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[Continued on next page]

(54) Title: METHOD FOR DETECTING CONTEXT TRANSITION

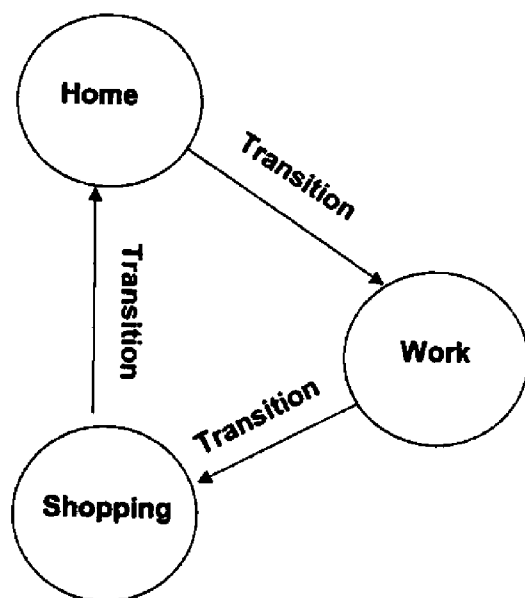


FIG. 1

(57) Abstract: The invention relates to a method for detecting context transition, especially context transition of a mobile equipment, such as a mobile phone. In the method time statistics of using the mobile equipment for communication are collected, in which statistics phone numbers used in the mobile equipment for communication are related to different context, and on the bases of the statistics context and/or location information or transition information of the mobile equipment is detected.



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Method for detecting context transition

The invention relates to a method as defined in the preamble of claim 1 for detecting context transition, especially context transition of a mobile equipment.

- 5 Location information can be used for detecting important everyday user contexts such as hanging around at working place or staying at home. Not only the actual contexts but also the transitions between these contexts are important and valuable. For example some services may be launched automatically when the user is leaving the office and going home. These transitions can be detected solely
10 based on location data but sampling relevant information sources frequently requires a lot of resources and hence is not tractable in real world applications.

The purpose of the invention is to accomplish a new method for detecting context transition, especially context transition of a mobile equipment, such as a mobile phone.

- 15 This invention proposes a system for focusing location information fetching the most plausible time intervals. The invention is based on the effective use of location information and communication, such as call or SMS, history.

This invention proposes a system that can be used for reducing the sampling considerably by utilizing other information available in the mobile device.

- 20 The method of the invention for detecting context transition, especially context transition of a mobile equipment is characterised by the features defined in claim 1. The dependent claims describe preferred embodiments of the invention.

- The object of the invention is a method for detecting context transition, especially context transition of a mobile equipment, such as a mobile phone. According to the
25 invention time statistics of using the mobile equipment for communication are collected, in which statistics phone numbers used in the mobile equipment for communication are related to different context, and on the bases of the statistics context and/or location information or transition information of the mobile equipment is detected.

- 30 In a preferred embodiment of the invention method comprises the following steps:

- establishing a phone book, where different phone numbers are related to different context;
- associating the corresponding phone book entry with the current context, when the mobile equipment is used for communication, (such as a number is dialed, a call is received, SMS is sent or received);
- collecting time based (sampling frequency/hourly) statistics of using the mobile equipment for communication (incoming and outgoing calls etc);
- detecting from the statistics when the context is about to change; and
- fetching location information on during the estimated context change time period.

10 The invention achieves several advantages. The invention detects automatically when the mobile equipment user is leaving a context playing considerable role in his/her daily routines such as work place and moving to another context such as home. This information can be used for accurately targeting any mobile service functionality e.g. advertising or marketing. An further advantage of the invention is that context transition detection can be carried out in a mobile device with very low battery power usage.

The invention is explained in further detail below with reference to the accompanying drawings, in which

Figure 1 is a principle view of user contexts and transitions;

20 Figures 2 and 3 show an example of phone book where statistics is to be collected.

Location information is used for detecting important everyday user contexts such as hanging around at working place, shopping or staying at home as presented in figure 1. Not only the actual contexts but also the transitions between these contexts are important information.

In the invention time statistics of using the mobile equipment for communication, such as incoming and outgoing calls or SMS, are collected. In the statistics phone numbers used in the mobile equipment for communication are related to hours and different context. On the bases of the statistics context and/or location information or transition information is detected.

On the statistics we obtain the phone numbers, which relate to different context. In this connection a phone book or equivalent memory unit is used to where the communication entries are recorded.

