

Mood based services for mobile phone environment

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Abstract – This is a research on a new class of services that we propose for the mobile phones, based on the user's mood. The paper contains a user oriented research and a Mood Server first attempt application. We studied the need for this kind of services in an experimental survey, a call monitoring and the effect of GSM coding and noise mood recognition. As result we understood that users need and want this type of mobile services. The Mood Server developed by us is a first attempt of implementing the service and is based on short messages (SMS). It provides emotion declaration support with respect to the belonging groups and privacy demands. As further work we intend to use fuzzy systems for mapping the moods and to take other context elements into consideration in developing the Mood Based Services.

I. INTRODUCTION

As social human beings, people are changing their position in order to meet the others. If the perfect question of the mobile era "Where are you?" [1] can get a satisfactory answer from a location server, why not having a mood server that can answer to the classical "How are you?" question.

Nowadays it became more important to send context information about the subscriber's environment. As mobile users we are free to change our context continuously. In the society we do not just move and exchange ideas but we feel each other as well. The mobile telephony solves our need for "telepathy"; we think that many people would like to tele-empathise with the others, too.

That is why we have imagined a class of services based on the subscriber's mood, analogue to the Location Based Services.

As similar applications we have found the following:

"Yahoo! Messenger" is accessible on the mobile phone too by a WAP-based application. It is useful for grouping people, expressing their status but we think that our proposal is better because:

- Is dedicated to serve mood requests
- Not all the mobile phones are WAP enabled
- If a user does not have a GPRS enabled phone he must pay a lot for the connection or must connect and authenticate in order to send a message to someone, and disconnect to be called on the phone.

"iCAMS"[2] is a mobile dedicated tool that considers the location and the personal schedule of a group in order to facilitate meeting planning. In addition we take into account the mood for establishing a meeting and/or forming ad-hoc groups.

"ConChat"[3] and other applications like CASE,

AgenIAN [4] are describing mediated communication with the affective state monitored in order to facilitate the communication between the parties on PC's. Our contribution is to provide a Mood Server in the mobile network that facilitates mobile mood-based communication services.

II. SCENARIOS

The mobile users have in their hands a tool useful for solving personal computational problems and to communicate. As a consequence the subscriber may interact with the machine, sustain a dialog or to communicate with the others from a group. The following scenarios illustrate some situation in which the mood is important for a mobile user. In the second part of the chapter we associate the mood with the location information to obtain a better image of the users context.

A. Scenarios for Mood Based Services only

We want to adapt the messages content received from the mobile network to the user's mood [11]. Here are some situations: publicity adapted to the target's psycho-emotional state, entertainment or information provided according to the user's state. Let's see some scenarios.

In publicity it is important that the message reaches its target. A suggested rule may be: if the person is in a negative mood, don't send him any publicity message: "David is stressed because today is the deadline for an important issue. The Mood Server knows his state and puts the following message in a queue "The B detergent is the best of all! Buy B!". After finishing his work David is now content and may be available to go shopping. The Mood Server reacts to the changing in his mood from a negative state to a positive one and sends him the queued message".

Mary had a quarrel with her boss and her mood is "sadness". Her mobile phone "feels" that and sends the new status to the Mood Server which reacts like a buddy sending her this message: "Panta rhei, everything is in a state of flux and motion. The fine days are around the corner :)".

In face-to-face dialog, the face of the other partner, its mimic and gestures movements, the voice tonality are giving us important clues of his psycho-emotional estate before, in the time and after the discussion. But when the mobile phone rings, unless we are not very sensitive, we can't say weather that person is in a good mood or not. In

the time of the dialog, on the phone, we may figure out or we may ask it explicitly. Finally when we decide to turn off we may just have an idea of what that person will feel in the next minutes.

There are sets of possible application that use psycho-emotional estate in managing a dialog: chatting on the mobile in a mood aware application, adaptation of our voice tone when speaking to a sensitive person as for example in the physician-patient, teacher-student, lovers, between businessmen.

