A Novel Mobile Phone Contact List Based on Social Relations

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Abstract. Social ties are of a great importance in African societies. Obviously, they are the major provider of entries in the mobile phone contact list. However, the contact lists of mobile devices, as they are designed until now, do not efficiently take into account the social connections between contacts. They do not allow to efficiently retrieve/remember a contact who is forgotten or concerned by homonymy. Inspired by African social and cultural practices, this paper is about a new vision of the contact list design by integrating social ties. Preliminary results of the implementation of this vision clearly show that the proposed contact list is a convenient instrument of contacts reminder and homonymy resolver.

Keywords: Contact list · Mobile phonebook · Social ties
Social software

1 Introduction

One of the basic features offered on a mobile phone is the contact list. The contact list is used to store contact information (names and surnames, phone numbers, etc.) of the mobile phone owner's contacts. Primarily, it serves for allowing people to call contacts without having to remember and dial their phone numbers. Nowadays, smartphones offer contact lists with more elaborated input fields that serve to identify and remember a contact entry. However, none of them is provided with input fields for explicitly describing the relationships that could exist between contacts of the same contact list. It seems evident that relationships existing between people in the social life (i.e., social ties) can explain how a contact list is populated. For example, a frequently observed social practice in African societies is that when a problem has to be solved, people use to resort to an acquaintance who, will in turn resort to his own acquaintance and so on until the right one who can actually help solving the problem. In that endeavor

to solve the problem, several types of social ties (mainly family and friendly) are activated and can spontaneously give rise to the creation of new entries in the contact lists. In this way, a mobile phone can be easily "crowded" with hundreds even thousands of contacts. In African societies in general, the way people do to recognize someone is mostly based on social considerations. Social ties are thus more useful than the classical contact information whenever a contact entry has to be matched to the individual of the real life that it represents. This is further true insofar the "crowding" of contact lists increases the number of the rarely called contacts and gives rise to more homonyms occurrences. The integration of social ties in the design of the contact list software can help facing such a problem of contact matching. The paper in [1] stood for this new vision of the contact list and looks for providing African people with a mobile phone which looks like them in the sense of their social and cultural practices. In the present proposal, the purpose is to deal with preliminary results of the implementation of this new vision.

In the remainder of this paper, we deal in Sect. 2 with a brief review of works with close research interest. We present in Sect. 3 the new design of the contact list, deal with the associated software architecture and illustrate a few screen shots of the developed software. We conclude the paper with Sect. 4.

2   Brief Review of Related Works and Inventions

Since the decade of the 2000s, the design of social software involving the mobile phone contact list has been an active field of research. Several related research works and inventions covered systems built based on the concept of awareness and besides many other issues. Some of them consist of mobile recommendation systems based on situation-awareness [2]. Associating mobile awareness to initiation of group communications, a community-aware mechanism was proposed in [3] for efficient creation of groups of contacts. Works that associate mobile awareness and collaboration are also found. Based on psychological findings, the smartphone contact list was redesigned [4] to provide cues for the design of mobile awareness application that is capable to disclose information about users' presence. Many other works addressed contact information update and exchange. They gave birth to inventions consisting of methods for updating automatically mobile phone contact list entries [5] and improved systems for providing phonebook and bookmarked links to web sites for mobile users [6]. A system [7], that proceeds with synchronization and updates through communications between the mobile phone and a data service provider, enables the mobile phone to initiate according to the circumstances the appropriate form of communication with one of the contacts. Regarding contact information exchange, a method [8] of sending contact list data from one mobile phone to another mobile phone allows to eliminate the need to re-key individual contact data. A messaging service is

used to exchange contact data between mobile phones within a group. In [9], a solution was proposed to take advantage of social relationship and context information to provide recommendations for users of social networks. Inspired by African social and cultural practices, this paper is about the integration of social ties in the design of mobile phone contact list. In [10], the cultural model of African countries was considered in the design of opportunistic networks for facilitating the collection and synthesis of agricultural information.

3   New Vision of the Contact List

The proposed new vision of the mobile devices contact list was described in details in [1]. The contact list is modeled as a graph; its nodes representing the contacts and its edges the social ties that link them. Any type of social tie can be considered. In the particular context of African societies, family ties that are of usual and cultural considerations are more meaningful: "*Is the father of*", "*Is the daughter of*", "*Is the sister of*", "*Is the cousin of*", etc. In this new vision, the classical usual CRUD (Create Read Update Delete) functionalities of the contact lists are preserved and the emerging social software (recommendation systems, group communications, . . .) based on mobile contact list can continue working. In addition, the proposed design of the contact list enables some novel functionalities that make it a practical instrument of reminder, homonymy resolver and cultural values promoter. It also makes available, through the social ties, new cues that can be used in mobile awareness applications.

