UNIVERSITY OF SOUTH FLORIDA

Defense of a Doctoral Dissertation

Adaptive Multi-scale Place Cell Representations and Replay for Spatial Navigation and Learning in Autonomous Robots

by

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For the Ph.D. degree in Computer Science and Engineering

Place cells are one of the most widely studied neurons in the brain hippocampus thought to play a vital role in spatial cognition. Studies show that place cell activity is highly correlated with the animal's location in an environment, forming "pl (v)49 (r)3.6.9 (g)4.9 (

ENB 313 and Online (Microsoft Teams)

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THE PUBLIC IS INVITED

Publications

1) **Scleidorovich, P.,** Weitzenfeld, A., Fellous, JM., and Dominey, P. Integration of velocity-dependent spatio-temporal structure of place cell activation during navigation in a reservoir model of prefrontal cortex. Biol Cybern (accepted).

2) **Scleidorovich, P.**, Llofriu, M., Fellous, JM. et al. A computational model for spatial cognition combining dorsal and ventral hippocampal place field maps: multiscale navigation. Biol Cybern 114, 187–207 (2020). https://doi.org/10.1007/s00422-019-00812-x

3) **Scleidorovich, P.**, Llofriu, M., Fellous, JM., and Weitzenfeld, A., "A Computational Model for Latent Learning based on Hippocampal Replay," *2020 International Joint Conference on Neural Networks (IJCNN)*, 2020, pp. 1-8, doi: 10.1109/IJCNN48605.2020.9206824.

4) Cazin, N., **Scleidorovich, P.**, Weitzenfeld, A. et al. Real-time sensory–motor integration of hippocampal place cell replay and prefrontal sequence learning in simulated and physical rat robots for novel path optimization. Biol Cybern 114, 249–268 (2020). https://doi.org/10.1007/s00422-020-00820-2

5) Llofriu, M., **Scleidorovich, P.**, Tejera, G. *et al*., "A Computational Model for a Multi-Goal Spatial Navigation Task inspired by Rodent Studies," *2019 International Joint Conference on Neural Networks (IJCNN)*, 2019, pp. 1-8, doi: 10.1109/IJCNN.2019.8851852.

6) Cazin, N., Llofriu, M., **Scleidorovich, P.**, et al. (2019) Reservoir computing model of prefrontal cortex creates novel combinations of previous navigation sequences from hippocampal place-cell replay with spatial reward propagation. PLOS Computational Biology 15(7): e1006624.

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