Let's say we already have a wap-based chat on the mobile phone [8]. "Mary had written a message to Virgil "We'll gone to have a baby!" and she waits for his answer. The next minute is emotionally very intense for both. She wonders what is his husband's mood because he gives no answer. She asks the Mood Server for his state. The answer comes from the server quickly: "Virgil is happy!". He was so happy that he lost his words!"

It is sometimes very important in a dialog, especially in hierarchical relations, to be able to figure out the other's affective condition. As an example a secretary knows the best when the boss may be not available emotional speaking, and for whom. So an application that gives us a person's mood especially before the dialog, can help avoiding difficult relational situations.

It says that "Similia similibus solvuntur" ("Like selects like"). People are meeting each other according to their mood. Gaming, shopping, having a beer, flirting with someone, being in a party mood are based on our inner condition. As this implies some other people, we share these moods with them in Collaborative Aware applications [4]. For instance, let's say that Dan is tired of his work and in the mood to see a movie. He usually goes to a movie with her girlfriend, but for now she is at an important meeting in another town. He asks himself who is available, among his friends, and may want to join him. Paul, an old friend is temporary in the town and he is alone and has a free afternoon. Paul serendipitously finds Dan's number and calls him. They decide to see together the movie. That is classic. But if we apply to Dan the Murphy's Law then the only available person in the town to see a movie, Paul, is the last person that Dan is calling in order to establish a meeting and in that particular moment has no signal.

The new scenario is that Dan is declaring his movie mood and the mood server finds Paul as available for that. They decide to see the movie together.

B. Mood Based Services scenarios with respect to the location

The location it is a very important clue that is why it is the first context element already available in some mobile networks. The services, which take into account the location of the users, are known as Location Based Services (LBS).

1) *Human-Mood Based Server interaction:* Let's say that Claudia has a time break between two meetings in a new city for her. She is quite tired and she is searching all over for a place to relax. She hears a spot at the local radio informing her that there is a salon perfect for recreation. She wonders if there are some other place and how far

from her location. She may ask someone on the street.

That is the classical one. The LBS-based one is that when she asks for a certain interest point in her neighbourhood - a restaurant, for instance - but she have to select from a set of near objectives which one she prefers.

If we are combining the location and the mood in the system, an application may provide to Claudia her mood and may find all the services for recreation in her area: the restaurant, the swimming pool, and the botanic garden.

2) *Dialog and group interaction:* We think that the location information added to the Mood Server will facilitate binding together people on the base of proximity and mood. People can avoid loneliness by sharing activities like shopping, gaming, and meeting for different purposes: beer, flirt, disco, movie [5] etc.

Mary is searching for some other girls from hers entourage in the mood for shopping. She changed her status from "learning" to "shopping" and she is near to a shopping centre. The system is searching for someone available in all her groups that are in that area of the city as the GSM provider's location server informs us. Christine and Lilly are very near and may join her. The system invites them to create the ad-hoc shopping group. Later George is getting in the proximity of the group with his shopping mood. George is a good friend with Lilly and he is automatically invited to join them.

III. RESEARCHES ON MOOD BASED SERVICES

In order to understand if this kind of services are of real interest for the user we have conducted several experimental surveys. The first one is answering to the question how important is in general the mood for the user compared with location and if is useful to group people. The second is simulating an application, which notes the mood (automatically and declared), position and other context elements. The third one is testing the effect of coding and noise in perceiving of the psycho-emotional state.

A. Mood importance in mobile communication

We did the experimental survey in Romania on 30 people and in Germany on a very small group of only 6. The purpose was to understand the importance of the location and the psycho-emotional state, the preference for automatic deducted or declared mood, the intimacy degree, the possible contribution of the MBS for the groups and situations in which the mood was essential for the user.

Mainly we looked at the survey took in Romania because it has a larger number, but we will comment some times the German survey, too.

1) *The experimental survey's procedure and questions:* The people interrogated in the experimental survey are young mobile users with a mean age of 27,56 years 12 women and 18 men. The persons involved in the experiment are not representative, because they belong to a restricted area of users. The set of questions where:

1. How often do you speak on the mobile phone -- number of initiated versus received per day?
2. In how many calls you are interested in the: a) location b) mood of the interlocutor?

