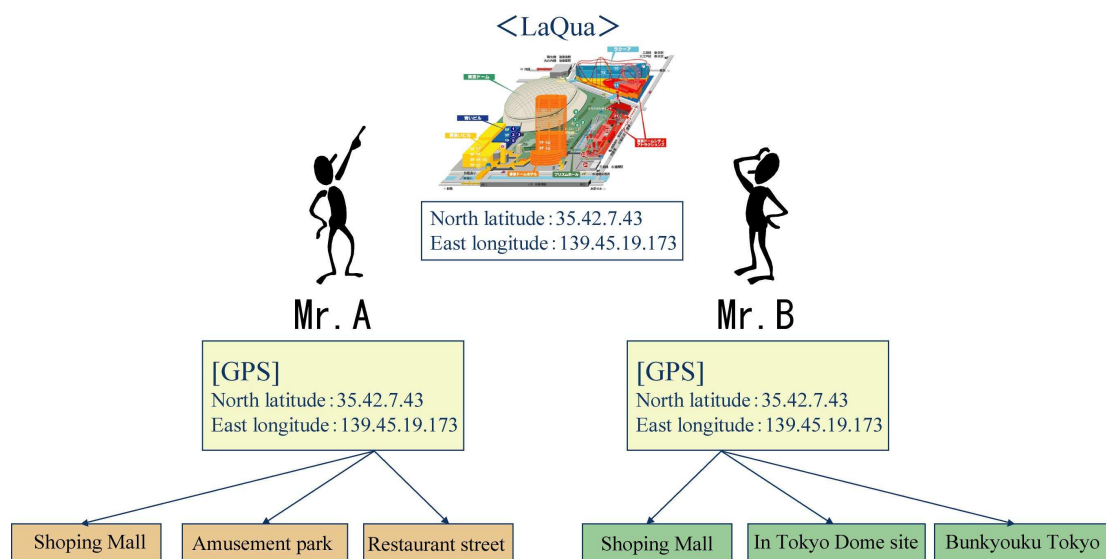

Figure 2 : Multiple interpretation

3.2   Hierarchy of situation

There are various ways to catch in the situation when the process of man's situation assessment is paid attention. For instance, there are "It wants information on the meal" situation and "Information on the rest" situation, etc. We define the situation," "For what now. Therefore, the situation assessment of this research indicates each category of information whether to have to send information that the user is requesting is judged.

For instance, when the situation assessment of "It wants information on the meal" situation and "It wants information on the rest" situation is done, each situation is independently judged. Therefore, it might be judged that only one of situations are necessary if judged that it is both situations. It might be judged that both situations are unnecessary oppositely. It is thought that man is processing such many situation assessments at the same time.

There are two noted points when man judges the situation. One is a selection of the element used to judge the situation. When the situation is judged, it is judged by the necessity now based on the result of the multiple interpretation from physical data. In this case, the result of the multiple interpretation is not all necessary. Only some necessary elements ..situation assessment.. are needed from among that. Therefore, it is necessary to choose which interpretation result to use from among the result of the multiple interpretation according to the judged situation. Another is how to reflect a knowledge structure and a sensibility user individual when the situation is judged based on the needed element. When the mechanism of man's situation assessment judges whether it is a situation "I want to eat meal" for instance the large difference depending on the person, Mr. A assumes that the state "Hungry state" and "Schedule after this" acts greatly. At this time, to judge hungry, "Elapsed time after it eats the last meal" becomes a critical factor in "Time" item. In this case, it only has to judge hungry by using "Elapsed time after it eats the last meal" from among the result of the multiple interpretation. However, it is assumed that "Present time" and "Time until the next scheduling" act greatly for Mr. B. In that case, "Present time" and "Time until the next scheduling" become the critical factors as for the needed element. Because the judgment structure at the situation assessment was different like this depending on the person, the process of such man's situation assessment was hierarchized in this research, and modeling was tried.

