

Episodic Memory for Verbalization of Robot Experience

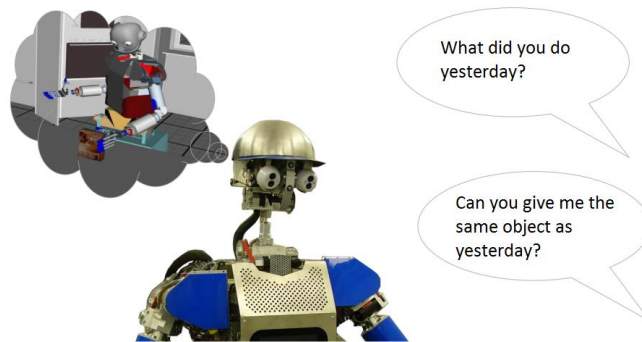


Fig. 1: The humanoid robot ARMAR-III remembering an executed episode after being queried by the user.

Modern robots can perform complex tasks in human centered environments with a high level of autonomy by integrating perception, action, planning and learning capabilities.

However, externalizing their internal state (i.e. executing action, sensorimotor experience, perceived world state) to the user in the same way humans would communicate, is still a limited ability. The verbalization of experiences, stored in the *episodic memory*, is a key component of human interaction and allows them to reuse knowledge from past episodes after being queried (such as the second query in Fig. 1).

To this end, the goal of this project is the creation of an episodic memory for robot experiences and their verbalization in natural language as a response to natural language queries. For this goal, it is necessary to be able to store experience in an episodic memory, to extract the semantic meaning of natural language requests, to query the episodic memory to get the necessary information, and to respond appropriately to the request.

This work includes the generation of episodic memories out of the robot's memories and the definition of an episodic knowledge representation including the perceived world and the executed actions. Further, this project involves processing of text in natural language as well as generating a verbalized description of the robot's experiences. For that, a data collection is necessary. While the knowledge representation should be stored symbolically, natural language can be processed using deep learning methods.

This work requires C++ and Python (pytorch) programming skills.

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