

Forgetful inference in a sophisticated world model

Submission ID 3000034
Submission Type Poster
Topic Cognitive Science
Status Submitted
Submitter Sanjeevan Ahilan
Affiliation Gatsby Computational Neuroscience Unit, University College London

SUBMISSION DETAILS

Presentation Type Either Poster or Oral Presentation

Presentation Abstract Summary Humans and other animals are able to discover underlying statistical structure in their environments and exploit it to achieve efficient and effective performance. However, the largest scale structures such as 'world models' are often difficult to learn and use because they are obscure, involving long-range temporal dependencies. We analyzed behavioral data from an extended experiment with rats, showing that the subjects discovered and exploited a world model, albeit suffering at times from immediate inferential imperfections as to their current state within it. To describe this process, we built a hidden Markov model (HMM) of the subjects' models of the experiment, describing overall behavior as integrating recent observations with the recollections of an imperfect memory. Over the course of training, we found that subjects came to track their progress through the task more accurately, indicating improved inference of the partially-observable state. Model fits attributed this improvement to decreased forgetting of the previous state. This 'learning to remember' decreased reliance on more recent observations, which can be misleading, in favor of a more dependable memory.

Paper Upload (PDF) [ahilan_ccn_final.pdf](#)

Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Sanjeevan *	Ahilan *	Gatsby Computational Neuroscience Unit, University College London	sanjeevan.ahilan.13@ucl.ac.uk
Rebecca	Solomon	Center for Studies in Behavioral Neurobiology, Concordia University	rb_solomon@hotmail.com

Kent	Conover	Center for Studies in Behavioral Neurobiology, Concordia University	kent.conover@gmail.com
Ritwik	Niyogi	Brain Science Institute, Johns Hopkins University ritwik7@gmail.com	ritwik7@gmail.com
Peter	Shizgal	Center for Studies in Behavioral Neurobiology, Concordia University	peter.shizgal@concordia.ca
Peter	Dayan	Gatsby Computational Neuroscience Unit, University College London	dayan@gatsby.ucl.ac.uk

Keywords

Keywords
latent state model
hidden Markov model
brain stimulation reward
learning to learn
partial observability