COMPASS2008:
An Intelligent Multilingual and Multimodal Mobile Information Service System for Beijing Olympic Games

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Abstract. We will demonstrate a novel information service system, which is designed and realized for meeting the demanding challenges posed by international mega-events. The system COMPASS 2008 is planned to be the mobile digital companion for participants and visitors of the 2008 Olympic Games in Beijing. Mobile personalized, multilingual and multimodal services will assist foreign visitors in typical situations such as navigation, communication with waiters or taxi drivers and in cases of emergency. Based on semantic web technology, ontologies are utilized on our platform for the description, the structuring and presentation of services and service content. The well-considered combination strategy of open-domain machine translation and service-specific translation ensures the robust and precise translation quality. Intelligent multimodal user interface technologies ensure comfortable access via the small screens of PDAs and smart phones and the limited input options for handheld computers.

1 Introduction

The COMPASS 2008 system is a combination of several mobile information and communication services especially designed to assist visitors of the 2008 Olympic Games in Beijing. The predominantly targeted user community are international visitors with no or insufficient command of the Chinese language. However, the overall system and most of the realized services could also be equally useful for any foreign visitor to China. Moreover, the services can also easily be adapted to other locations, events and languages.

The main challenges of mobile information services for international mega events such as the Olympic Games are

- *multitude of languages*: neither event nor tourism information is provided in all of the languages needed by users

- *small devices*: mobile phones and even smart phones or PDAs have very restricted in- and output facilities such as small screens and lacking keyboards or tiny keyboards
- *multitude of different services*: a variety of different services with different sources formats and types of interactivity need to be accommodated
- *multitude of user types and interests*: different types of users exhibit different information needs, interests and different preferences for interaction methods

The accommodation of different user types is difficult but it can be handled by advanced methods for service personalization. The flexible and seamless integration of different types of services is a nontrivial problem that can be met by applying AI methods for the description and combination of services such as service ontologies and some inferencing on the choice and composition of services.

The tougher challenges are the language barriers between human languages and the communication barriers between users and machines. The most powerful way to overcome the language barriers is reliable and trustworthy translation. The most intuitive mode of communication without screen and keyboard is spoken language. However, high quality automatic translation and robust speech understanding belong to the unsolved problems of artificial intelligence research.

In addition to the multilingual mobile information services, we also wanted to provide some assistance in human-to-human communication across the inevitable language barriers. In a country with a language that is so different from nearly all other languages, even relatively simple communication situations such as an exchange with a taxi driver or the ordering of food in a restaurant can become impossible to master for the non-Chinese speaking tourist. A mobile speech interpreter, some product realizing the vision of Verbmobil [3], would be the most desired solution for such situations. But here again, the lack of high quality machine translation and robust large vocabulary speech recognition prevent us from realizing the dream solution.

Although there are both machine translation systems and speech recognition systems in daily use, they do not suffice for the special demands of our specific application. The automatic translation of isolated sentences or short utterances is too unreliable to be trusted in critical real life situations. Speech recognition is not robust enough to deal with the expected combination of noisy situations, variance in voices and dialects and the host of topics to be covered. Thus, we have complemented the best available technologies for speech recognition and for machine translation with more robust and less sophisticated methods for input and translation.

Thus the special contribution of the demonstrated application is an innovative combination of several methods ranging from scientifically less sophisticated but carefully designed techniques for translation and language input to most sophisticated state-of-the-art methods for automatic translation and speech input. Other included methods are ontologies for information content and services; location, user and situation sensitive services; novel multimodal user interface techniques; and a modular flexible system design.

In Section 2. we will sketch the functionality of the various services, in Section 3, the combination of techniques for realizing the crosslingual communication assistance is described. Section 4. offers a conclusion and plans for future developments.

2 COMPASS2008 Services

The basic design idea of COMPASS2008 is to develop a general and adaptable service system for international Mega events. Therefore, we have modeled a service taxonomy, which is general enough to integrate new specific service categories and to be reused for new events. The top-level service concepts are *information service, transaction service* and *composed service.* As mentioned in [1], we haven taken various existing ontologies as references. The *transaction service* contains *communication service* and *e-commerce service*. The *translation service* belongs to the *communication service*, which plays an important role for crosslingual communication help. Our current system provides following translation services: *free machine translation*, *smart dining assistance* and *crosslingual dialog help*. Among the *crosslingual dialog help* we have developed *taxi dialog*, *dining dialog*, *shopping dialog* and *emergency dialog*. The *composed service* is a special category, including services, which integrates various services to deal with a complex situation. For example, a *taxi-dining service* for a foreign visitor is a *composed service* that makes use of translation service such as the *taxi dialog*, *location-based service*, *the smart dining assistance and dining dialog.*

3 Multilingual and Multimodal Mobile Information Services

In the following, we will give a more detailed description of our multilingual services. With the help of the multimodality, users can choose their input methods for search depending on the situation: via speech or writing and they can decide whether they want to read or hear the information found system, even let the system speak the translated content. The integration of speech synthesis is important for Beijing, because our system can speak Chinese and communicate with the local people.

We have developed a situation-based crosslingual communication dialog model, which enables people speaking two different languages to communicate with each other easily. The dialog model provides a general framework that can be adapted to new situations and new languages straightforwardly. In the current system, we have developed dialogs for dining, shopping, taxi and emergency. The dining dialog helps users to order dish, request receipt and complete payment, while taxi dialog services aids the users to tell the taxi driver the destination in Chinese and cope with various situations before, during and after transportation. In the following Figure, we give some examples of the taxi dialog service.

Parallel to the dining dialog, a smart dining assistance is developed to support foreigners to find their preferred dishes and restaurants in their own language. In [1] and [2], we have given a more detailed description of this service. Dining Dialog and Dining Assistance can use each other when the communication situation is needed.

a. Taxi dialog states   b. Dialog phrases   c. Interaction with driver

4 Conclusion

COMPASS2008 is the first system, which applies the various translation techniques in combination with multimodal and mobile user interface methods to the international Mega events. Evaluation will be performed in a field test in Beijing under realistic conditions with test users from several countries.

References

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