

Towards an experience-based artificial intelligence

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Certain theories of cognitive development, of the evolution of cognition, and of knowledge representation (Nelson 1895, Barsalou 1999, Donald 1991, among others) have indicated that the episode is a central element to understand the first stages of cognitive development, as well as of certain basic cognitive abilities, such as intelligent behavior. Developing these approaches, we introduce the experion theory of cognition (Vilarroya 2002) and we set the future lines of research for applying this theory to the generation of artificial intelligence.

I. The real meaning of a experience

Let's define experion as a slice of the life of a cognitive being, with a limited duration constrained by (bottom-up) neural synchronization and (top-down) attentional dynamics (Vilarroya, in press). An experion would consists of the web of all the states of all sensors, motors, emotions, internal states and motivations (understanding motivation as an internal drive of the being that generates desired states for the being), conscious and unconscious, of the being at a particular moment. The states of all these elements are a function of certain physical constraints of the system, of certain predispositions of the system, of the dynamical interaction between the different elements and of previous experions.

All experions experienced during life are stored in the brain of the being. The cognitive process of a being is then seen as a concatenation of experions. This process of experion accumulation establishes relationships (i.e. similarity) between the present experion and past experions so that the experion is stored modifying its nature and that of relevant past experions according to the type of relationships established.

All the experion storage has as goal to be an action selection mechanism, which should result on a maximal survival of the being. The final motor answer given by a being on a determined situation is then produced by the activation of all the present experions that the being has accumulated during his life, on that particular situation and moment.

II. Towards experion based AI

The experion theory is presumed to be underneath all biological cognition, from the most simple up to the most complex. Therefore, it should be possible to generate an artificial being that behaves in that way using the experion theory. In order to do that, we identify the following points to be addressed for an artificial intelligence based on that theory:

- 1. The AI must be able to acquire/generate experions from its sensors, actuators, internal states and motivations. How the process which gives rise to an experion should be implemented?**
- 2. The AI must be able to generate its concepts about life from its experions. How should those concepts be generated from different experions?**

3. **One of the most important mechanisms of this theory is the one that finds relations between several experions that are very different from a panceptual state (Vilarroya 2002), but that are very similar from a conceptual point of view (i.e. one is a metaphor of the other, Lakoff & Nuñez, 2002). Until now, most of the artificial systems that tried to find such relations were based on symbolic methods, but basing the analysis on experions may provide a new light. How could relations be found between different experions which are indeed related?**
4. **When generating a new experion, a lot of variables take part in the process, but only a few are really important for the present situation. This is what is called the figure/ground relation. How a figure/ground relation is established from the current experion?**
5. **Finally, all the mechanisms explained must have a reason to be there, i.e. they must drive the artificial entity on its environment. How do the relations among all these mechanisms and the action selection mechanism are established in order to help the AI survive in its environment?**

These are the lines that will trace our research in the following years.

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