Ubiquitous, social networks in the street

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INTRODUCTION

Never before humans had access to so much data so easily; however, this scenario disappears as we move away from a computer. In our cities, urban services are provided via supports, which practically have not changed in a century: bus-stop shelters, metro-stations panels and screens, maps or urban furniture[1]. This scenario brings up the opportunity to refresh the idea of services that a city provides to citizens and tourists, with the novel possibility of ubiquitously accessing personalized multimedia content.

The growth of the World Wide Web and the rapid rise of eCommerce and the semantic Web (Berners-Lee et al., 2001) have led to significant efforts to develop standardized software models and technologies to support and enable the engineering of systems involving distributed computation. For example, so-called service-oriented architectures (SOAs) for distributed applications involve the creation of systems based on components, each of which provides predefined computational services, and which can then be aggregated dynamically at runtime to create new applications.

Nevertheless, the greatest potential of the World Wide Web, possibly represented by the hyperlocal Web, multi-agent systems and cloud computing (Carr, 2008), is not exploited enough in the streets and other public spaces. In fact, ubiquitous or context-aware computing supporting urban services could be obtained by the integration of existing devices, information retrieval systems, advanced infrastructures and human-computer interactions, bringing new solutions to the streets (Greenfield, 2006). The difference between the semantic Web and the hyperlocal Web (that is 'hyper' as in hyperlinked and 'local' as in location) is that the databases of the new Web are stuffed not only with semantics, but also with geographic coordinates.

In the last decade, with the appearance of the Web 2.0, the user's collective intelligence began to be shared as content on the public Internet like at Wikipedia or Flickr (Weinberger, 2007). Suddenly, social networking has been converted into the most famous activity played on the Internet; even US president Obama has been called the 'social media president'. Apparently, location awareness and social networking will be among the trendiest areas of researching for the next few years, as more and more

[1] See [http://www.cityofsound.com/blog/2008/02/the-street-as-p.html].

consumers use their GPS-enabled phones and social software to find or buy stuff, and to see people wherever they are, at any time.

THE PaTac PLATFORM

We are living in a new communication era, where corporations, communities and personal connections are continuously changing, as Weiser envisioned a decade ago (Weiser, 1991). The PaTac platform is a TMT Factory's initiative designed to reify and enhance the commercial and research potential of *interactive community displays* (ICDs)[2], multimedia information points offering interactive services in public areas (Ceccaroni et al, 2009). This enhancement is obtained using technologies and applications based on the hyperlocal Web that includes social networks, semantics and locations, and agent technology (Willmott et al., 2001): an open, distributed network platform hosting diverse agents and remote services.

Unlike tourist offices, PaTac aims to a proactive and automatic personalization based on social network users' profile and actions, using RFID for identification. Moreover, users' feedback will be used to increase the accuracy of descriptions about locations and services.

The PaTac platform's approach is the integration of social networks and semantics in urban environments, using mobile devices or ICDs. The cornerstone is the Web on the street, where the users are able to access at personalized content, which is generated using semantic metadata, such as in the projects CRUZAR[3], Linked Open Data[4] or DBpedia[5]. Ontology-based, semantic data are used to clearly define the meaning of words and objects of Web pages, making this knowledge available for sharing.

PaTac is not based on the idea of creating another Web-based social network (like *loopt*[6], *facebook*, *LinkedIn, MySpace, Nexopia*[7]*, Bebo*[8]), but on the mash-up of existing social networks in a new layer, sharing components and contents of all of them. Facebook Connect[9] and Google Friend Connect[10], still with limited functionalities, indicate the first steps on the new way for social networks mash-ups.

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[2] See [http://www.smartpoint.net].

[3] See [http://www.w3.org/2001/sw/sweo/public/UseCases/Zaragoza-2/Zaragoza-2.pdf].

[4] See [http://esw.w3.org/topic/SweoIG/TaskForces/CommunityProjects/LinkingOpenData].

[5] See [http://dbpedia.org/].

[6] See [http://www.loopt.com/].

[7] See [http://www.nexopia.com/].

[8] See [http://www.bebo.com].

[9] See [http://developers.facebook.com/connect.php].

[10] See [http://www.google.com/friendconnect].

SCENARIO

A personalized recommendation tool for entertainment and cultural activities is the basis for the envisioned scenario. The recommendation is offered via mobile devices or ICDs. This scenario brings city services closer to residents and tourists by interconnecting people, service providers and locations (Palau et al., 2009). The initial state of the scenario is a user interacting with the system's interface (the ICD) or via a mobile device (for example a *smartphone*) in search for entertainment and cultural activities around the city. The user identifies herself (using *OpenID*[11], *OAuth*[12], Facebook Connect or something equivalent). Then the system accesses the user profile (if available) from a remote repository, and composes an initial recommendation, using ratings and reviews of other social network users, about restaurants, cinemas, shops and museums, considering user preferences and location. Proposed activities are presented located on a map (using Google Maps services) with basic information such as a brief description, address and pictures (from Flickr).

When the user requests information of a venue, for instance a cinema, the system shows its detailed description, such as movies, sessions, potentially interesting user-reviews and prices. When the user selects a cinema session, the system contacts social networks' friends who could be interested in the movie. Proactively, the system informs on the required transportation (such as bus or metro) to reach the venue and, if it is lunch or dinner time, suggests a restaurant along the way, composing information from different services (cinemas, restaurants, maps and buses).

The user then requests to buy a movie ticket for next session. The system makes the reservation via a booking service and informs the user about the reservation and the itinerary, specifying how to get to the cinema. From this point on, the system monitors the booking service and the cinema service to be able to inform the user about any deviation until the booking expires. At the same time, the system monitors the other service providers (such as the transport service) involved in the user's itinerary.

Once at the cinema, the user enters her movie session just bringing her phone in the proximity of the entrance detector (which greenlights her), without any further interaction with the venue personnel.

FUTURE WORK

PaTac platform's first ICD and mobile prototypes will be deployed in Spain, in 2009. The main objectives of this research line at TMT Factory are making services accessible for all, and enabling a more natural interaction between people and machines: improving natural language processing (speech, text and gestures). Also, the inclusion, in the interface, of avatars with emotional features is planned, providing an even more

[11] See [http://openid.net/].

[12] See [http://oauth.net/].

multimodal interaction with the users. Finally, with respect to the improvement of the services provided, it will be necessary to collect more relevant information about the user and her networks, her interaction with the devices and her physical location.

CONCLUSION

In last two decades, many researchers have been seeking a solution to offer digital, context-aware services in real time across cities' public spaces, using supports such as mobile, GPS-enabled devices. TMT Factory's efforts are oriented towards a ubiquitous-computing scenario, with some of the services described here already implemented and soon available in the street. The objective is to obtain interoperable and portable data and to be able to share them with other platforms, possibly using ontology written in standard languages. These data will be used to add social features to software applications, to personalize the recommendation of content, to improve human-computer interaction, and to offer a new communication channel in the street.

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