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Usability Evaluation on an Affective Mobile Platform Based on Social Computing

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Abstract: In recent years, people's impression of web2.0 has been changed by many social networking rising abruptly, especially Facebook. It has become the most popular site for most of the Internet users. Facebook's CEO, Mark Zuckerberg, has also announced that there are over five-hundred million members visit Fcebook for a day. It means many people use Facebook to socialize with their friends. With Facebook's graffiti wall, you can post news, photos, or favorite links. By pressing the "like" or replying message on your graffiti wall , you can easily know there are many of your friends concerned about you.
But only through the content which was published on the graffiti wall is difficult to find out users' emotions. So, if we can build an affective social computing platform on Facebook, analyzing and evaluating the contents what user posted on their graffiti wall, sending the relevant emotion result let user's friends know, it may help them understand what is user's emotion easily ,and this may help your friends know what is your situation recently that they can have some corresponding to you, and this behavior is what we want to see. We hope to use this platform to help improving you and your friends' friendship. This study is focus on three major as following: (1)Using Internet to have Community and interaction .(2) How to build a platform combining affective computing on Facebook(identify symbols including text and voice), then let users decide whether update their emotion status on Facebook's graffiti wall or not.(3) Setting up our platform on mobile device. Such as: Android、iPhone…etc. We used Android smart phone in this project.

Keywords: Mobile Device, Social Network, Affective Computing, Facebook, Android

Introduction

Due to the Internet boom, people who use computer are growing to a enormous number . Many people will use computer no matter how old they are; And using time is also being longer and longer. For those results, many different communities had been built on Internet. Those communities which were built on Internet have a new name, "Social Network".
Facebook, which is the leader of social networks in recent years. According to checkFacebook.com (Facebook's official website) shows that, Facebook had already have

624,682,160 users, and is continuously growing. The data said that: Taiwan's Facebook users have more than ten million people. What a enormous number!
You might have a question for Facebook, how did Facebook get so many users? Here is the reason :Facebook has a function called ”user’s emotional state”, this one is really attract teenagers; You can make friends on Facebook or comment a post by “like”. If your friends change their emotional state from “In a relationship” into “single”, there must have a lot of curious friends to ask “What’s going on” or something else. But sometimes ,they are already heart-break, and don’t want to be bothered cause they are in a blue. So, we think Facebook might need an affective computing platform which can let users talk about themselves then make analysis. When user’s emotion state come out, sharing on the graffiti wall .This may help people understand each other more clearly.

1. Typographical Style and Layout

1.1 Web2.0 and community computing

Facebook can be regarded as the representation of Web2.0 and social computing .Web2.0 and social computing have many definitions; Macaskill and Owen had a definition :"To allow users to have access rights to get, provide, description, tags, comments and labels with a variety of Internet web media formats such as text, video, music, photos, graphics on the website platform".

1.2 Affective computing

Affective Computing has four dimensions: (1) Perception: the system in terms of a mechanism for emotional input. (2) Modeling: to establish the classification of emotional relationship with the relevant variables. (3) Expression: emotional output mechanism. (4) Communication: to describe the emotion through language, to facilitate the transmission of emotions (Li Yan Tsai, 2004; Vesterinen, 2001; Hosts Red, 2007).
Picard (2000) mentioned on the Emotional Intelligence and noted that affective computing can be divided into four levels, they are: (1) Identification of emotions (2) The expression of emotions (3) With emotion (4) Emotional Intelligence.

1.3 Android

Android is created by Google, many technology and mobile phone companies .They gathered a team called “Open Handset Alliance”, and it’s totally free and open source, this reduces the costs of research a new mobile device. Android mobile device is designed on the basis of Java programming language, and use Linux Kernel as core; It provide a lot of convenient API and works on Dalvik (the machine use to test Android system). In this framework, developers can minimize the coupling degree between programs and hardware that they can concentrate on developing Android program .

2. Research Methods

This research used affective computing algorithm, PHP, MySQL, Android mobile device and Flash AS3 , to build a platform that can recognize emotion with user's text or vocal level. We built a platform by Flash AS3,turning it into an Android App to catch information from user's inputs. After our database get user's information, it'll return the recognize results for users. The database used Facebook API to communicate with Facebook.
Word recognition, using the method as follows: (1) Ontology and natural language processing technology base on the Symbolic AI mode.(2) Computational Intelligence model which is Combined with SVM, KNN and other classifiers, emotional dictionary, language structure. Vocal level recognition part are: (1) Using sensors to capture emotional speech signal, then use the endpoint detection method to cut out the useful passages to exclude unnecessary data.(2) Calculating sound pitch and energy from the data to define different emotional features. Finally, to determine the emotion state with hybrid model of decision-making through voting algorithm to send the recognition results.

2.1 Emotion recognition database

User's Android phone or Facebook will be linked to the emotional identification database to define. The function of this emotion recognition database are as follows:
(1) Connecting and setting with user's Android phone.
(2) Capturing user's text from the platform and use text to do emotional recognition.
(3) Capturing user's voice then transmitted from Android phone to the database and doing voice emotion recognition
(4) The emotion recognition results will automatically publish on user's graffiti wall.

2.2 Facebook API

Facebook provide some API and related development kit for developers ;That can be used in Facebook's website, mobile application and so on. In this research we used Graph API and PHP for development, JSON for Graph API to pass user's data, PHP SDK will assist in communication between PHP and Graph API (such as login, pass the user ID, etc).
The main functions of this API are as follows:
(1) To obtain the permission to post the recognition on user's graffiti wall.
(2) Automatically obtain the user's information from Facebook.
(3) Automatically post user's results on the graffiti wall.

