Semantic-based Mobile Mashup Platform

Zhipeng Peng[1], Huajun Chen[1], Jinghai Rao[2], Ying Liu[1],
Lei Wang[1], Jian Chen[1],

[1] College of Computer Science, Zhejiang University,
Hangzhou, 310027, China
{pzp, huajunsir}@zju.edu.cn, {islandsolo, blueabysm, crocus.chen}@gmail.com

[2] Nokia Research Center, Beijing Economic and Technological Development Area,
Beijing, 100176, China
{jinghai.rao}@nokia.com

Abstract. Mobile devices contain more personal data such as GPS location, contacts and music, with which users can create innovative and pragmatic mashup applications for different areas such as social networking, E-commerce, and entertainment. We propose a semantic-based mobile mashup platform which enables users to create mashup applications by simply selecting service nodes, linking them together and configuring some connection parameters. Our platform also offers a recommendation mechanism on linkable services by adding semantic annotation to service description, so that users do not need to read specifications of web services in order to find out linkable ones. Therefore, users can focus more on the innovation and practicability of their mashup applications, which will surely result in the emergence of abundant mobile mashup applications.

Keywords: Semantic annotation, mobile mashup, mashup recommendation, web service

1 Introduction

Presently, the number of mobile mashup applications grows rapidly with fast mobile computing development. Current mobile devices' multimedia (e.g. Camera and media playback), sensing (e.g. GPS, Bluetooth, RFID and barcode readers) and communicating (e.g. GPRS, UMTS, Bluetooth, Wi-Fi) capabilities are ideal sentient intermediaries with which users can obtain information for mashup applications. Sentient Graffiti (SG) [1] is one such proposition which offers a platform through which users can contribute content and create integrated mobile applications with mixed information from diverse distributed sources. The TELAR mashup platform [2] is another example which facilitates the creation of adaptive mashups for mobile devices such as the Nokia Internet Tablets. Xu et al. proposed platform architecture based on service oriented architecture (SOA) [3], which focused on how to manage and operate mobile mashup services. Obtaining such mashup applications is not easy because users have to read each service specification and do plenty of programming

work to get what they want. However, most of the mobile mashup users who may have plenty of novel ideas for mobile mashups are not tech-savvy. Our proposition of semantic-based mobile mashup platform meets these users' needs by offering a service recommendation mechanism and a user interface in which users can construct and execute resulting mashups. We choose browser-server architecture so that it will be operating system independent. What users need are simply a mobile device and a flashlite supported web browser. In this paper we present our mobile mashup platform and its semantic-based recommendation mechanism.

2 Semantic-based Mobile Mashup Platform

2.1 Semantic-based Recommendation Mechanism

On our platform, users are able to make a mashup application by selecting a few service nodes and connecting them together. The platform is able to find matched services and the inter-connections among them, which allows users to easily create their applications without knowing every single detail about each service. The recommendation mechanism is implemented by adding semantic annotation to each input or output parameter, so that all services have a common interface. The linkability judgment of two services is shown in Fig. 1.

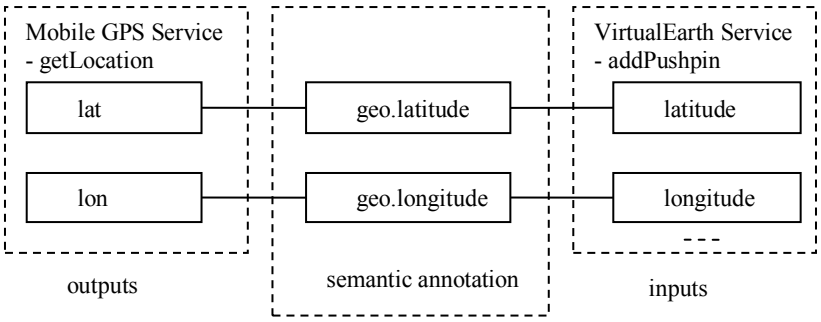


Fig. 1. Since the output parameters ("lat" and "lon") of operation "getLocation" have the same semantic annotations ("geo.latitude" and "geo.longitude") as input parameters ("latitude" and "longitude") of operation "addPushpin", Mobile GPS service is linkable to Virtual Earth service.