3.1   Software Architecture

Our approach for implementing the new vision of the contact list is based on the software architecture of Fig. 1. The user interface of this architecture has been developed using Java programming language. The knowledge base is for the contacts information storing and accessing. It consists of an ontology of the social ties populated by individuals and a set of rules of inference. We implemented the knowledge base using Protégé, an open-source ontology editor [11], to create an OWL (Web Ontology Language) [12] file that contains the description of the concepts related to the social ties. The inference engine is in charge of the reasoning and is so the support of the intelligent functionalities that could involve the contact list. The inference engine has been based on Apache Jena, an open-source Java framework for semantic web and linked data applications building [13]. For the queries management between the knowledge base and the user interface, the SPARQL protocol and query language [14] has been used.
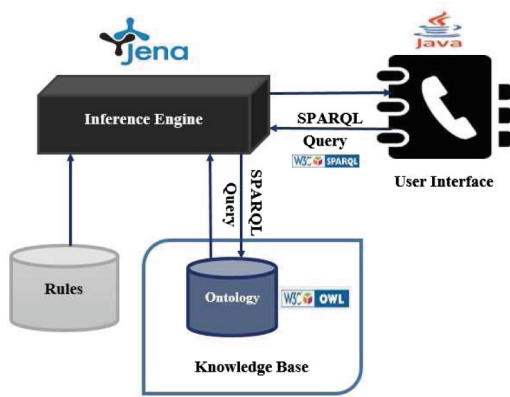
**Fig. 1.** Technical architecture of the contact list software

3.2 Views of the Developed Contact List Software

We developed the proposed contact list software based on the architecture of
Fig. 1. The software is provided with both the classical CRUD functionalities
and novel functionalities that are inherent to the new design. For the purpose of
the demonstration, we registered in the contact list software six contacts includ-
ing two homonyms with name and surname "Dagnogo Ibraïma". The resulting
sample of the contact list is as given in Table 1.

Table 1. A sample of the contact list content

1	**Dagnogo Ibraïma** is the brother in law of **Poda Pasteur**
2	**Dagnogo Ibraïma** is the cousin of **Dagnogo Binta**
3	**Poda Pasteur** is the colleague of **Tapsoba Théodore**
4	**Tapsoba Théodore** is the friend of **Dagnogo Ibraïma**
5	**Poda Pasteur** is the friend of **Zongo Rashid**
6	**Zongo Rashid** is the colleague of **Dagnogo Ibraïma**

One of the novel functionalities makes the contact list an effective reminder.
Indeed, in the particular case of a rarely contacted contact for instance, the
simple visualization of his contact information is not sufficient to remember who
he is in the real life. However, based on the social ties, we are able to remember
that rarely contacted contact and then initiate any form of communication with
him. This is illustrated by the view of Fig. 2a where the fact of knowing that the
contact "Dagnogo Ibraïma" is a brother in law of the contact "Poda Pasteur"
can help remember who "Poda Pasteur" is in the real life.
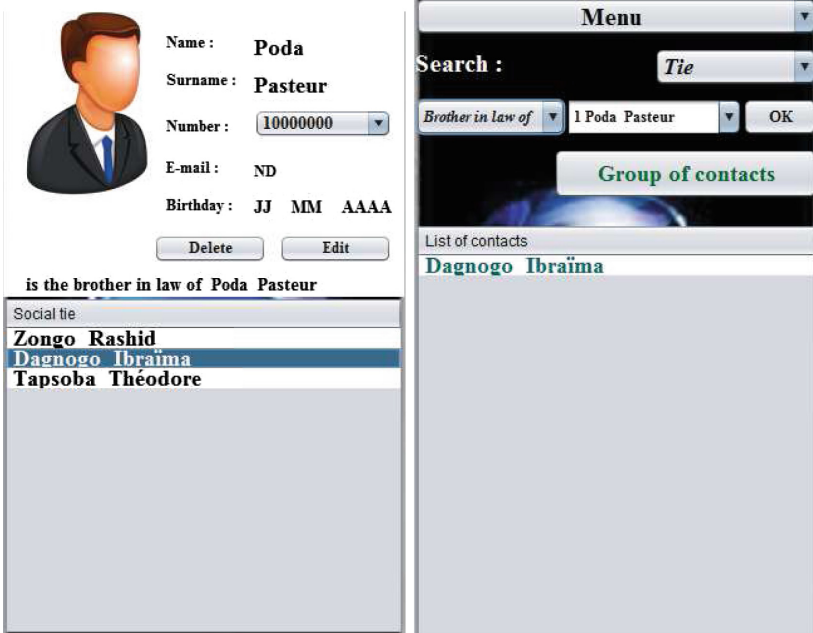
(a) Exhaustive listing of contacts of any social tie with a given contact