We use phone call/SMS distribution to find start and end time estimates for daily contexts. Location information sampling frequency is preferably increased near of the estimated border values (transitions). We can define the phone book as follows:

1. Set unique IDS (= identification code) to different phone book entries
2. Set a list of geographical locations (number of locations is D)
3. For each incoming or outgoing call/SMS (and related phone number) fetch the current location and associate with the nearest location the corresponding ID
4. Initialize two C x D dimensional matrices to zeros. Each row C corresponds a timeslot and each column D a location. One matrix is based for working days and another for weekends, for example.
5. For each incoming or outgoing call/SMS (phone number) add one to the element of the relevant matrix. Let T be the timestamp of the call/SMS and d the location in which the entry has been active most often. Then the matrix element (q, d) is updated. $\lfloor T \rfloor$ rounds the time to the suitable timeslot.

In the previous algorithm Item 3 and Items (4,5) are not dependent and can be executed parallel.

In figures 2 and 3 we can see an example of the phone book. In the first column, figure 2, we have entry and related phone numbers (Number 1, Number 2, Number 3), in the second column we have location information ID. In the third and fourth columns we context 1 and context 2 to which column elements we have collected entry information. In this embodiment C = 6, which means that each timeslot represent 4 hours, as presented in figure 3. Further, D = 2 corresponding locations (work, home). The data in figure 3 show clear work related context between 8.00–16.00. A good candidate for intensive location sampling period is e.g. 7.00–9.00 and 15.00–17.00.

The invention is not restricted to the embodiment example above alone, many variations being conceivable without departing from the inventive idea defined in the claims.

Claims

1. A method for detecting context transition, especially context transition of a mobile equipment, such as a mobile phone, **characterised** in that in the method time statistics of using the mobile equipment for communication are collected, in
5 which statistics phone numbers used in the mobile equipment for communication are related to different context, and on the bases of the statistics context and/or location information or transition information of the mobile equipment is detected.
2. A method as defined in claim 1, **characterised** in that the method comprises the following steps:
 - 10 - establishing a phone book, where different phone numbers are related to different context;
 - associating the corresponding phone book entry with the current context, when the mobile equipment is used for communication, (such as a number is dialed, a call is received, SMS is sent or received);
 - 15 - collecting time based (sampling frequency/hourly) statistics of using the mobile equipment for communication (incoming and outgoing calls etc);
 - detecting from the statistics when the context is about to change; and
 - fetching location information on during the estimated context change time period.

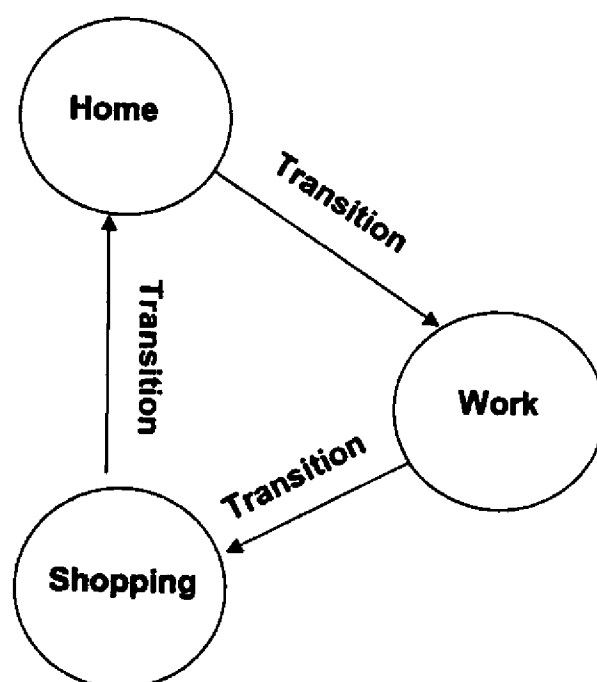


FIG. 1

Entry	ID	Context 1	Context 2
Number 1	1	4	2
Number 2	2	6	1
Number 3	3	1	15

↑

Estimated context 1

↑

Estimated context 1

↑

Estimated context 2

Fig. 2

Time slots	Calls/SMS (entries)	Work	Home
0:00-3:59	-		
4:00-7:59	1,3	1	1
8:00-11:59	3,1,1,1,2,2,3,2,2,1	8	2
12:00-15:59	1,1,1,2,3,2,2,1,1,1,1	10	1
16:00-19:59	2,2,2,1,3,3,3,3	4	4
20:00-23:59	3	0	1

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04L, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI, INSPEC, IPCOM, IEEE Xplore, ELSEVIER, IETF, ETSI, COMPDX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2010029260 A1 (KIM, K.-L. et al.) 04 February 2010 (04.02.2010) paragraphs [0010], [0011]	1, 2
A	GB 2410863 A (ORANGE PERSONAL COMM SERV LTD) 10 August 2005 (10.08.2005)	1, 2
A	US 2009070283 A1 (KANG, T. et al.) 12 March 2009 (12.03.2009)	1, 2



Further documents are listed in the continuation of Box C.



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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT
Information on patent family members

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