# GeniusPhone: Extracting and Relating Relevant Personal Information

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## Abstract

*Mobile devices have become faithful companions that keep track of most of our daily interactions and are always available to interact with. However, considering their capabilities, mobile devices play an insufficient role helping the user in his common daily tasks. The information they have access to is limited, as is the context in which it can be used. We present GeniusPhone, a system that inter-relates the users' personal information and interactions with others from their computers and mobile devices, using it to gather additional data from online public sources. The information retrieved from the personal devices, due to its personal and trustable character, helps us filter the information retrieved from other less trustable and structured sources. It is able to provide the users with relevant summaries about someone or something, from their point of view, at the time they want or need them.*

## 1. Introduction

Mobile phones are widely used and have become essential tools for most of us. Moreover, they contain information about the users, their habits and daily interactions, as no other person or device. However, they are still of little use when the user needs to meaningfully access personal information, created both on the phone and in other devices, in a related, synergistic way. Nowadays, the usage of mobile device acquired knowledge is restricted to word dictionaries, recent contact recall or other somehow basic functionalities. Even projects that try to go beyond these basic functionalities are restricted to a limited set of information (ex: [1, 2]), ignoring the enormous amount of personal and public information possibly available on and from a mobile device and its inter-relation. What all the past and present approaches lack is a usage of personal information, from different sources, taking advantage of all the knowledge the devices have about their owners. Further, little attempt is made in trying to combine such information with that from public sources. In a social environment it is natural to wonder "I know that person, but where from?" or "I had some things to discuss with Jack, but what were they?". GeniusPhone is able to provide answers to those questions by gathering and inter-relating information from the user's devices enriched with other public information sources, to offer the user context- and personally-sensitive information when it is needed. All this information is interconnected within a semantic network providing a structured and meaningful knowledge base, dealing with the information from different sources as a coherent whole and being able to recognize the information that defines a person, theme or event from the user's point of view.

## 2. GeniusPhone

GeniusPhone manages the users' personal information and their interactions with others in a mobile context, to obtain relevant and timely information about some person, document or subject. All the data existent in mobile devices, together with other personal and public information can provide insights on the user and surrounding context. The personal information can be used to filter data from other less trustable sources thus reducing the search universe and resolving ambiguities. At the same time, it guarantees that the resulting information is gathered from the user context and point of view. The world-wide-web is a "universe" of information, so it is crucial we can find and establish some standards to find where the useful information is.

The GeniusPhone platform, is able to collect and interrelate personal information from the user's devices (mobile devices and personal computers) like documents and their metadata, emails (and the attachments therein), calls, web pages, SMS, agenda, call logs, etc., and inter-relate it as a consistent whole. It can then, at the users' request, find relevant data about a particular subject or person by looking not only at that personal information, but also at online sources

(blogs, personal pages, facebook and other social networks), establishing semantic relationships between the different data items, and selecting those more accurate and personally relevant to the user.

## 3. Inter-Relating Information

A module of great importance in GeniusPhone architecture is the Knowledge Base, a semantic network which gathers all relevant information collected from the different plugins, inter-relating it into a coherent whole. Different plugins might provide the same information about a concept, thus accumulating evidence of its truthfulness, while in other cases opposing information might result. To account for this, the semantic network allows the different relationships between concepts to be weighted, as an indicator of their credibility.

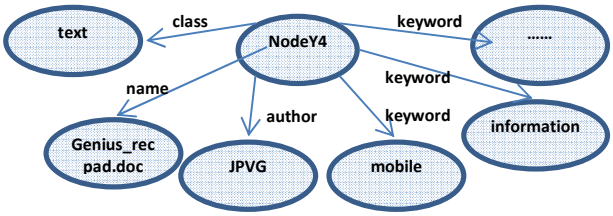


**Figure 1 – Simple RDF Case Frame Example (Doc)**

The Knowledge Base uses the Resource Description Framework (RDF) to represent the information as triples (Subject, Predicate, Object). The information considered in GeniusPhone is represented by resorting to two different case frames: simple or weighted. The simple case frame is used when we desire to store the properties of a given object. They are just elements defining some entity (Figure 1). However, while the information that defines some node can use the standard representation, in particular situations some extra information is required (i.e., weight and origin). Figure 2 – **Weighted RDF Case Frame Example**presents a scenario where this weighted case frame is used. In this frame, the components of a traditional relation are placed as links (predicates) between nodes and objects. This enables us to include as many characteristics as we desire for this particular information.

It is important to notice that the same information may be retrieved from different plug-ins. However, it is not trivial to reinforce the information mostly due to the diversity of forms it can be presented. To be able to maximize concept reinforcement, the words are stemmed. Stemming gets the root of the word, so when we have similar words they count as the same.

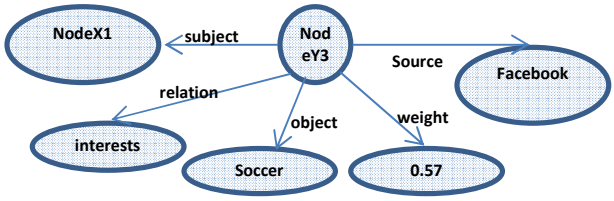


**Figure 2 – Weighted RDF Case Frame Example**

When some information chunk, already indexed in the knowledge base, presents itself again, the confidence on that piece of data is reinforced. We developed an algorithm that respects the value of the information and maintains a normalized weight scale. Considering that a relation is previously weighted with 0.8 (in a scale from 0 to 1) and a duplicated entry is detected with a weight of 0.5, the weights are recalculated as follows: The relation is to be reinforced. To this end, we are only working with the remaining weight percentage

**1 – OldWeight [0.8] = 0.2**

We use this value to scale the remaining weight (0.2)

**AddWeight = 0.2 * ArrivingWeight[0.5] = 0.1**

The calculated value is added to the old value.

**NewWeight = OldWeight + AddWeight = 0.9**

The new weight on the KB would now be 0.9.

## 4. Example Application

Figure 3 shows an application to assist the user when in need of information about someone. The user searches for a person's name (with the option to add additional and known context), and GeniusPhone presents a resumed set of information about that someone. In this case, GeniusPhone was able to retrieve the person's photo, some information about his interests, birthday, e-mail, high school graduation and some exchanged mails and a phone call. It is also possible to access the source of information (e.g. the facebook profile) or a document presented, for example, as an attachment of a mail. Weight is also represented to show which information is more credible.

## 5. Conclusions

Requiring a document, a mail message, or trying to remind where we know someone from is a common task for almost everyone. However, the available amount of information is enormous and to be useful it must be contextualized and summarized. GeniusPhone gathers personal information from the user's devices, and use it as a filter to the information available in public sources like search engines and social networks. It stores the information from different sources in a Knowledge Base, inter-relating it as a coherent whole. After an iterative process of searching, renewing and improving the information retrieved, from the user point of view, GeniusPhone is able to present contextualized structured information.

## 6. References


[1] Beach, A., et al.. WhozThat? Evolving an ecosystem for context-aware mobile social networks. Network, IEEE, 22(4), pp. 50-55, (2008).

[2] Lamming, M. et al., "Forget-me-not: Intimate Computing in Support of Human Memory". Proc. of Next Generation Human Interfaces, (1994).



**Figure 3 - GeniusPhone HTML example application**