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1 Summary

The RoboErgoSum project employs a cognitive architecture (Fig. 1) designed for providing a robot with the necessary skills for autonomous activity in an unknown environment. The architecture contains modules for:

- sensing and acting in the environment (Interaction or Sensorimotor module),
- visual perception for object segmentation, effect detection (Intepretation module),
- learning (Learning module),
- memory (Memory module),
- motivation (Motivation/Deliberation module),
- decision and action planning (Decision/Execution module).

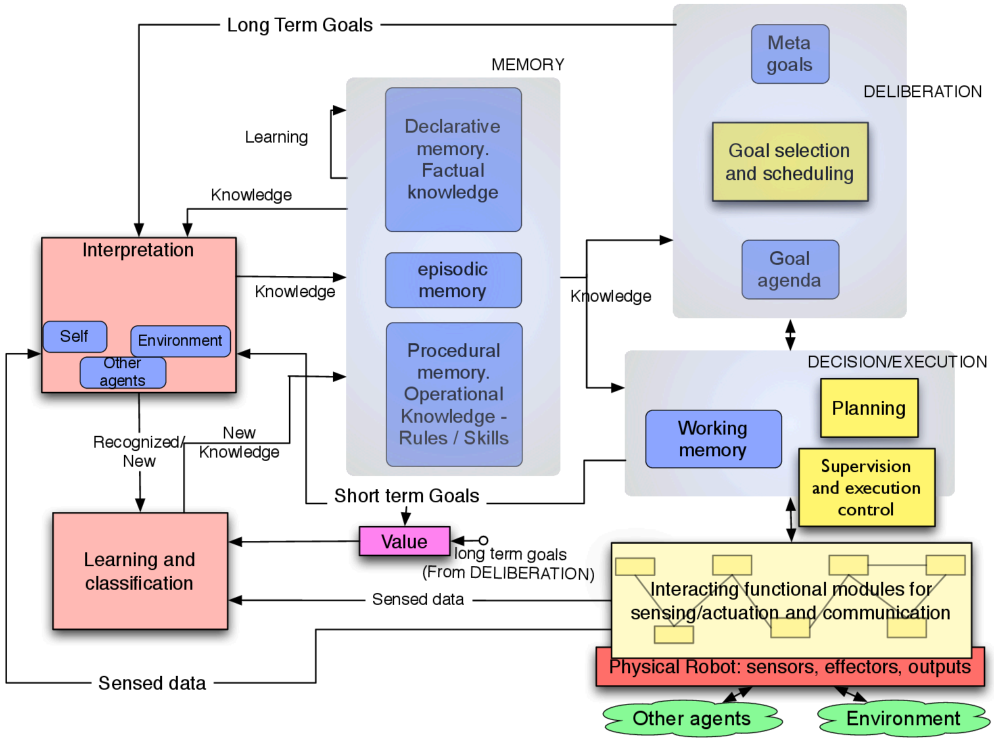

Figure 1: The cognitive architecture employed in the RoboErgoSum project

These modules have been developed and validated separately. However, the integration of the modules into a common system still remains to be done.

The interconnections between the modules are structured in the following way. The **Interaction or Sensorimotor** module contains the innate set of action primitives available to the robot, which allow it to interact with the environment. It also contains the innate set of perceptual abilities for perceiving the environment: visual perception and proprioception.

The **Learning** module processes the available pre-processed inputs (i.e. objects detected, actions performed, measured effects) to discover and learn which interactions are available to the robot in the current environment (i.e. affordance learning). It also generates the set of available actions, that were learned after the interaction with the environment, together with their pre-conditions and post-conditions.

At the same time, the **Motivation/Deliberation** module manages the set of goals that have to be achieved by the robot. Then, the **Decision** module uses the outputs of both the Learning module (i.e. the domain of available actions) and Motivation module (i.e. the set of goals to achieve) to compute the optimal set of actions to perform, so as to obtain the highest reward in the given time horizon.

The **Memory** module is composed of the *episodic memory* (which defines the size of perception signals that can be processed), the *procedural memory* for action execution, and the *factual knowledge memory*, which conserves the causal relationships (e.g. affordances) learned by the robot.