Voice Recognition Intelligent Agents Technology

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INTRODUCTION

Mobile computing technology is evolving at a rapid pace. Under the pressure of market demands, the format of mobile devices evolves towards a contradictory situation: on one hand, the handset tends to become smaller, but on the other hand, the users demand increased data search, transmission, and saving capabilities. In order to achieve this, the model of interaction between humans and mobile devices has to evolve from the presently prevalent keyboard-screen system for data input and output towards *voice-recognition intelligent agents* technology.

This article attempts to present the rationale and the advantages of this development, and to analyze the possible problems raised by the introduction of this technology.

The article starts with a presentation of the existing mobile phone technology, outlining its main limitations in terms of functionality, which are logically determined by the way and the context in which mobile phones are normally used. Based on the analysis of the contradictions between the present model of interaction with mobile phones and the requirements of users, the article presents possible solutions to this problem. The study argues that the introduction of voice recognition intelligent agents can enhance significantly the functionality of mobile phones, representing a true revolution in mobile computing. Various practical applications of this technology are briefly presented, as well as the main problems related with its development and implementation.

The article ends with a summary of the arguments discussed and with definitions of the main terms and concepts presented.

BACKGROUND

Mobile phone technology was developed with the aim to provide users with a telephone connection anyplace, anytime. The main innovation that allowed the mass adoption and use of mobile phones was the cellular approach in transmitting a radio signal. Traditionally, people that required frequent communications could install in their car a radio telephone, but the small number of radio channels available in one area limited drastically the number of possible users of this technology. By dividing a large area into small cells, and each of these cells having a low-power transmitter, the number of communication channels increases significantly, since people that are not located in neighboring cells can use the same frequency to communicate (Layton, Brain, & Tyson, 2005).

The introduction of digital technology (2G) has increased even further the number of communication channels. Finally, 3G technology represents the latest trend in mobile phones standards, offering increased bandwidth and information transfer rates to accommodate Web-based applications and phone-based audio and video files.

However, the use of mobile phones to access Internet applications presents a number of limitations, some of which are related with the specific interface of mobile phones, and others with the existing Web protocols adapted for mobile networks. The screens of mobile phones are small and have a lower resolution in comparison with PC or laptop screens/monitors. On the other hand, the wireless application protocol (WAP) works badly on wireless devices with small screens, and it is dependent on mobile technology's bandwidth (such as GSM or CDMA) for access to information and services (Yeo, & Huang, 2003). Other problems are connected with the Web navigation and site structure, or with the input methods available for mobile phone users (Buchanan et al., 2001).

The future development of mobile services requires a revolution in the technological model applied, which is based on transforming the Web architecture, as well as the usage of mobile devices.

WIRELESS WEB APPLICATIONS FOR MOBILE PHONES

At the moment, the Internet is a network of databases supported by applications that allow users to search, retrieve, and use information contained in computers' memory. However, the rapid increase of online available data makes it more and more difficult for users to find the specific information they need. A trivial search on the Google search engine usually displays a list of a few million more or less relevant Web documents. In this case, the use of a search engine is only the beginning and not the end of searching for particular data,

and this process can indeed be very time consuming, without providing any guarantees for a successful result.

An alternative is to use customized intelligent agents, which can search the Web for clearly defined data. These intelligent agents are usually adapted for a specific type of Web search—for example, they can provide a list of companies that offer online a specific type of product. Strictly speaking, they are not very intelligent, because traditionally, these applications were not able to learn and improve in time their searching capabilities. However, this can be changed. Using neural network technology, and registering a history of operations realized or a particular user, the advanced intelligent agents can progressively learn the preferences of their customers and provide improved results.

Wireless devices such as mobile phones have a number of limitations determined by their specific circumstances of usage. The main advantage of a mobile phone is obviously its mobility, which implies a small size and weight, combined with good usability, in various environment and circumstances. These characteristics limit the size and the resolution of the screen, the size, and the functionality of keypads; the power and memory capacity; as well as the bandwidth. Because of these problems, the mobile phones cannot be used like a PC device, which incorporates autonomous computing capabilities. However, the model of distributed networks and resources can be effectively applied to a mobile phone (Mattern, 2000). In a traditional sense, mobile phones are simple communicating devices, more like interface terminals than personal computers. The solution for their effective use is to create easily accessible networks with distributed resources, and to develop advanced software applications in order to improve the mobile communication capability (Alesso, & Smith, 2001).

Some of these applications that can significantly improve the interface between the user and the distributed network are based on voice-recognition technology. On the other hand, the nature of mobile devices is adapted to a model of discontinuous, time-limited use; therefore, the user does not have the time himself/herself to browse the Internet in search of relevant information. Even given the required time and stability, the user might prefer the use of an Internet-connected PC or terminal, which offers better interaction and visualization capabilities. This problem can be solved by developing intelligent applications that can work automatically and independently of any human supervision, using the instructions given by the user.

The solution of improved Web services using mobile devices is the combination of voice-recognition technology with the use of intelligent agents (Lai, Mitchell, Viveros, Wood, & Lee, 2002). The mobile phone user will initiate a command by directly speaking with one or more intelligent agents, which then can search for specific information on the Web and announce the results through an SMS message. This type of interaction is presented in Figure 1.

The intelligent agents pass through a succession of phases in order to fulfill their tasks (Rodríguez, Favela, & Muñoz, 2003):

- **Activated:** This represents the main state of the agent, which includes a number of specific sub-states:
  - **Learning:** Represents the initial sub-state of an agent, in which the agent acquires knowledge

Figure 1. The use of voice recognition intelligent agents in mobile phones services