

Context and context-aware

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Papers

- Towards a better understanding of context and context-awareness

Anind K. Dey and Gregory D. Abowd

- Context is key

Joelle Coutaz, James L. Growley, Simon Dobson etc.

- There is more to context than location

Albrecht Schmidt, Michael Beigl, and Hans

Previous definition of context

- Location, identities of nearby people, objects, environment and time
- User's emotional state, focus of attention, and orientation
- Synonyms of context

Disadvantages: difficult to apply because people are not clear to use these definitions to solve the dilemma

Their own definition

- Context is any information that can be used to characterize the situation of an entity
- How to clarify the context based on this definition: given a piece of information, if it can characterize the situation of user in an interaction, this information is context

Two levels of context

- First level: Primary context -- are location, identity, activity and time
- Second level: All the other type of context– the attributes of the entity with primary context, can be indexed by first level

Definition of context-aware computing

- Previous definition
 - Synonymous: reactive, responsive
 - detect and sense, interpret and respond to aspects of user's local environment.
 - adapt to context

Disadvantages: more specific so that they do not fit in some case.
- Their own definition:

the definition of context-aware is the system using context to provide relevant information and/or services to the user, where relevancy depends on the user's task

advantages: more general, only require the response to context.

Context-Aware Application

- Classification of features
 - presentation of information and service to a user
no difference between information and services
 - automatic execution of a service
 - tagging of context to information for later retrieval

Context-Aware Application

- Design of architecture
 - support context-aware and applications
 - No concern about how the context was sensed
- Context widget
 - An abstraction that implements this concept
 - Acquire a certain type of context information
- Abstraction – a situation
 - Correct to use for building applications
 - Gather the context about an entity
 - Support primary types
 - Provide facilities to each other to allow comparison on the primary context types

Conclusion

- Summarize the definition and categorizations of context
- Their benefits which assist researchers understand the context-aware computing
- Help application designers use context etc.
- In future, the authors hope to understand context and context-awareness more comprehensively.

Issues for current context

- Context is not simply a state but part of a process.
- A holistic treatment of context.
- The risk of engendering a mismatch between the system's model of interaction and users' mental model of the system

Addressing these issues

Conceptual Framework

- an ontological foundation
 - Model context as a directed state graph, where every context is the node and edges mean the change in context
- an architectural foundation
 - Multiple layers including sensing layer, perception layer, situation and context identification layer and exploitation layer
- an approach to adaptation
 - allows a system to maintain consistent behavior across variations in operating environments

Conclusion

Should find the proper balance between contradictory features so that the context could be constant to be used correctly.

Background

Location is most often used to approximate context and to implement context-aware applications.

- Not sufficient

Working Model

- To structure the concept of context
 - Human Factors
 - User
 - Social Environment
 - Task
 - Physical Environment
 - Conditions
 - Infrastructure
 - Location

Working Model

- To acquire context
 - Provide an infrastructure to obtain context
 - Embed sensors in ultra-mobile devices to get context.
 - Have more advantage which does not rely on infrastructure, and could be used in any environment

Working Model

- To apply context in ultra-mobile computing
 - Adapt to the new environment,
 - Improve the user interface,
 - Context-aware communication and proactive application scheduling

Sensor-based context awareness

- Light-sensitive display
- Orientation-sensitive user interface
 - Both are at low level of abstraction, such as specific physical condition
- Sensor Fusion
 - combine several simple sensors in an awareness component.
 - layered architecture: sensors, cues, contexts and scripting.
 - built an awareness device with both hard and software components.
 - The procedure to compute context is first processing signal in hardware, then cuing generate and calculate contexts, final software executing the script

Conclusion

- Introduce a working model to explore context
 - Acquire the context
 - The application domains of model
- Context-aware enhances ultra-mobile devices
 - Light sensitive display
 - Orientation aware
 - Fusion of multiple sensors
- Future work
 - focus on the cooperative context discovery.

Thank you !