"Thinking-Understanding" Approach in Spiking Reasoning System

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Abstract. In this position paper we propose the approach to use "Thinking-Understanding" architecture for the management of the real-time operated robotic system. Based on the "Robot dream" architecture, the robotic system digital input is been translated in form of "pseudo-spikes" and provided to a simulated spiking neural network, then elaborated and fed back to a robotic system as updated behavioural strategy rules. We present the reasoning rule-based system for intelligent spike processing translating spikes into software actions or hardware signals is thus specified. The reasoning is based on pattern matching mechanisms that activates critics that in their turn activates other critics or ways to think inherited from the work of Marvin Minsky "The emotion machine" [7].

Keywords: Spiking neural networks · Artificial emotions · Affective computing

1 Introduction

We suppose that the next revolutionary step in robotics will be done by autonomous systems able to make decisions and adapt themselves to complex social and dynamic environments. Unfortunately, the complexity of these environments prevents current bio plausible architectures from real-time calculations because of the lack of the computational power requested, especially in case of absence of network connectivity. Although several decades have passed between Stanford's Shakey and Honda's ASIMO, robots still have problems to perform a lot of tasks autonomously or connected through swarm protocols. DARPA DRC Trials, combining 10 tasks in human environments can help to understand the pitfalls and severe problems of autonomous robotics. For that reason, and considering the several challenges engineers are faced to, we propose computational architecture that could contribute to the improvement of adaptive skills of a robotic systems. We adopt a two-phase model in which two information processing mechanisms are combined to improve robotic processing architecture, that we call "Robot Dream" [12].

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