Design Guideline on Location Based User Emotion Sharing Map Service

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Abstract. In this paper, we present our preliminary initial investigation about a Heart-map system that detect user`s emotion and visualize to cartography map on mobile service. For this project, we developed a wearable prototype to recognize emotions. Based on the prototype, we propose mobile application guideline for this concept functions. Then, We present the results of a in-depth interviews, scenario story board study with ten local people that we conducted with local people, and indicate guidelines for the Function of a Emotion-map systems. Through this project, individuals' emotion and evaluation could look at possibility that social network service(SNS) based on user's specific location. Furthermore, this research can suggest that effective emotion SNS based on system design guideline.

Keywords: Emotion map · Location sharing · Socialization · Mobile application

1 Introduction

Most studies were put in effort from times past in detecting and transferring human emotions. Recently, there has been significant development towards measuring human emotion and the possibility of transferring them to computers [1]. This change of paradigm has focused on utilizing information regarding internal and external human biological signals, a natural reaction that the user can provide appropriately when it is desired [1, 3]. For this, human emotion can be visualized by utilizing the bio-signal data with the external world we live in. The visualization of the emotions of people by displaying in a form of a map can be a good example of a service that can connect people within a society [2]. The current technology with smart phones can be seen as an initial a step as it is using location based map information service [4].

Considering the fact that the existing studies that 94.59 % of human emotion can be accurately measured through ECG and be classified into two contrasting feelings of joy and sorrow [9], a new service can be designed based on regions of human emotion. For an example, a service can be designed for sharing reviews on landmarks, emotions recognized from travel experiences, and reviews on restaurants solely based on human emotions. The data extracted from such reviews and recognized emotions can be categorized and be visualized by designing [2] an emotion map. A wearable device is

work in progress to appropriately measure emotions and effectively visualize such emotions related to designated locations. We have developed a prototype based on location based information for measuring human emotion designed to be measurable anywhere at any time by using biometric data of heart rate variability (HRV) [6].

Currently, there are two largely used human emotion recognition inference models. First, a two dimensional recognition model where it is categorized as: preference to neglect and activity to inactivity. Along with the valence-arousal model, human emotion can be distinguished into happiness, surprise, fear, anger, sadness and more [7]. The two models were used together to utilize the processing software Pulse sensor Amped Visulizer v1.1 which is based on recognizing five human emotions was used to extract the code and the data [6].

Following the previous work [6], this study will focus on providing a system design guideline from the data measured from the wearable device based on human emotion and the user's needs through user study and scenario. We present design space of an emotion map (The Heart-Map application, web site) that helps travelers, families and others to review decide restaurants, landmarks to visit and to leave feedbacks and emotions. We expect a more manageable design guideline for an interacting wearable device with a mobile phone as well as a web site and to see a more complete service.

2   User Study

We designed a user study as in [8], using a speed- dating storyboard study technique in which participants were Separately requested to debate and elaborate their opinions about three different scenarios about when searching for a specific location. We tried to find the user's thoughts and their wants and the possible dangers.

Method and materials. Recruited participants included both male and female in their 20 s and 30 s, mostly those comfortable and used to using smart phones based on a internet community site from a certain location called Mapo-Gu. The participants included: 2 single males in their 20 s, 1 married male in their 20 s, 4 single females in their 20 s, 3 married females in 30 s.

The experiment took a total of 90 min and it was divided into three different parts. First, the participants were given an introduction of the experiment and an initial demographic questionnaire was taken (15 min) following an in depth interview (20 min). Participant's needs and their daily lives as well as their motive. Second, by using the scenario board, the participants were shown the pictures of three different scenarios and after reading the descriptions and carefully understanding the situations they were encouraged to express their opinions and thoughts concerning the situations provided (30 min). Finally, the participants were given the opportunity to share thoughts, two in particular, on how to improve from the scenarios (25 min).

Demographics questionnaire. The initial demographics questionnaire was composed of 40 questions divided into three parts to appropriately categorize users: Part 1. Personal tendencies on using smart phones Part 2. Location selection methods   Part 3. Personal standards on leaving reviews.

In Depth interview. The in depth interview was formed as a one to one interview to specifically find out how participants selected locations when traveling and why. They

also were interviewed on their usual behaviors regarding searching for reviews on restaurants, leaving memos on pictures with family when traveling, and were interviewed regarding with all else concerning searching for locations.

3   Scenarios Storyboard Study

We conducted a Scenario user study using a paper storyboard to stimulate the users' discussion about finding a certain location. The scenarios provided show a set of different functionalities and situations of an imaginary concept.

Scenario 1. This scenario shows how a reservation can be made at a restaurant using the application. The wearable device will measure the user's emotions and leave reviews on that particular restaurant on the mobile phone. This scenario describes how linkage between wearable device and mobile phone is important how reviews from the application can be used to restaurants easily.

Scenario 2. This scenario shows how a family can transfer a emotion from a certain location to their mobile phones and leave a photos and memos. They can store their memories with each other and not just leave as it is. The scenario shows that using the push alarm and having the users write memos allowed to check the application's functions once again.

Scenario 3. This scenario shows a couple using the application to find a travel location with a certain concept or with certain atmosphere. The couple can search for locations with using emotion based keywords. The application shows feedbacks and other users emotion based reviews. Through this scenario, we show how user can control proper trip for their family and how to prepare for find famous landmark in foreign country.

