Enforcing Personalized Human-Robot Interaction through an Integrated Epigenetic Robot Architecture

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March 2016

Abstract

This research describes a robot architecture based on the epigenetic approach that is able to model robot behaviors using the robot past experience and contextual information. When two humans interact, an *interaction gap* may arise between them when they refer to the same object, concept or event in the real-world, but they associate it with a different meaning. However, as long as the interaction progresses, the gap can be reduced by continuous interaction and adaptation to form a sort of mutual understanding. In human-robot interaction processes, the interaction gap can be present and it is difficult to reduce, given the limited capabilities of current robot architectures in knowledge acquisition, revision, and adaptation.

We posit that it is possible to enforce mutual understanding between a human and a robot providing the latter with the possibility of building a *personalized* experience as far as the interaction with the former is concerned, and we propose a conceptual design and implementation of Epigenetic Robot Intelligent System (ERIS), a robot architecture that is capable of acquiring and revising relevant knowledge during the interaction process. Experiments are aimed at demonstrating how different robots when exposed to different stimuli and interaction processes, are capable of conceptualizing different past experiences and *memories*, and ultimately engaging humans in contextualized interaction.

Keywords: Epigenetic architecture, developmental learning, memory-inspired architecture, long-term knowledge acquisition, context-based memory retrieval