2.3 Symbolic AI mode: Ontology and natural language processing technology as the foundation

In the relationship between the intensity of the two concept ;If one concept is set to emotions of joy, anger, sorrow, hate, surprise or other emotions, then it can get a concept node relative to the distance between different emotions, then it can be regarded as a concept for associated intensity with different emotion. Therefore, we can define every keyword (concept) by the emotional intensity.
If we only discuss the keywords of a sentence, make inferences, then calculate, it can be regarded as the emotional content of this sentence.

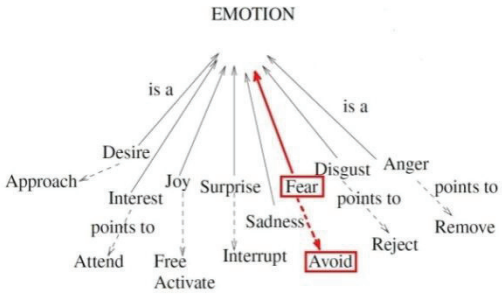

Figure I: Ontology-based & NLP system architecture

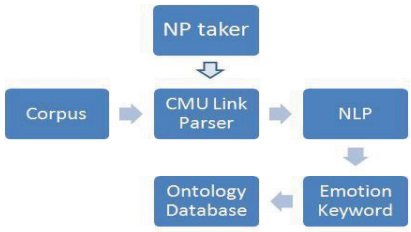

Figure II: Emotion Ontology

2.4 KNN

KNN (K-th Nearest Neighbor) is based on Statistical Learning Theory. It developed a kind of unsupervised machine learning system. After analyzing text ,the information with those characteristic values will help KNN training and improving recognition accuracy.

2.5 Hybrid voting algorithm for decision-making model

We use Nguyen's study to decide the emotion, it contains three types (Nguyen, 2005): (1) Minimum Misclassification Method (2) Maximum Accuracy Method (3) Dominant Class Method.

2.6 System usability scale(SUS)

SUS was created by Digital Equipments Co Ltd. in 1986; It's purpose is to help companies to know their product's usability and it's easy to get the information which you need. We used SUS to figure out how people think about our platform. We analyzed the question and solve the problem which base on these questionnaire.
Table 1 shows our SUS questionnaire. In this research, we got 59 subjects .

Table1 SUS questionnaire

	Very disagree	Disagree	Non	Agree	Very agree
I think it's really easy to use this					

prototype of the Simulation tests ,and I love to use this way to share my emotion					
I think this prototype of the Simulation tests is too difficult, there are some Redundant design.					
I think this prototype of the Simulation tests is easy to use					
I think I might need a guide to tell me how use this prototype of the Simulation tests					
I think this prototype of the Simulation tests have a good design of interface, it can help me to share emotion easily.					
I think this prototype of the Simulation tests have so many confused place.					
I think most of the people can easily learn how to use this prototype of the Simulation tests					
I think it's hard to use the prototype of the Simulation tests					
About this prototype of the Simulation tests ,I have confidence to use the correct way to share my emotion.					
I think I should use more time to figure out how to use the prototype of the Simulation tests					

Table2 is the calculation base on Table 1.The average is 62.14;Minimum is 45, maximum is 87.5, and mean is 60.

Table 2 The result of SUS

Average	Median	Minimum	Maximum	Standard deviation
62.14	60	45	87.5	10.15

The initial simulation questionnaire's scores are not look pretty well. So we redesign the system and platform. At next round, we picked 30 people to do the questionnaire again. And we got Table 3.

We find that the score has raise. It means most of the subjects think our system is worth to develop and they would like to use our platform.

Table 3 (For 30 surveys)

Average	Median	Minimum	Maximum	Standard deviation

69	65	60	87.5	8.77

Why are these surveys have different score?

(1) Most of the subjects are students; They don't have much experience on using smart phone whether Android or iPhone, so they answered the question as "non". After using our system they find that it's not difficult to use smart phone and it's pretty easy to use our platform on it.

(2) At the first time we have this questionnaire is only on paper, so some of the subjects maybe can not fully understand what we are doing and accept our system. After we turn it into video and put it on Youtube ,we put our questionnaire on the internet and we got positive affirmation more than we expected.

3. Experimental Results

Users can use our platform on Facebook or their Android phone. When users is using their Facebook on the PC, they can use microphone to input the vocal level, then upload to emotional recognize database or type text with their keyboard; Or, using Android smart phone to give the information which our system need to our database. After system recognized, the database will transfer user's emotional state to their platform and the platform will automatically upload the result to Facebook's graffiti wall.

4. Conclusion and Future Works

In this research, we met a numerous problem ;Some user don't have a smart phone and it's not easy for everyone to accept what affective computing is (Some of the subjects said that it's dangerous to give emotion to computer). This research did a great job to help people understand what is the new trend of 22 century technology, Smart phone ,Android, and affecting computing. We proof that computer have emotion it's really humanity and it's only dangerous in movies.

There are more and more people start using smart phone. Android, Apple and windows, they are getting better and cheaper. This is a chance to have a revolution on technology, letting everybody have a smart phone it's not just a dream; It have happened , and it's still happening.People will get closer due to our platform. It's really easy to share your feeling, after recognized you can upload your emotion to the Facebook. It is so easy to let people know each others.

We hope to add facial detection in our platform. Besides, we want to put our platform not just on Facebook or Android but even iPhone or Windows phone. This might help our system to get more recognition and more accuracy. Hoping user who use our platform will:(1)Getting more and more people to use Facebook, and let the social network getting better and better.(2) Let user know what is their feeling and help them to recovery or share with user's happiness (3) Let people know each other not just what they looked outside but their heart inside.

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