Chapter LXII
Visualisation of Meeting Records on Mobile Devices

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ABSTRACT
Multimedia data such as music and video are key forces behind the widespread use of mobile devices today. However, the usefulness of mobile access to multimedia sources extends beyond entertainment. The popularisation of teleconferencing and collaborative technologies on the desktop, for instance, has opened the possibility of recording online meetings for later review. Yet, despite the fact that mobile technology could enable convenient access to recorded meetings, research on interfaces for visualisation and access to meeting recordings on portable devices is currently very scarce. This chapter discusses issues on design, implementation, and evaluation of such interfaces. The discussion is illustrated with a case study and lessons learned from work on the HANMER (Hand-held Meeting Browser) system.

INTRODUCTION
Time-based (or continuous) media such as audio and video currently account for a large part of data handled and presented by mobile devices, from PDAs to mobile phones to game consoles. These data are usually of an entertainment nature: most audio data on mobile devices consist of music and audio books, and most video data consist of professionally or home-made movies. In addition to time-based media, there are static media which convey what one could term “space-based” data, which comprise still pictures and text, including whiteboard data, SMS, and text documents on PDAs and mobile phones (Harada, Naaman, Song, Wang, & Paepcke, 2004; Lam & Baudisch, 2005; Bederson, Clamage, Czerwinski, & Robertson, 2004; Masoodian & Budd, 2004; Masoodian & Lane, 2003). While presentation and visualisation of, and access to space-based data can be done
in a variety of ways, presentation of time-based data predominantly conforms to a “tape recorder metaphor” whereby playback is essentially sequential and a time-line is used as reference for non-sequential access.

More recently, another kind of recorded time-based data has started to emerge. As teleconferencing and computer-supported co-located meetings become common in the workplace, meetings are increasingly being recorded for later review by participants or viewing by those unable to attend them (Chiu, Boreczky, Girgensohn, & Kimber, 2001; Chiu, Kapuskar, Reitmeier, & Wilcox, 1999; Tucker & Whittaker, 2005). Recorded meetings are a special kind of time-based data in that meeting participants often employ artefacts of an essentially spatial and persistent nature, such as agendas, minutes, and private or shared notes, at identifiable points along the time-line. Despite the existence of such “structuring elements,” achieving effective presentation and visualisation of recorded meetings is far from trivial on any kind of computing platform. It often does not suffice, for instance, to present a textual summary of outcomes or minutes, no matter how accurate, since in reviewing a meeting one is typically interested in why certain decisions were made rather than simply what those decisions happened to be (Moran et al., 1997). Many attempts have been made at supporting the activity of “browsing” recorded meetings by indexing their speech content (Stiefelhagen, Yang, & Waibel, 1999; Waibel et al., 2001; Tucker & Whittaker, 2005), temporally aligning text and speech streams (Masoodian & Luz, 2001), or simply by improving sequential access (Arons, 1993). These attempts mainly targeted information retrieval aspects and the resulting systems essentially comprised improved time-line interfaces, or combined basic time-line access with indexed textual information and meta-data. With the possible exception of SpeechSkimmer (Arons, 1993), these interfaces cannot be easily adapted for use on small mobile devices, where screen space constraints are a primary concern.

In this chapter, a novel approach to the design of meeting browsing interfaces for mobile devices is described. This approach explores the inter-relation between the time-based component of meetings and its space-based artefacts in order to implement a view of recorded activity which supports structured, non-linear indexing and access to speech and textual elements. The ensuing visualisation components depart from the rigidity of basic time-line interfaces and are particularly suited for presentation on hand-held mobile devices which lack the input and output capabilities of the conventional computers for which almost all other existing meeting browsers have been developed.

For simplicity, attention is confined to speech as the recorded time-based modality. However, the techniques and observations made here are expected to apply equally to video. In fact, towards the end of the chapter, the ways in which recorded video could be profitably exploited as a source of space-based data and access points in the general indexing strategy proposed are discussed.

This chapter is organised as follows. The next section describes the context of the application area and reviews the literature on meeting browsing and relevant works in the area of multimedia access on small mobile devices. This is followed by a presentation of the overall framework and paradigm for meeting browsing on mobile devices, a description of the HANMER prototype, along with an outline of its design process. A section on evaluation and a discussion of results follows. Finally, future trends, perspectives, and conclusions are discussed.

BACKGROUND

Handheld technology is already having a big impact on how people interact and work. It is suggested that these mobile devices have “the potential to provoke even more radical changes in work practices and encourage an even greater level of mobile work and distributed collaboration [than the Internet]” (Perry, O’Hara, Sellen, Brown, & Harper, 2001). Therefore, it is not surprising that people are gradually starting to consider meeting using their mobile devices, or at least record and share work-related information using such devices in situations where mobility is essential (Bergqvist,

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