Modeling the impact of arousal on decision making with spiking neural networks

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Abstract

Complex decision making (DM) requires coordination of elementary information processes subserved by a distributed network of brain areas. Computational models help to understand these processes, but most of the existing models focus on simulating only one of the many parallel operations. One existing spiking neural (SNN) model (Duggins, Krzeminski, Eliasmith, Wichary, 2020) attempts to simulate DM holistically, however it does not take into account significant influence of emotional context of DM. To address this limitation, we propose to examine the impact of arousal-related neural gain modulation on DM using the mentioned SNN model. In this study we outline the methodology and perform successful in-silico validation of global gain modulation hypothesis with the SNN model of DM. To perform the simulation, we use a well-studied multi-attribute choice task and we validate simulation results against human behavioral data.

In M. Goldwater, F. K. Anggoro, B. K. Hayes, & D. C. Ong (Eds.), *Proceedings of the 45th Annual Conference of the Cognitive Science Society.*