3. If you would have a system that adapts to your psycho-emotional state would you prefer to: a) declare yourself; b) be detected from my physiological manifestation

4. How would you like to be your mood: a) secret from the others; b) public or private according to the person that requests it.

5. Describe a situation in which your psycho-emotional state or the one of the interlocutor where very important for you.

6. How useful do you think would be to know your interlocutor's mood? a) not at all; b) a little bit; c) medium; d)very.

7. How could help you individually a mood-based application if it would know your psycho-emotional state?

8. Do you believe that a mood-based application could facilitate your integration in a group or to help you create a new one? And if the answer is yes, please explain how.

There are some significant answers to the questions 5, 7 and 8. First the descriptions of important psycho-emotional during the dialog: the interlocutor's mood was important "When I had to beg something from my relatives I had to be very kind, calm and humble", "When I had to give an unpleasant news because I had no idea how will he react", "When I am in love". The answers for the question 7: a mood-based application may help me "Through encouragements.", "It could adapt itself to the state and take some proper decisions like: if I am angry block some calls etc", "To send me some flowers when I seek for them".

The question on grouping people seemed very inspiring for the interviewed. A more general answer says: "Yes, [a mood-based application, authors note] would help the participants to find their fellows, to harmonize with each other and to share their emotions at distance". The idea of creating ad-hoc or permanent groups is related as follows: "When I am in a good mood and I want to visit an exposition, they maid be some other friends of mine who would like to join me", "For instance: creating a group of optimists". In order to maintain the group there are some propositions and observations: "The empathy would facilitate understand each others and generate trust", "Harmonizing with the others or communicate with the ones with the same positive mood", "Especially when I feel very well it is easier to integrate in a group".

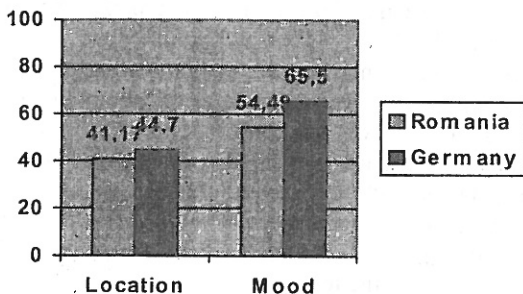


Fig. 1. Location vs. mood

2) *Conclusions on the experimental survey:* The first conclusion is that in 41.17% of the calls it is important the location and in 54.49% is important the psycho-emotional

state. The Germans seem to have the same preference in the favour of the mood. The automatic detection and transmission of the mood is convenient for 23.3%, but 73.3% prefer to declare it.

For 23.3% of the mobile users consider that the mood should be secret from the others, 73.3% say that the privacy must be shared accordingly with the degree of intimacy and 3.3% did not answered. This means we will

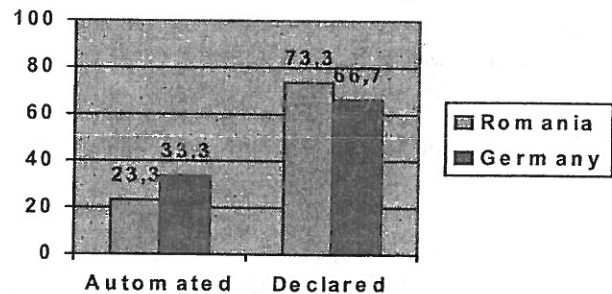


Fig. 2. Declared or automatically detected mood in %

have to measure the state, store it as a parameter and compare it with the declared one for further studies.

The persons interviewed described us some interesting situations in which they were very focused on the other's mood. Generally are negotiations, professional discussions for teachers, doctors, and emotional charged contexts: exam, penalty, marriage, someone's death and so on.

