

UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

A memory-augmented neural network model of abstract sequential reasoning

Permalink

<https://escholarship.org/uc/item/38m243md>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 42(0)

Authors

Sinha, Ishan

Cohen, Jonathan

Webb, Taylor

Publication Date

2020

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed

A memory-augmented neural network model of abstract sequential reasoning

Ishan Sinha

Princeton University, Princeton, New Jersey, United States

Jonathan Cohen

Princeton University, Princeton, New Jersey, United States

Taylor Webb

University of California Los Angeles, Los Angeles, California, United States

Abstract

A key aspect of human reasoning is the ability to recognize abstract patterns in sequential data and then use those patterns to make novel inferences. Capturing this capacity for abstract reasoning is a major challenge for neural network models of human cognition. We present a recurrent neural network model of abstract sequential reasoning that is augmented with a form of episodic memory. This memory system enables the network to accomplish a form of variable-binding that has long been considered an important component of abstract reasoning. We evaluate the model using visually grounded, abstract sequential reasoning and pattern completion tasks, including a task based on relations commonly found in Ravens Progressive Matrices.