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Author(s)	Pratama, Ferdian Adi
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氏　　名	FERDIAN ADI PRATAMA			
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論文題目	Enforcing Personalized Human-Robot Interaction through an Integrated Epigenetic Robot Architecture （ロボットの統合発達アーキテクチャに基づいた人ロボットインタラクションの個別化に関する研究）			
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		浅野　文彦	同	准教授
		田中　宏和	同	准教授
		MASTROGIOVANNI, Fulvio	University of Genoa	助教

論文の内容の要旨

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

論文審査の結果の要旨

An epigenetic based approach to building robot architectures for enriching human-robot interactions was proposed analogous to human-human interactions and experimentally verified on a commercially available humanoid robot platform using ROS (Robot Operating System). This research is built upon a thorough review of existing cognitive psychological ideas applied to solve the problem of stereotyped, monotonous robot behavior in human-robot interaction. The proposed architecture named ERIS (Epigenetic Robot Intelligent System) enabled any robot running ROS to provide the possibility of building a personalized experience through the interaction with a human and/or objects around it, which is believed to be essential for generating robot personalities and helping reduce human-robot interaction gaps.

The author demonstrated significant technical achievement by extending the state-of-the-art of developmental robotics. Abstract psychological concepts were well embodied in a real robot allowing it to facilitate progressive self-development in an autonomous open-ended manner through lifelong interactions, which is a meaningful step toward the possible future of social robots designed to interact with people. Until now, no other architectures have been proposed and implemented to accommodate personalized interactions in the robotics domain. Notably, two important elements- robot past experience and contextual information- were cleverly incorporated into the proposed architecture. Furthermore, acquisition and successive revision of relevant knowledge were performed during the interaction process in a fully autonomous fashion without a priori knowledge. The proposed integrated architecture can be easily expanded to accommodate a variety of sensory memory types and procedural memory.

Overall, this dissertation has made a significant contribution to the field of developmental robotics and information processing. The committee has therefore agreed that Mr. Pratama deserves to be awarded a Ph.D. in Information Science.