For the individual use human-system interaction, the survey shows that there is a correlation between the people who believe that mood must be secret (23.3% RO, 26.6%GE) and the people who think that the system cannot help them individually (20%RO, 16.6%GE). The idea of using a mood machine accessible as a service from the mobile phone seem pleasant to the subscribers with a majority of 63.3% to 20% in Romania and 83.3% to 16.6%

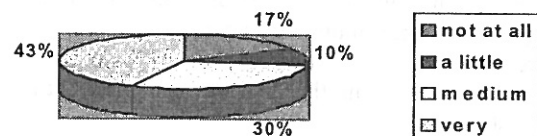


Fig. 3. The psycho-emotional state importance in % for the mobile subscriber in a dialog

in Germany.

The importance of the mood in a dialog is depicted in figure 3. It is clear that many 83.3% are attentive to the psycho-emotional state of the called person.

The users of the mobile network think that mood-based ad-hoc groups may be created in 46.6% cases but some 23.3% deny the usefulness of the mood in creating groups. The same ratio of deny (33.3)/agree (66.6) of 0.5 we observed in Germany, too.

B. Call monitoring for context elements

The call monitoring involved six mobile subscribers who gave details of around ten calls. Due to the diversity

of the mobile phones we conducted the monitoring in the classical manner – on the paper. The context elements where: location, psycho-emotional state (base state, extended set), and other elements. When a call took place the subscriber had to complete some details about the dialog's context. Corresponding to the context element the person had to chose between low, medium or high importance of that element.

As you may see in the table bellow the location is in majority considered as a low importance context element, the mood restricted to a set of eight states (fear, anger, sorrow, joy, disgust, acceptance, anticipation and surprise [4]) is of a medium importance but is very important when is expressed in natural language. The users considered other context elements as less important.

TABLE I
THE RESULTS OF THE CONTEXT ELEMENTS AND THEIR IMPORTANCE IN A MOBILE CALL

		low	medium	high
Location		50.79%	12.69%	36.5%
Mood	Base states	42.8%	14.28%	42.8%
	Extended set	25.5%	23.25%	51.16%
Other elements		52.38%	11.11%	36.5%

C. The effect of coding and noise to the perceiving of the psycho-emotional state for the mobile user

From these surveys we may see that for the user is important to know the interlocutor's mood. The question that is rising is when is it the most important before, in the time or after the call. Does the GSM voice coding affects the perceiving of the psycho-emotional state?

We have used 12 different states (agitation, power, fear, happiness, proud, surprise, contentment, sadness, tiredness, bored, melancholy, joy) interpreted by the same person with the same text: "The human kind is a superior being. It can understand the psycho-emotional state of his fellows."

Eleven persons listened to a set of nine audio tapes, corresponding to PCM, GSM and GSM with noise coded signal. All nine audio tapes where different states. The interviewed person listened to the audio sample and had to decide which among the 12 states is the nearest to the one he listened.

We have obtained the following results for PCM 57.57%, GSM 39.39% and GSM with noise 36.36% of correct recognition of the psycho-emotional state. As we may see the GSM coding affects the correct perceiving of the mood. This justifies applications that monitors and represents the mood in the dialog period, too.

IV. TECHNICAL ISSUES

As far as we may see now there are these problems concerning human-machine interaction and telecommunication:

1. How to determine automatically the mood?
2. How to transmit it?
3. How to adapt the content to the mood?
4. How to personalize the mood information?
5. How to optimise client application?

We are not trying to solve some of above. The

automatic determination of the affective state is in study now in different teams but is not our team's object. As described in [4] the emotion detection may be done taking into consideration some of the most important physiological responses: pulse, heart rate, blood pressure, skin conductance and colour, papillary dilation, temperature and respiration. The mobile network solves the transmission problem. The Mood Based Service Server should have access points for SMS requests; WAP-WML pages format requests, voice and DTMF requests and HTTP. At least one of SMS or voice access is mandatory.

The adaptation of the content to the mood implies a representation of the psycho-emotional states [4], a system that can interpret them and to find the best formula to transform the voice or text message content into a new one adapted to the user's state [11].

The personalisation of the mood information must take into account the need for intimacy [10]. We already have the "Yahoo!Messenger" example in which the status is changeable according to the personal option. For instance you may change your status into "invisible" or even "off-line" for one person. As in the OMA [9] recommendations for LBS we must consider the situation that the user does not want to show his mood. We think that he must have the freedom to declare his estate according to the degree of intimacy of the target group members.

