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A Model of Generative Episodic Memory and its Function

Wednesday, July 5, 2023 10:00 AM (50 minutes)

Many studies have suggested that episodic memory is a generative process, but most computational models adopt a storage view. In this talk, I will first present a system level model of generative episodic memory, in which incomplete memory traces are completed by semantic information [1]. It is based on standard machine learning components, like a vector-quantized variational autoencoder (QV-VAE) and a pixel convolutional neural network (PixelCNN). The model shows similar trade-offs between attention and semantic consistency as found in psychological experiments in an episodic memory task. In a second part, I will focus on the functional role of episodic memory, because just remembering the past has little evolutionary relevance. We show that episodic memory can accelerate spatial learning in a reinforcement setting through one-shot learning and replay learning.

[1] Fayyaz, Z.; Altamimi, A.; Zoellner, C.; Klein, N.; Wolf, O. T.; Cheng, S. & Wiskott, L. A Model of Semantic Completion in Generative Episodic Memory. Neural Computation, 2022, 34, 1841–1870, https://direct.mit.edu/neco/article/34/9/1841/1123 Model-of-Semantic-Completion-in-Generative

[2] Zeng, X.; Diekmann, N.; Wiskott, L. & Cheng, S. Modeling the function of episodic memory in spatial learning. Frontiers in Psychology, 2023, 14, https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1160648/full

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