The process of man's situation assessment can be divided into four hierarchies. The mechanism that the system can be judged is considered by considering user's situation based on this idea.

Physical state layer:
Layer where physical data that man's interpretation doesn't enter is treated. Layer where objective value like place and time, etc. is treated.

Multiple interpretation layer:
Layer reinterpreted from data of physical state layer to necessary shape by man's subjectivity. It is a layer reinterpreted from the time data to time zone and time, etc. This hierarchy can be interpreted from the item of the physical state layer as some items. For instance, it is a translation that can be interpreted, "Time" and "Time zone", etc. from data "Time". The interpreted knowledge is different the user one by one. Therefore, interpret it by separately preparing the database corresponding to a knowledge structure user individual, and referring to it.

Element layer:
Layer where element data used for situation assessment is treated. Everything is not used since it is multiple interpreted when the situation assessment is done. Therefore, only a necessary interpretation result for the situation assessment is acquired from the multiple interpretation layer in this layer.

Situation assessment layer:
Layer where various situations are judged according to value of element layer. The situation here indicates" "For what now. The method of the situation assessment is various depending on the person. Therefore, it becomes a judgment structure matched to each one of the user in this layer. In the judgment in this layer, the Bayesian networks where the vagueness of the method and the situation assessment of the judgment of each user is both treatable is used and judged.
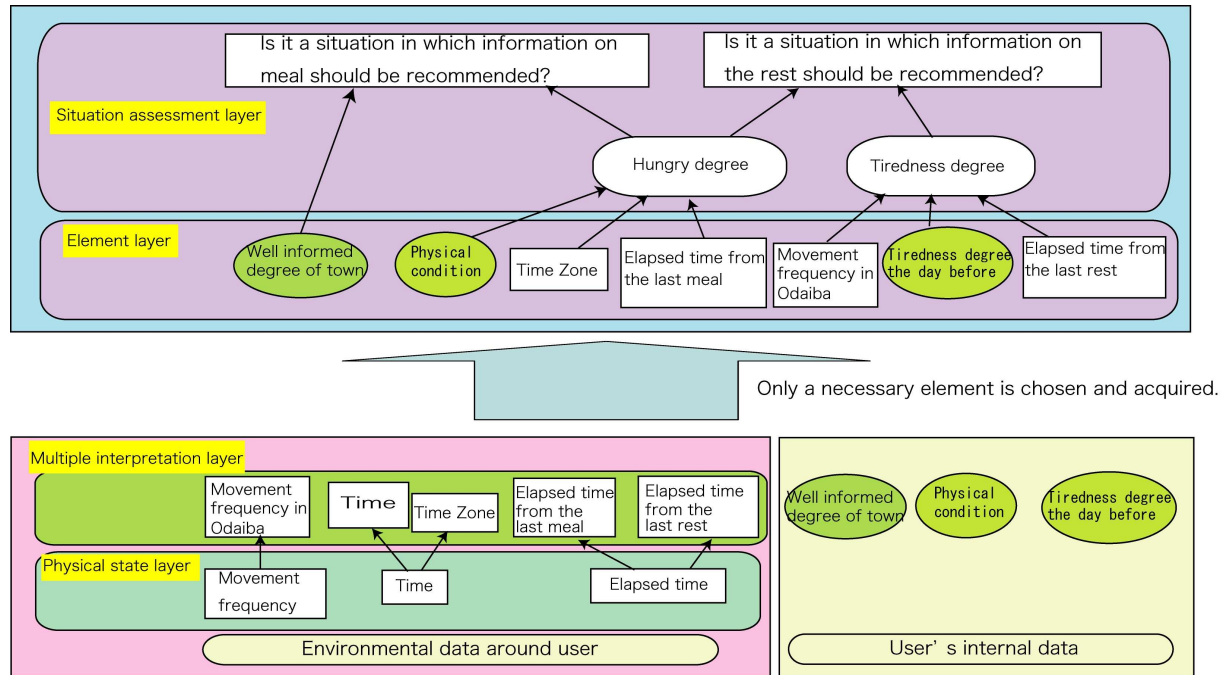
Figure 3 : Hierarchy of situation

We propose the technique for judging user's situation by using these hierarchies.

