A memory-augmented neural network model of abstract sequential reasoning

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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.