Because of the diversity of the mobile devices it is difficult to do applications that satisfy all customer needs. Even so we say some minimum requirements are needed:

- the access must be at least through short messages or vocal and DTMF requests
- the interface to be easy to use
- the price to be convenient.

V. EXAMPLE OF A MOOD SERVER APPLICATION

A. Use Cases

Case 1: Iulian wants to know in what mood is his friend, Razvan. He writes a SMS and sends it to the system. The message is: *yul mobile razvi* (*yul* = Iulian's nickname, *mobile* = name of the group, *razvi* = friend's nickname). The system receives it, searches for the emotional state of his friend and sends a SMS with the text: *razvi is sad* (*sad* = Razvan's current mood).

Case 2: Iulian wants to change his emotional state that is shown to his friends from a specific group. He writes a SMS with the text: *yul*happy*mobile* (*yul* = Iulian's nickname, *happy* = new personal emotional state, *mobile* = name of the group). The system updates his emotional state and sends him a SMS for confirmation (*Your update for the emotional state was made!*) and to his friends from this group (Marcel and Razvan) a message announcing the change of his friend's mood (*yul's new mood is happy*).

Case 3: Gigi wants to find out how's Iulian feeling; sends a SMS with the text: *gigi yul*. Iulian is mad on Gigi and he does not want him finding out how he feels so he puts Gigi as an ignored person. The system verifies and sends a message to Gigi containing: *yul's emotional state is not available for you!*

B. Application's functionality

Currently the application has two major functions:
 -answers to any request for the emotional state of a person

-makes an update of an emotional state

In each case the application deals with the type of the emotional state that is written in the SMS. We established a coding for the types of SMS.

* * - update for a private emotional state

- update for a public emotional state

' - request for an emotional state

After interpreting the SMS after this code and the access parameters (nick, group) and new values (emotional state) the application returns a response. The response could contain: a confirmation (e.g. "Your update for the emotional state was made"), the emotional state requested (e.g. "John's new mood is happy!) or an error (e.g. "You are not subscribed to this service", "You are not a member of this group!", "John's emotional state is not available for you!").

For the future we are proposing to add other component to the application that will handle the localisation also for a person.

C. The global architecture

The application consists in three major parts:

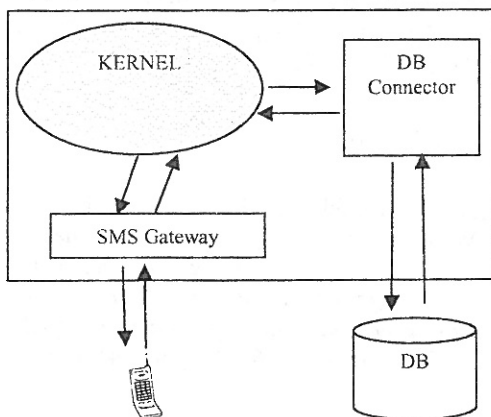


Fig. 4. The application architecture

SMS Gateway – converts the SMS [6] messages in a standard format and vice versa

DB component – interrogates the DB [7] and retrieves information needed

Kernel - is the core of the application; manages the messages (interpretation and creation)

D. The experimental database

The developed database contains information about the clients and their preferences. The structure of the database is made from four tables:

-the information about each client (Client – name, nick, phone number)

-the existing groups (Groups - name)

-members of each group (Grouping – idClient, idGroup)

-clients ignored by other (ClientIgnored – idClient, idClientIgnored)

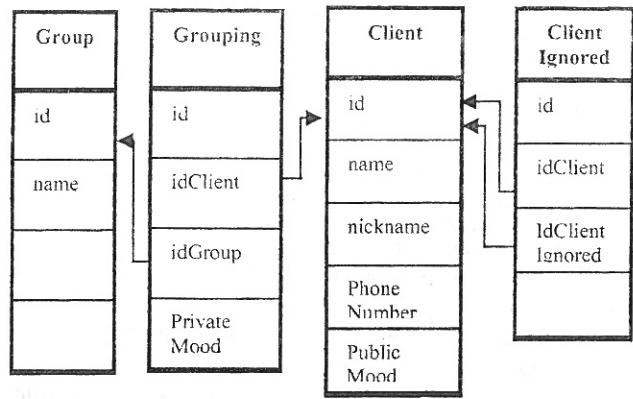


Fig. 5. Relations between the tables from the application's database

The relations between the tables can be seen in the next figure:

