

# Chapter 16

## A Natural Language Based Portal for Multiple Mobile Services

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### ABSTRACT

*Information services accessed via mobile phones provide information directly relevant to subscribers' daily lives and are an area of dynamic market growth worldwide. Although many information services are currently offered by mobile operators, existing solutions usually require a unique gateway for each service, and it is inconvenient for subscribers to remember a large number of such gateways. Furthermore, the Short Message Service (SMS) is very popular in China, and Chinese subscribers would prefer to access these services in natural language via SMS. This chapter describes a Natural Language based Service Portal (NLSP) for use with a large number of mobile information services. The system can accept a subscriber query in natural language and navigate it to the required service. Because it is difficult for general natural language processing methods to achieve high processing accuracy, the NLSP is based on a Multi-service Ontology (MO) and Multi-service Query Syntax (MQS). The MO and MQS provide semantic and linguistic knowledge, respectively, to facilitate service selection for a subscriber query. The MO and MQS building solutions are also presented in this chapter. A trial involving navigation of 30 different mobile services shows that the NLSP can provide a viable commercial solution for mobile operators.*

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## INTRODUCTION

With the proliferation of mobile communication networks and currently 3.3 billion mobile subscribers worldwide (520 million in China), mobile services directly relevant to subscribers' daily lives are becoming a large market (Portio, 2006). Eyeing this potential market, mobile operators are offering an ever increasing menu of information services to their subscribers (Paulson, 2005), including routing services, congestion services, weather services, and flight services. These services usually come from different service providers, and they usually have different service parameters. It becomes very inconvenient for subscribers if they have to remember a large number of different gateways for the services they wish to access. In order to maximize subscriber take-up, there is considerable need for a service portal which will allow subscribers to interrogate dozens of services via a single gateway in a uniform way.

There are three models for service portal in current use.

1. Subscribers call the human operator to make a query, and the human operator searches for the answer from dozens of services. One such example is 114 Best Tone<sup>1</sup>.
2. Subscribers find a relevant service using service directories or search engines and then navigate to that service to input a query directly to the service. For example, Google Mobile<sup>2</sup> and Yahoo Mobile<sup>3</sup> offer such search engines.
3. Subscribers send a query directly, and the query is forwarded to the relevant service. For example, AskMeNow<sup>4</sup>, mInfo<sup>5</sup> and Any Question Answered<sup>6</sup> can provide such solutions.

In the first model, the query can be formatted in any natural language, but a large number of human operators are needed. In the second model, the query format is particular to each service,

and subscribers have to execute two operations (first find a relevant service, and then input the query to that service) to obtain an answer. In the third model, the query format ideally should be a general one expressed in a natural language, and subscribers simply need to input the query to obtain an answer.

Of these three models, the third is both the most economical for mobile operators and the most convenient for subscribers. Furthermore, in China almost all subscribers have experience of sending short messages (SMS) and 1.1 billion messages are sent every day. Since subscribers are accustomed to writing short messages in natural language, we chose to develop a natural language based service portal in order to improve the efficiency of the third model outlined above. For example, when a subscriber queries "What is the weather like in Beijing?", the query is automatically forwarded to a weather service which then returns the answer.

Although it is convenient for subscribers to access information using natural language, it is difficult for a general natural language processing method (Dekleva, 1994) to achieve high accuracy, especially when allowing subscribers to query information from multiple services (domains). Basically, it suffers from the following two problems:

1. The system does not have enough service domain-specific semantic knowledge and linguistic knowledge, and therefore it is difficult for the general method to understand services and process the flexible natural language queries from different subscribers with high accuracy. For example, when a subscriber queries "How is the traffic near Silver Plaza?", it is difficult for the system to understand that the subscriber wants to query the traffic situation at Baofusi Bridge if the system does not know that Baofusi Bridge is the nearest congestion point for Silver Plaza.

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