A Re-Implementation of a Dynamic Field Theory Model of Mental Maps using Python and Nengo

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Abstract

In Dynamic Field Theory (DFT) cognition is modeled as the interaction of a complex dynamical system. The connection to the brain is established by smaller parts of this system, neural fields, that mimic the behavior of neuron populations. We reimplemented a spatial reasoning model from DFT in Python using the Nengo framework to test if the models results can be reproduced. Moreover we aimed at providing an alternative to the existing DFT implementations to facilitate future research in that direction. Our results show that the proposed spatial reasoning model works as described since we were able to duplicate both the behavior of single neural fields and the whole model. However, there are statistical differences in performance between the two implementations, and future work is needed to determine the cause of these differences, and to increase the speed of the Python implementation.