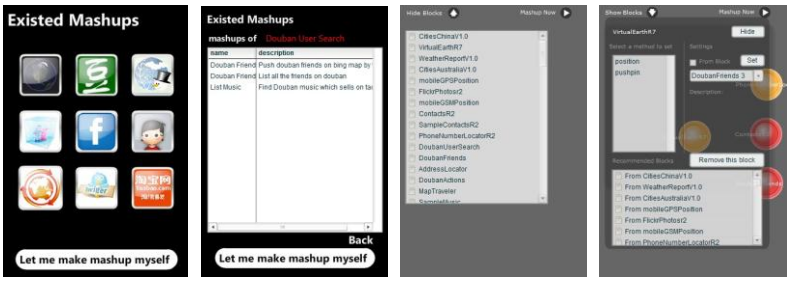
Along with this basic parameter-match recommendation theory, we also include other criteria to filter and rank recommended services. The first criterion is matching degree (the numbers of parameters matched) of two operations. Required input parameters must be met, or the service will be filtered out. After that, with bigger matching degree, the recommended service receives higher rank. The second criterion is conditional probability calculation [4]. The bigger probability that the link of

recommended service and target service is included by any mashup in repository, the higher rank the recommended service gets.

Besides the mashup constructing UI, our platform also includes a mashup execution engine. The execution result is shown in a new page temporarily with a list view or map view. Moreover, advanced users who expect more complicated functions can also encapsulate services by conforming to a specified standard by themselves.

2.2 Mashup Constructing UI

The mashup constructing UI is shown in Fig. 2. On the home screen, users can either execute mashups which are already made by themselves or by others or construct a new one by following a few steps. Firstly, users select a node from the service list. Then they will get a list of recommended services and they can add recommended services to the construction panel. After that, users need to do a little configuration work for connections between service nodes. Lastly, users can execute the resulting mashup, and save it if they are satisfied with the result.



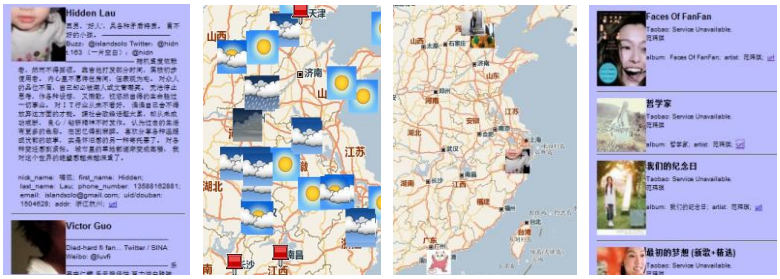
(a) (b) (c) (d)

Fig. 2. User interface of our platform: (a) Some icons represent different classes of mashups, such as location related, or contact related. (b) A list of mashups which are executable. (c) User interface where users can select service nodes to make a mashup. (d) Configuration panel where users can get recommended services and configure links between service nodes.

2.3 Mobile Mashup Examples

With our platform, users can get a variety of innovative and pragmatic mashup applications in different areas such as social networking, E-commerce and entertainment. In Fig. 3 we show several mashups obtained with our platform including a Douban[1] social mashup, a weather checking mashup, a friends' location viewing mashup and a mashup which shows disc information and related purchasing information for music in the mobile[1] device. Users are able to obtain more diverse mobile mashups by selecting linkable services and constructing a mashup graph.

[1] http://www.douban.com/



(a) (b) (c) (d)

Fig. 3. Mobile mashup results: (a) Show Douban information of friends in the contact book. (b) Show weather in major cities. (c) Show friends which are in the contact book on a map. (d) Show disc and purchasing link information of songs in the mobile device.

3 Conclusion

We have presented a mobile mashup platform with a semantic-based recommendation mechanism and a mashup execution engine. The recommendation mechanism makes mashup construction and execution much easier. By following a few simple steps, users are able to obtain a mashup based on their preferences. For future work, we will improve the platform to deal with more complicated situations.

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