

Reinforcement Mechanism in Semantic Structure Models

Reinforcement learning models for the behavior of Semantic Structures

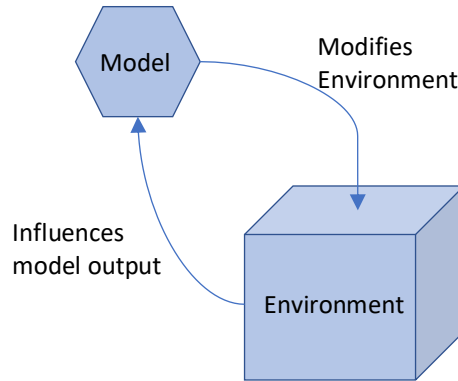
We are considering reinforcement learning models where both are true:

- 1) The environment influences the model
- 2) The model influences the environment

The model influences the environment in such a way that the environment gets conditioned to support certain interactions and encourages forming certain types of ensembles. The pertinent question here is what constitutes the environment. We will consider both a static model and dynamic model for semantic structure interactions. In both static and dynamic modeling the environment is represented by some kind of a *field* which will influence the particles entering semantic space either via inference or via parsing. The environment will condition those new particles to form certain kinds of ensembles and to associate them in a certain preferred way with the existing semantic structures.

The Role of the Environment in parsing and inference of semantic structures

The model of semantic structure interactions in conjunction of the Environment determines how the incoming semantic particles will form semantic structures and how the newly formed structures will interact with the existing ones.



When structures are formed from semantic particles certain semantic paths will be reinforced by the Model while other paths will be discouraged. The reinforcement happens based on certain statistics computed for every newly formed structure. Discouragement happens when the attempt to form a semantic structure fails.

In the Figure below it is depicted an ensemble of 4 properties travelling toward their bound states. With green are depicted the in-situ positions of each of the properties. With blue are depicted the bound state positions of each of the properties. The red point in the center is the energy weighted center of mass of the ensemble \vec{p}_E when each of the properties are in their bound states. The mass center of each property in some position between in-situ and bound state, denoted with $\vec{p}_{c,i}$, is depicted as a magenta point. The orange points connected to each magenta point represent the semantic aspects of each property. The blue lines between the in-situ and bound state positions are the trajectories (travel paths) of the mass centers of each property. Notice that the trajectories are not straight lines because the position of the energy weighted center of mass of the ensemble \vec{p}_E moves while the properties are

travelling toward their bound states. How exactly \vec{p}_E moves while the properties are travelling toward their bound states will be found in a later discussion in this article.