(b) Vague search of a contact

Fig. 2. Some views of the contact list software

A second novel functionality is such that we have to retrieve a contact (e.g.: "Dagnogo Ibraïma") whose contact information are forgotten and that fortunately we remember one of his contact (e.g.: "Poda Pasteur"). Vaguely, knowing that latter contact, we can try by selecting any type of social tie (e.g.: "*is the brother in law of*") and then search for the corresponding contacts who share that social tie with him. This search operation can be iterated, if needed, with another type of social tie until the contact who is searched for (i.e., "Dagnogo Ibraïma") is retrieved or not. This is illustrated in the view of Fig. 2b.

Another situation where the new design of the contact list can help is the need to efficiently discriminate between several contacts that are involved by homonymy. In this case, before initiating a communication with the desired contact, we need to select the right one. For each homonym, the developed software offers the possibility to display his social ties with other contacts so that by browsing the list of homonyms, the right contact with whom we want to communicate can be identified. In Fig. 3, we illustrate how the two homonyms with name and surname "Dagnogo Ibraïma" can be discriminated based on social ties. In Fig. 3a, we are about the contact "Dagnogo Ibraïma" who has "Poda Pasteur" as brother in law. In the same contact list we have a second contact "Dagnogo Ibraïma" who has "Dagnogo Binta" as cousin.

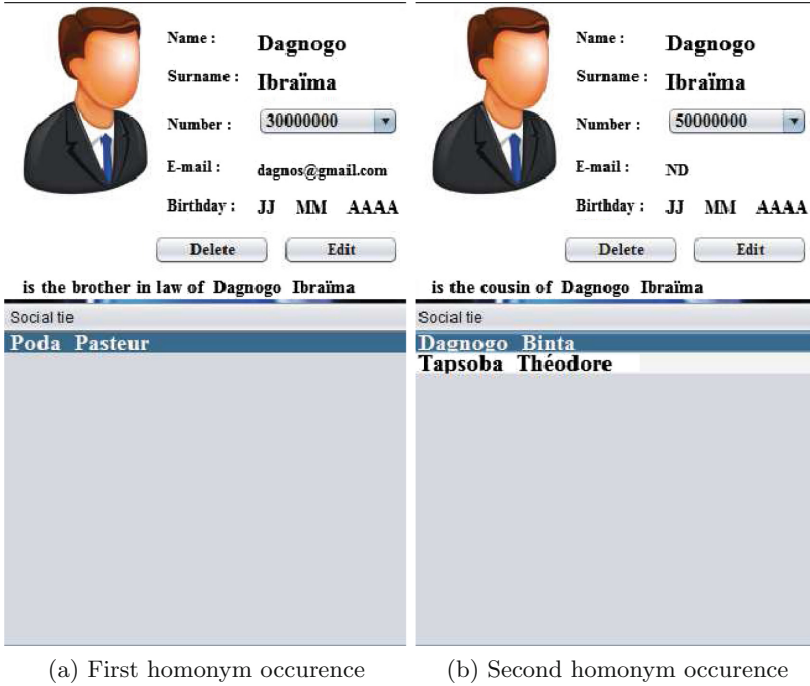(a) First homonym occurence   (b) Second homonym occurence

Fig. 3. Views of the contact list software relative to homonimy resolving

4   Conclusion

This paper was about the implementation of a new vision of mobile contact lists. Taking into account the particular context of African social practices, the new design of the contact list consists of integrating social ties existing between people in the real life. To implement the proposed contact list, we built a system comprising a knowledge base, an inference engine and a graphical user interface. Well known Java programming tools and emerging linked data technologies were used to develop the software. A few views of the developed software were provided to illustrate functionalities regarding contacts reminder and homonymy resolver.

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