(1) Whenever man is looked at and the item of the physical state layer is heard, information is updated. Therefore, the value is stored in the slot for which this layer is automatically prepared at a certain constant cycle at the user present location and time, etc. now.

(2) The item of all a multiple interpretation layers that derive from data is buried based on updated information.

(3) Because the slot in the element layer is decided according to the item that judges whether to have to present information, the data to put it in the slot is chosen from the multiple interpretation layer and it inputs it.

(4) The element of various situations is judged based on information on the element layer, and the element state layer that becomes an indicator that judges whether to have to present information between situations is judged.

4   Recommendation system

In this chapter, we propose the method and the system configuration when information guessed to be an automatic judgment of user's situation, and appropriate to the user is recommended.

When information is recommended for the user, the recommendation method is very important. Because I might feel information that has been sent according to the recommendation method not the recommendation but compulsion. It is actually understood that the system automatically judges user's situation, and there are the following problems at the PUSH type recommendation that presents concrete information through a preliminary experiment.

The user is when the situation assessment is mistaken to judge the situation automatically and there is a possibility of sending unnecessary information in the situation.

The result of the automatic judgment of the system is not permitted of the user but there is a feeling compelled by feeling of looking rather than the recommendation to send it one-sidedly.

To cancel such a problem, we propose the method of recommending the advice form. This technique asks whether I may present the presumption result of information that doesn't send information at once when the system detects the situation in which you may send the user information but was guessed once by the user. When it recommends, it is judged it is unnecessary, and doesn't return the system the response, guessed information is not recommended if information to which the user is guessed on that is requested. As a result, information can be presented in the timing that the user wants to see at the same time as giving the authority to judge whether to receive information in the user.

In this recommendation method, it recommends it according to the following procedures.

(1)　The system judges user's present situation based on various elements. The system is judging whether there is information that should always be sent to the user at a certain constant cycle. It is judged whether there is information that should be sent about each information category. For instance, the situation assessment situation assessment "Whether it is necessary to send information on the meal or not?" and "Whether it is necessary to send clothes information or not?" is mutually independent. Therefore, when both of both are necessary, it is likely to be judged, and only one might be judged to be necessary. It might be judged that both naturally are unnecessary.

(2)　It is necessary to do work to confirm whether the information is really necessary for the user once when judged that it is a situation in which information is recommended for the user. For instance, to the user once when it is judged that it is a situation in which information on the meal should be sent "Does not the stomach become empty slowly? There is a restaurant to be near." The information in shape is seen. As a result, presented information will try to be seen according to the advice, and it is thought that it disregards it if it is not thought that it is necessary if it is thought that the user is necessary.

