

Chapter XIX

Terminals for the Smart Information Retrieval

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ABSTRACT

In this chapter we describe a proposal of a metropolitan information system (MIS) for providing various information for inhabitants of the city, as well as for strangers. The main principle is based on a philosophy of accessing data from the Internet and to provide a user-friendly interface to these data using various types of intelligent kiosks. The stress is put to the multimodal human-computer communications in both directions using image audio/speech and text modes. We propose several versions of the intelligent kiosks and various types of communications with MIS. The first version is placed on public places and offer three-dimensional human head displayed on a large display that gives information about city, institutions, weather, and so on. It is a system with integrated microphone array, camera, and touch screen as an input and two displays and loudspeakers as the output. Speech recognized question for some information will be transformed into an answer using database or Internet and then visually and acoustically displayed to the costumer with help of robust multilingual speech synthesizer and powerful graphical engine. The second flexible version, even if with limited functionality, is the concept of mobile phone used as a multimedia terminal for access to different information. The last possibility is to use a regular phone (fixed or mobile) to access MIS via an intelligent speech communication interface. The type of communications depends on the version of the terminal. The stand terminals suppose to have mainly fixed IP connection to MIS, but wireless access can be used as well. The second version of terminals uses WiFi technology to MIS. The last solution, the general phone, can access the MIS using either fixed telecommunication network or GSM.

INTRODUCTION

The fields of multimodal interfaces, computer graphics, and speech recognition have drawn the interest of researchers for a long time. This fact led to a development of increasingly more sophisticated autonomous or semi-autonomous virtual human interfaces over the last few years. Stephanidis and (1998) have predicted that public information systems, terminals, and information appliances will be increasingly used in a variety of domains.

Information kiosks are a special variant of such devices, which are deployed on public locations. The kiosks are used for an information retrieval, multimodal communication, and so forth. Cassell et al. (2002) point out that kiosk systems differ from traditional systems in that they should stand out so that they are noticed by visitors, their functions should be self-evident, no user training should be required, and they should be able to recover from user errors.

This chapter describes an idea of metropolitan information system (MIS) for various information services in a city. The MIS is based on a design and implementation of an intelligent kiosk (IQ Kiosk) that is being developed on Slovak University of Technology in Bratislava. IQ Kiosk is a device that provides diverse information to the wide public. There are two versions of the IQ Kiosk.

The first version is based on a concept of a multimedia terminal placed in public places. The second, flexible version, even if with limited functionality, is based on the concept of using mobile phone as a multimedia terminal for accessing different information. In both cases the emphasis is put on an intelligent speech communication interface computer supported with picture information (maps, photos as well as speaking head). The third possibility, which we do not call IQ Kiosk, is a regular phone (fixed or mobile) that can use a specific MIS server for intelligent speech communication interface.

PRELIMINARIES

One of the information kiosks that demonstrated a significant improvement over earlier systems is the MINNELLI system (Steiger & Suter, 1994). MINNELLI facilitates interactions with bank customers primarily by the use of short animated cartoons to present information on bank services. However, the MINNELLI system requires a basic user training, which reduces its applicability in most public sites. Another successful kiosk with a broader scope than the MINNELLI system is a MACK system (Cassell et al., 2002). MACK is an embodied conversational kiosk that provides information on residents and directions to locations at a research site. It integrates multiple input sources that include speech, gesture, and pressure. The system also exhibits a degree of spatial intelligence by utilizing its awareness of its location and the layout of the building to reference physical locations when it provides directions (Stocky & Cassell, 2002). An August spoken dialog system is also kiosk-based and helps users to find their way around Stockholm, Denmark using an on-screen street map. The most advanced system is a MIKI system (L. McCauley & D'Mello, 2006). MIKI is a three-dimensional, directory assistance-type digital persona displayed on a LCD in FedEx Institute of Technology at the University of Memphis. MIKI stands for Memphis Intelligent Kiosk Initiative and is used to guide students, staff, and visitors through the Institute's maze of classrooms, labs, lecture halls and offices through graphically rich, multidimensional, interactive, touch and voice sensitive digital content. MIKI differs from above mentioned intelligent kiosk systems by advanced natural language understanding capabilities that provide it with the ability to answer informal verbal queries without the need for rigorous phraseology.

The idea of an application for communication in mobile phone is not new and there have been some systems developed already, working both

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