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Chapter VI

On IETAL, Fuzzy Algebraically

Abstract

Based on the material presented in Appendix A and B, in this chapter we give alternatives to the definition of agent using fuzzy algebraic structures. The notion of intrinsic representation of the environment is formally defined as a fuzzy relation valued by the lattice of drives of the agent.

Introduction

Inspired by the flexibility of the fuzzy modeling tools and taking into account the relationships between the multiple key notions in our theories on agency, learning, and multi-agent systems, especially the drives, actions, and the like in this chapter we give a new approach to the definition of an Interactivist-Expectative Theory of Agency and Learning (IETAL) agent.

Structures in Drives, Motivations, and Actions

The agents' drives, motivations, and actions can identify multiple relational structures that can later be used as valuating structures for the L, P, and R fuzzy structures.

Abraham Maslow (Hoffman, 1988) developed a hierarchical system of motivations that influence human behavior. The psychological and the physical needs of the human are at the bottom of the hierarchies, and they need to be at least partially satisfied before people can be motivated by motivations higher in the hierarchy. Maslow gives the following layers of motivations (starting from the bottom, going upwards) in humans:

- biological motivations (food, water, oxygen, sleep);
- safety;
- belongings and love (participation in sexual or nonsexual relationships, belonging to social groups);
- respect (as an individual); and
- self actualization (to be all the unit is able to be).

In one such strict hierarchy, we talk about a total linear ordering, and chains are special cases of lattices. Motivations, however, do not have to always be comparable, so the hierarchy does not need to always be a total ordering. If the weakest and the strongest motivation in an agent — along with all the other motivations that are comparable to the weakest and the strongest motivation, but not necessarily to all the others — can be identified, then the algebraic structure of the motivations does not need to be a linear ordering. In the most general discourse, they compose a relational structure (when we cannot identify the strongest or the weakest motivation), but we can identify binary relationships between the motivations in an agent.

In the discussion that follows, we shall be observing the structure of the motivation as crisp relational structure with a finite carrier. Moreover, we will assume that the motivations are structurally ordered in a lattice and by intensity. In a general case, as far as the motivations are concerned, in most of the models, the weakest motivations at the bottom of the lattice structure of the drives, is the need to survive. The strongest motivation, on the other hand, is the need to use the resources it (or its environment) possesses maximally.