

Tracing Experience as a potential support for meaning negotiation between human and computer agents

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In this study, we consider a group of human actors, who work together to accomplish a collective task. These actors use a common computer environment as a medium for their cooperation to manage reports of their activities in the context of their collective task.

The general goal of the project is to help each actor to achieve his/her task by providing a contextual access to his/her individual experience, to the experience of peer actors, and finally to the collective experience.

The specific problem treated in this paper is to assist one actor to reuse his/her past experience in the context of his/her current task. Individual experience is represented by individual use traces, which are observations of the real usage situated in the activity. This assistance requires some common meanings between the actor and the system in order to allow their mutual understanding.

The fundamental issues are to model the experience captured by observing actors' actions in the environment, and to have a way to reuse this experience with a minimal cost for an actor. A first way to ease information retrieval is to personalize the assistance. However it is always limited by the numerous interactions which are required to the actor, before the assistant starts retrieval. Our proposal is to use the principles of the emergence of language to achieve this negotiation, and by this way to take into account past negotiations. Here, the emergence of language is chosen to obtain a shared communication system between one actor and his/her personal assistant. By the same way, this system could be extended to the communication between personal assistants in order to assist cooperation.

To construct individual experience bases, we use the trace-based reasoning paradigm, an extension of the case-based reasoning paradigm to unstructured cases where problem and solution descriptors are not defined beforehand. Traces are captured by observing users' actions, and represented in the system by use traces; a reasoning by analogy is done to retrieve past traces. A use trace is an alternate sequence of state and transition, describing respectively the stable state of the environment and the action performed by the actor. In order to allow the emergence of meaning in the traces, we apply the mechanisms of emergence of language considering the interactions between agents. An *alter ego* agent is associated to each actor to manage the interactions; it has to assist the reuse of the individual experience, to allow experience sharing and exchange and to participate in the emergence of a collective experience. The interactions are then grouped in two categories : between one actor and his/her assistant, and between actors mediated by the system, and thus between alter ego agents. The system we consider is an hybrid system, and our paper focuses on the subsystem constituted of an actor and his/her assistant. The same principles could be applied to the system as a whole.

To allow emergence of language, a symbolic representation of the use traces is required. A formal grammar for use traces defines the elements of this representation; associated to a given abstraction, they constitute the patterns for the language. The meanings of the language are the meanings of the assistance, and they are defined using the patterns. During actor's actions, some patterns are recognized in the current trace, and an ascendant process allows to finally identify some meanings. The recognized meanings are used to retrieve past traces, which are proposed to the actor. The actor can interact with these proposals, and these interactions constitute some support for negotiations, which are taken into account to perform the language games necessary to emergence of language. By this way, patterns and meanings are modified and can be reused in forthcoming negotiations.

A prototype is presented to illustrate our proposal, some experiments are to come.