4   Results

The affinity diagram was developed from the study considering user's main needs and their feedbacks. The affinity diagram was categorized into 3 different issues and was again subcategorized. We drew a list of needed and un-needed functions for the users. Most users felt comfortable using the application as they were already using a similar application on their mobile phone. 10 out of 8 users did not feel uncomfortable using the wearable device outside. Users felt the interlinked data from wearable device to the mobile phone was useful. 2 of the users questioned the reliability of measuring their emotions simply from the wearable devices. We describe some of the design issues from the study.

Emotion based map. Most participants preferred and felt eased mapping the emotion by colors rather than with words. A color's intrinsic effect had a strong impact towards the users' ability to view the map with ease. An opinion was raised if a simple keyword would be added to supplement and provide explanation for each color.

Interaction between wearable device and mobile application.   Two of the users questioned the need for the wearable device for measuring their emotion. Other users seemed positive towards the device and felt that it was easy to use on their mobile

phones. They also suggested having a pc-based emotion map for better visualization and for a wider look.

Review service and SNS. Most participants were already involved in travel and food communities. They were already sharing their data with others. They wanted real reviews from real users not from the owners themselves. They seemed positive tagging themselves to locations and leaving reviews on SNS but were concerned if their involvement will cause negative impact towards housing market or an overall negative insight towards a certain location.

5   Concept Prototype

Most of users' feedback was used to complete the prototype. The Information Architecture was formed using the study regarding the affinity diagram. Gathered data was able to be better sorted using the diagram. Mobile users feel most sensitive when facing complicated interfaces. The important fact is to structure the interface for them to be able to follow and use the interface without any troubles. The application shows the prototype (Fig. 1) where the colors show user's emotions regarding locations. The user can also type in a certain keyword to search for a location by using the wearable device and transfer his or her emotions towards that location into their mobile phone.

The user can apply the emotion data from measured by wearable devices using mobile application and leave reviews regarding each location. They can select three different mode for the following emotion map (1.) Emotion Map (main), (2.) Emotion graph, (3.) General Map. User also use the application when taking photos and using SNS leaving emotion factors inside. They can review using personal emotion data when they visit the various shops in the map and share to people through the SNS.
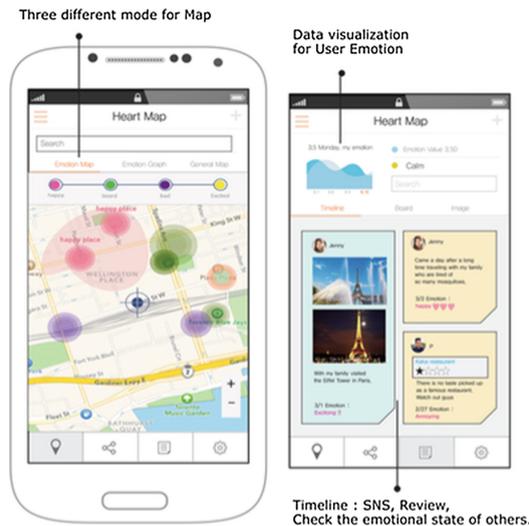
Fig. 1. Overview of the Heart-Map Mobile application prototype feature

Finally, Finally, the Mobile application allows users to see recommendations for happy place and allow user to share review information conveniently with other user, using categories for easier access.

6 Conclusions and Future Work

This study is based on examining user's emotions related to a particular location as well as his or her reviews by using a wearable device. The extracted data from the experiment will be used to develop emotion based map. The concept of the product and the importance of its functions were concerned from the interviews regarding users' needs as well as its expected scenario storyboard. The prototype was completed using the extracted data above and using the possible guidelines and beginning points of the project. In future work we plan to include considering and deciding whether the users' emotion will be measured automatically or manually based on usability tests. Most work will be focused on developing an algorithm towards testing and supplementing the limitations of the project and will be considering generalization as well as visualization of each location.

References

1. Jung, H.S.: Trends and prospects in healthcare wearable devices. In: KHIDI 2014 (2014)
2. Biomapping. http://biomapping.net/
3. Kim, K.H., Bang, S.W., Kim, S.R.: Emotion recognition system using short-term monitoring of physiological signals. Med. Biol. Eng. Comput. 2004 **42**(3), 419–427 (2004)
4. Kan, S.G., Lee, K.W.: Development of android smartphone app for corner point feature extraction using remote sensing image. Korea J. Remote Sens. 2011 **27**(1), 33–41 (2011)
5. Lee, J.A., Na, E.Y.: The Influence of Motivation for Using Smart Phone Applications And Innovativeness/Compatibility on Application Use and Substitution for Other Media/Living Equipments. Korea Press Association 2012 (2012)
6. Park, S.S., Jeung, D.N., Noh, G.Y., Cho, J.D.: A study on the human emotion infer in meaningful place using HRV signal and text mapping. In: KCHI 2015 (2015)
7. Russell, J.A.: A circumplex model of affect. J. Pers. Soc. Psychol. **39**(6), 1161–1179 (1980)
8. Davidoff, S., Lee, M.K., Dey, A.K., Zimmerman, J.: Rapidly exploring application design through speed dating. In: Krumm, J., Abowd, G.D., Seneviratne, A., Strang, T. (eds.) UbiComp 2007. LNCS, vol. 4717, pp. 429–446. Springer, Heidelberg (2007)
9. Jing, C., Liu, G., Hao, M.: The research on emotion recognition from ECG signal. In: ITCS 2009, pp. 497–500 (2009)
10. Niskanen, J.P., et al.: Software for advanced HRV analysis. Comput. Method Programs Biomed. 2004 **76**, 73–81 (2004)
11. Miu, A.C., Heilman, R.M., Miclea, M.: Reduced heart rate variability and vagal tone in anxiety. Auton Nerosci 2009 **145**, 99–103 (2009)