A context awareness architecture for facilitating mobile learning

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Abstract

The MOBIlearn architecture (EU IST-2001-37187) supports a wide range of services and applications for learners using mobile computing devices such as phones, PDAs, and laptops. The display limitations of these devices mean that it is crucial to deliver the right content at the right time. One way of doing this is to use contextual information to derive content that is relevant to what the user is doing, as well as where and how they are doing it. Here we present an architecture for a context awareness subsystem to be implemented within the MOBIlearn achitecture.

Keywords: context awareness, elearning, mobile computing, mlearning

1. Mlearning in MOBIlearn

The MOBIlearn project focuses on providing a generic, reusable architecture to support learning on mobile devices. The display capabilities of these devices are limited when compared to desktop alternatives, and so provisions must be made for tailoring content and options. Context awareness continues to be a highly desirable feature for mobile computing devices (for a recent review see Chen and Kotz, 2000), and in MOBIlearn contextual information is used to provide filtered content appropriate to users' goals, settings, and resources. For our purposes, 'content' includes not only actual learning content but also applicable services (such as collaboration tools) and options (such as interaction preferences).

1.1. Context awareness for mlearning

Context awareness in MOBIlearn is implemented as a *context awareness subsystem* (CAS) that selects content reflecting the requirements of a specific individual and then presents this content with minimal user effort.

Two potential advantages of this system over conventional approaches are:

1) The need to define search terms and perform content search is reduced
2) The system is usable whilst the person is engaged in other activity

The utility of this approach has already been demonstrated by Bristow *et al* (2002) who showed that simple sensor input indicating user status could provide effective context-dependent content management.

For example, a user walking past the library sees a link to the library homepage on a head-up display, and if they stand still they are presented with a brief version of the page itself. If they then sit down, they see the page in full.

In broad terms, the aim of the CAS is to provide a means by which users of mobile devices can maintain their attention on the world around or the task at hand, whilst providing timely and effective computer support. The CAS provides a mechanism by which relevant content can be selected, filtered, and passed to the user. Users can then either look at the content or select other content from the filtered set.

2. Architecture

The CAS comprises a central *context engine* using a set of *context features* – obtained from real-world data such as location, activity, and device capabilities – to derive a c*ontext state*. This context state is used to perform *exclusion* of any unsuitable content (e.g. high resolution web pages that cannot be displayed on a PDA) and then *ranking* of the remaining content to determine the best *n* options.

Content is to be drawn from a repository of learning objects, appropriately marked-up for content using XML or similar and an agreed mark-up standard such as the IEEE learning objects meta-data schema (IEEE Standards Department, 2002).

3. Current status and next steps

The CAS is currently implemented as a pre-prototype demonstrator with a CLIPS production system as the context engine linked to a user/debugging interface in Tcl/Tk.

The next steps for the MOBIlearn context awareness subsystem involve using sensors that can provide real-world context features on a mobile device such as a tablet PC or iPaq. We also intend to explore alternative implementation methods such as agent-based systems to engender a flexible, reusable context awareness subsystem.

4. References

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