A Constructive Memory Architecture for Context Awareness

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Thesis Declaration

I declare the research presented in this thesis is original and has not been submitted in any form for another degree or diploma at any other University or institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in this thesis and a list of references is provided.

Yohann Daruwala
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Abstract

Context-aware computing is a mobile computing paradigm in which applications can discover, use, and take advantage of contextual information, such as the location, tasks and preferences of the user, in order to adapt their behaviour in response to changing operating environments and user requirements. A problem that arises is the inability to respond to contextual information that cannot be classified into any known context. Many context-aware applications require all discovered contextual information to exactly match a type of context, otherwise the application will not react responsively. The ability to learn and recall contexts based on the contextual information discovered has not been very well addressed by previous context-aware applications and research.

The aim of this thesis is to develop a component middleware technology for mobile computing devices for the discovery and capture of contextual information, using the situated reasoning concept of constructive memory. The research contribution of this thesis lies in developing a modified architecture for context-aware systems, using a constructive memory model as a way to learn and recall contexts from previous experiences and application interactions. Using a constructive memory model, previous experiences can be induced to construct potential contexts, given a small amount of learning and interaction. The learning process is able to map the many variations of contextual information currently discovered by the user with a predicted type of context based on what the application has stored and seen previously. It only requires a small amount of contextual information to predict a context, something common context-aware systems lack, as they require all information before a type of context is assigned. Additionally, some mechanism to reason about the contextual information being discovered from past application interactions will be beneficial to induce contexts for future experiences.

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