Chapter 36
User Pro–Activities Based on Context History

Teddy Mantoro
International Islamic University Malaysia, Malaysia

Media Ayu
International Islamic University Malaysia, Malaysia

ABSTRACT

Context-aware computing is a class of mobile computing that can sense its physical environment and adapt its behavior accordingly; it is a component of the ubiquitous or pervasive computing environment that has become apparent with innovations and challenges. This chapter reviews the concept of context-aware computing, with focus on the user activities that benefit from context history. How user activities in the smart environment can make use of context histories in applications that apply the concept of context prediction integrated with user pro-activity is explored. A brief summary of areas which benefit from these technologies as well as corresponding issues are also investigated.

INTRODUCTION

Current research and development in information technology is moving away from desktop based general purpose computers towards more task specific information appliances. Mobile phones and Personal digital assistants (PDAs) have dominated the research landscape and their dominance has grown commercially (Schmidt et al., 1999). The focus of this chapter is more towards the mobile computing arena.

Mobile technologies can be seen as new resources for accomplishing various everyday activities that are carried out on the move. People have tremendous capabilities for utilizing mobile devices in various innovative ways for social and cognitive activities. For example, there are services for arranging ad hoc face-to-face meetings with friends, finding driving directions, fixing blind dates, playing games, and even chatting with unknown people. Over the last decade, several researchers, especially in the mobile computing field, have developed applications that take ad-

vantage of environmental information, also called context to enhance interaction with the user. The goal of Context-Aware Computing in general is to make user interaction with computers easier in the Intelligent Environment where technology is spread throughout (pervasive), computers are everywhere at the same time (ubiquitous) and technology is embedded (ambient) in that environment (Mantoro and Johnson 2004). Many aspects of the physical and conceptual environment can be included in the notion of context. Time and place are some obvious elements of context. Personal information about the user is also part of context: Who is the user? What has the user done in the past? As history is part of context, how should that affect what happens in the future? Information about the computer system and connected networks can also be part of context. We might hope that future computer systems will be self-knowledgeable i.e. aware of their own context. Context histories, especially when recorded over a long term, offer a wide range of possibilities to enhance the services provided by some computer system. These possibilities include inferring current and past user actions, selection of devices, etc. (Mayrhofer R., 2005).

This chapter explores Context-Aware computing with concentration of context history and how User Activities benefit from them, i.e. the more the device knows about the user, the task, and the environment the better the support is for the user. To this end, the term "context" is reviewed from relevant and past literatures to better understand its actual meaning so that a clearer picture of context history is not misunderstood in relation to the scope of this chapter. User interaction in the Intelligent Environment is also briefly investigated to help the intended readers better comprehend the expression "user activity". Benefits and challenges in the use of context histories are discussed followed by the approach for related and future research.

CONTEXT AND CONTEXT-AWARENESS

While most people tacitly understand what context is, they sometimes find it difficult to elucidate. The term "context awareness", was first introduced by Schilit and Theimer (Schilit and Theimer 1994). Their definition of "context" is "the locations and identities of nearby people and objects and changes to those objects". This definition is useful for mobile computing. It defines context by examples, and thus is difficult to generalise and apply to other domains.

Winograd points out that context are composed of "con" (with) and "text", and that context refers to the meaning that must be inferred from the adjacent text. Such meaning ranges from the references intended for indefinite articles such as "it" and "that" to the shared reference frame of ideas and objects that are suggested by a text (Winograd 2001). Context goes beyond immediate binding of articles to the establishment of a framework for communication based on shared experience. Such a shared framework provides a collection of roles and relations with which to organise meaning for the phrase.

Other researchers have defined context in terms of the situation and user activity. Cheverst et al. describes context in anecdotal form using scenarios from a context-aware tourist guide (Cheverst, Davies et al. 2000). Their work is considered as one of the early models for context-aware applications. Pascoe defines context as a subset of physical and conceptual states of interest to a particular entity (Pascoe 1998). This definition has sufficient generality to apply to a recognition system. Dey reviews definitions of context and provides a definition of context as any information that characterises a situation related to the interaction between humans, application and the surrounding environment. Situation refers to the current state of the environment. Context specifies the elements that must be observed to model a situation. An entity refers to a person, place, or

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