(3)　Information presumed to be appropriate after user's preference and situation are taken into consideration is retrieved and presented from among the information category when demanding from the system side to see information that has been presumed. It doesn't recommend it because it is thought that the information is a situation without the necessity when there is not a response oppositely either.
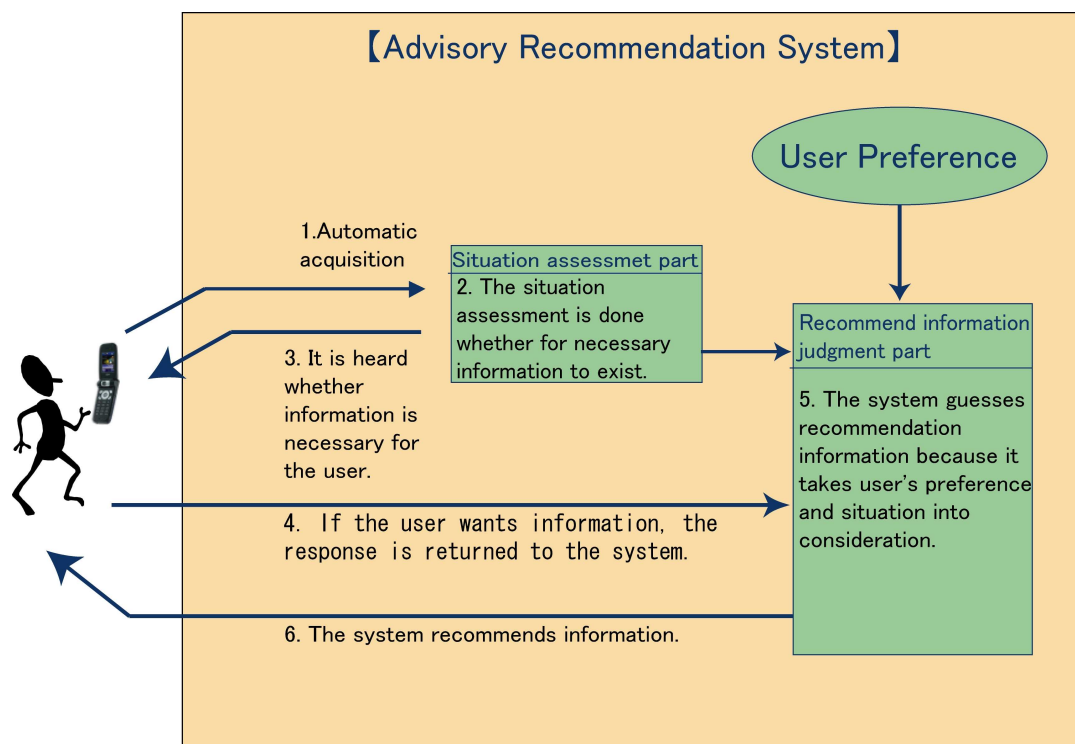

Figure 4 : Advisory Recommendation System

The user can increase the chance to receive information by stepping on such a procedure. The system supports even when my not noticing, and the chance to use suitable information for the situation effectively can be obtained.

Thus, when the response is requested from the user once after the situation is judged, it is necessary to divide "Recommendation information judgment part" that presumes concrete information after the user's situation and preference are taken into consideration into user's seeking for information actually, "Situation assessment part" that judges user's situation from the automatic operation. Then, we constructed the advisory recommendation system that took user's situation into consideration.

Moreover, information to take user's preference and situation into consideration by using "Recommendation information judgment part" because the information category that the user wants to examine on the system side is thrown out at the delivery of information on the PULL type that the user examines by himself/herself if it is this system configuration can be retrieved.

5   Research development in the future

To verify the effectiveness of the system that proposes it by this research, we are advancing the preparation for the situation assessment experiment that makes Odaiba a stage. This chapter introduces the experiment being advanced now.

There are roughly separately two parts in the advisory recommendation service that takes the situation of the user who is proposing it by this research into consideration. It is two of the "Recommendation information judgment part" that judges what "Situation assessment part" that judges user's situation and information I only have to send.

The experiment of "Situation assessment part" that judges it is a situation in this experiment in which the user is requesting what information is scheduled. The situation assessment part is a part where what information category the user needs is presumed, and the result is confirmed in shape of advice. The situation assessment part is a part where what information category the user needs is presumed, and the result is confirmed in shape of advice.

In Odaiba, events related to sightseeing are abundant towns. Generally, the user often comes by the sightseeing purpose. Therefore, if he or she doesn't know detailed information on the town, many of users are assumable. Then, the experiment that judges whether it is a situation in the actual experiment after it fixes in the state "Sightseeing purpose" in which "Meal" and "Rest" should be taken is conducted.

It is while we are doing such a verification experiment now. We want to hope to the announcement while having developed further based on an analytical result when announcing in July.

References
[1] Development of a recommendation system with multiple subjective evaluation process models
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