Modeling Robots with Anticipations Generated by Analogy-making

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•Most of the models of social interactions are reactive – they react to what is present in the environment.
•How to create predictive models?
  •One possible way – by generalizations the regularities, captured from past experience and predicting on the basis of these generalizations
  •**Our approach – by analogy**. One may make anticipations even using a single structurally similar episode from the past.
•The constructivists approach to cognition: top-down generation of inferences about the present, past, and future; then – verification of these inferences. However, where these inferences come from? Our answer – from hypotheses, generated by the mechanisms of analogy-making

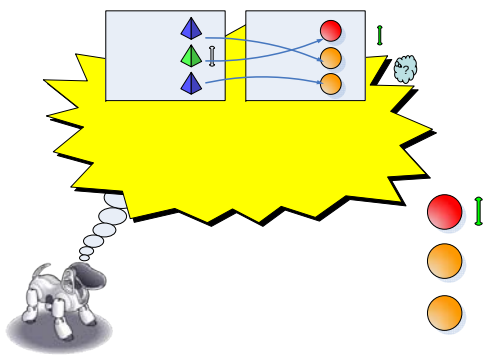
The RecMap model (Petkov, Shahbazyan, 2007, Shahbazyan, Petkov, 2007):

-Objects, scenes, and events are represented by structural description of elements and their configural relations

-Vision is an inferential process in which limited preattentive information is mapped to existing knowledge to generate hypotheses about what is present in the environment

-The role of attention is to bind elements and their relations into integrated representations, as well as to verify whether they are present.

-Attention is biased to the aspects of the visual world that are most consistently supported.



Simulations with AIBO robots (combining constructive vision and high-level thinking by analogy):

-Create an internal representation of the scene

-Retrieve an analogical scene from memory

-Transfer the missing information (make anticipations about the present)

-Do the action – movement to the goal

Speculative extension of the model to social situations:

•Understanding others' intentions depends critically on two abilities:

  •structure detection skills and

  •inductive propensities (Baldwin, 2002)

•Some low-level features of the situations bias attention and it groups them as one chuck of information (Baldwin et. al, 2001)

(Partnership with Institute of Systems Engineering and Robotics, for designing robot, assisting elderly people)

Constructing usable companion-robots requires:

-Create an internal representation of the situation

-Retrieve an analogical situation from memory

-Transfer the missing information (make anticipations about the intentions and future actions of the others)

-Do the appropriate action

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