Chapter 10
Model-Based User Interface Generation for Mobile Tourism Applications and Services

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ABSTRACT
The purpose of this chapter is to describe a model-based approach for automatic generation of user-centric interfaces for an individual mobile tourist. The generation of user-centric interfaces can provide a tourist with self-customized interfaces for efficient accessibility to mobile applications and services. The authors’ polymorphic logical description (PLD) model is an interface description created at design time to address the diverse needs and preferences of users in a mobile computing environment. A PLD consists of three important modeling elements, namely, polymorphic task modeling (PTM), polymorphic abstract modeling (PAM) and polymorphic concrete modeling (PCM). A toolkit was developed based on the model-based PLD approach to user interface design. The toolkit achieves user-centric and multi-device interface generation with a high degree of dynamism and flexibility. The evaluation results of user satisfaction of the toolkit and usability of the generated interfaces are provided.

INTRODUCTION
The proliferation of mobile computing devices and their continuous injection into the world market at a rapid rate bring about appreciable impacts on e-Commerce applications and services. This proliferation of mobile devices has turned our working environment into multi-device computing environment, providing effective information communication, enhanced business transactions and numerous novel business opportunities. Due to their nomadic nature, the tourists are one of the most potential beneficiaries of mobile applications and services. However, the provision of efficient
universal accessibility mechanisms to mobile applications and services in a mobile computing environment remains a quandary. Heterogeneity of computing devices, diversity in users’ needs and preferences, and changing execution environments are the core challenges to be squarely addressed so as to achieve efficient accessibility to mobile applications and services. Specifically, in the tourism domain, the diversity of users, devices and execution environment is still a palpable challenge.

The objectives of this chapter are to: state the challenges facing universal accessibility to applications and services in a tourism execution environment, present the state-of-the-art knowledge in user interface design, describe a model-based approach called polymorphic logical description for automatic generation of user-centric interfaces for mobile tourism applications and services, and present an evaluation of a model-based toolkit that was implemented based on polymorphic logical description. The toolkit provides a unique opportunity for a tourism application designer, due to its ability to support automatic generation of customized interfaces. The toolkit can be used by a designer of tourist applications and services to provide user-centric interface generation on mobile devices. At design time, the designer provides a polymorphic description of tourism applications and services that are adapted by the toolkit for a particular tourist based on the preference information provided by the tourist.

Section 2 of this chapter gives background information and discusses polymorphic logical description for user-centric interface design. Section 3 presents an architecture for integrating polymorphic logical description into a mobile computing environment. The evaluation and application of an authoring toolkit realized from polymorphic logical description is further presented in section 4. Section 5 describes opportunities for future work in interface generation for mobile tourism applications and services. Conclusions are articulated in Section 6.

BACKGROUND

The dynamic nature of the tourism industry brings about some challenges, which crave for efficient technological solution (Staab, et al., 2002). More importantly, the provisioning of efficient access to Tourism Information Systems (TIS) constitutes to be a big challenge. TIS are software applications that are deployable on the web and accessed over desk-top as well as small hand-held devices, for provisioning of tourism business support services (Daramola, et al., 2008). As mobile devices become more prevalent, universal accessibility to mobile tourism applications and services by tourists becomes of prime significance due to the nomadic nature of tourists. Tourism applications and services must be accessible to tourists who are anonymous or familiar, but differ in race, culture, background, needs, preferences and motivation. Tourists are often faced with unfamiliar territory and languages, as pointed out by Yang, et al. (1999). For tourism applications and services to be universally accessible, they must be able to adapt to the intrinsic characteristics of every tourist, and his or her computing device.

Ongoing advancement in wireless technology and communication devices, such as PDA (Personal Digital Assistant), mobile phones, pagers and WebTV are aiding ubiquitous information accessibility. But, to achieve efficient universal accessibility to mobile applications and services, the diversity in users’ preferences must be taken into cognizance. Efficient universal accessibility to mobile applications and services by tourists can only be achieved when the many challenges facing a mobile computing environment are surmounted. We believe that user interface adaptation solutions can play a significant role in adapting tourism applications and services to users’ needs, thereby, making TIS more usable. The general challenges of mobile computing environment that can be addressed by user interface adaptation methods are succinctly summarized as device limitations, diversity in users’ preferences and heterogeneity of execution environment.