E. Experimental results

We have developed an application that responds to mood requests, as a Mood Server. From scenarios presented above we have chosen to present one of them as a screenshot.

In figure 6, in the right part we see the Java application running. The message received by the server is "yul mobile razvi". The silver mobile phone Nokia 6310i is the interface with the GSM world and is connected to the PC using a Bluetooth dangle. The connection is active as you may see in the left-up corner of its screen. The answer (see in the programs window) is send by the server to +40724371570 and is received as seen on the Nokia 6110

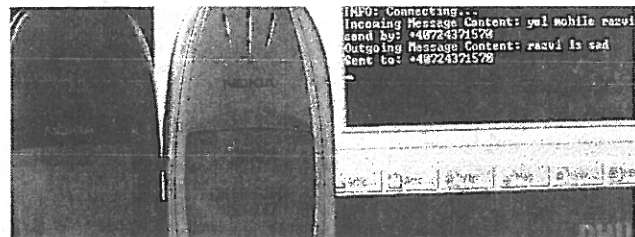


Fig. 6. Private group mood request and answer

phone in the left side of the picture.

The public and private emotional update, the ignored and the not subscribed case are illustrated in the next log:

```

E:\java\mood\vs6\ArticolSoft>java StartMBSApp
11.06.2004 14:00:31
org.jsmsengine.CSerialDriver open
INFO: Connecting...
Incoming Message Content: yul mobile razvi
send by: +40724371570
Outgoing Message Content: razvi is sad
Sent to: +40724371570
Incoming Message Content: sandy*happy*IS
send by: +40721165527
Outgoing Message Content: sandy has a new mood!
That is happy
Sent to: +40724371570
Outgoing Message Content: sandy has a new mood!
That is happy
Sent to: +40721165527
Incoming Message Content: gigi yul
send by: +40722861314
  
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Outgoing Message Content: yul's emotional state is not available for you!
 Sent to: +40722861314
 Incoming Message Content: YUL#happy
 send by: +40724371570
 Outgoing Message Content: Your update for the emotional state was made!
 Sent to: +40724371570
 Timeout period expired, exiting...
 12.06.2004 14:00:36
 org.jsmsengine.CSerialDriver close
 INFO: Disconnecting...

The first situation is that seen in figure 6. The next one is an mood update "sandy*happy*IS". The server's response is send to the IS group which has two members ("yul" and "sandy") "sandy has a new mood! That is happy". The next case , the "gigi yul" request is from a person that "yul" wants to ignore "yul's emotional state is not available for you!" For updating the public mood we have the message "YUL#happy" followed by the server's response "Your update for the emotional state was made!".

VI. CONCLUSIONS AND PERSPECTIVES

In this article we propose a new class of services for the mobile users: Mood Based Services. The survey, the importance of context elements monitoring and the tests on the effect of the GSM voice coding and the presence of noise insures us that this class of service maid be useful for the user.

The application developed is a first attempt of a MBS server. The positive aspects of this tool are it provides psycho-emotional information on request, facilitate the dialog, helps creating and maintaining ad-hoc and permanent groups. As negative aspects we mention the user's concerns about the privacy, the problems of accepting to wear biosensors [10], the exercises needed to learn the message patterns, and the price if the user is not very stable emotionally.

We intend to use, in the next version of the application, a Location Server in addition to the Mood Server and to implement combined applications as described in the chapter 2. We will also consider the fuzzy representation of the psycho-emotional states in order to quantify the valence and the arousal [12].

In this paper the users declare their mood and this has some inconveniences. As future development we intend to use a voice and image based mood automatically detection.

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