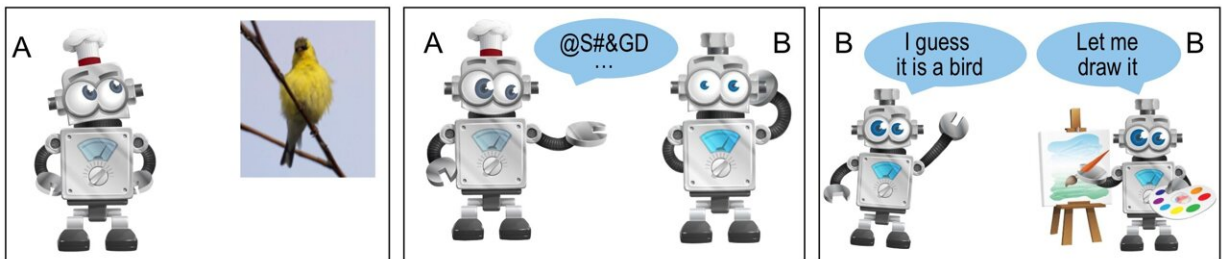


Emergence of machine language: Towards symbolic intelligence with neural networks

February 22 2024



From left to right: Agent A sees a random image; A tries to use his own language (to be learned) to tell a friend B what he saw; B needs to understand the language and guess what A is talking about and meanwhile draw the image according to the description of generated through cooperation. Credit: Science China Press

Led by a team from the Institute of Automation, Chinese Academy of Sciences, a new study explores a novel frontier in machine learning. With the rise of large language models, AI is evolving from perceptual intelligence to cognitive intelligence, and human language has become a pivotal component of visual understanding. This study questions whether machines can spontaneously learn a machine language as a visual representation, without relying on human language.

The work is [published](#) in the journal *National Science Review*.

Inspired by the strengths of [human language](#), the researchers began by

simulating the emergence of language in the most basic scenario of a two-agent game. Their aim was to generate a language through the interactions of these agents. Using the "speak, guess, and draw" game as a platform, the researchers demonstrate the capabilities of neural networks in generating variable-length, discrete, and semantic representations.

The team also validated its potential advantage by comparing discrete language with continuous features from three perspectives: interpretability, generalization, and robustness across diverse datasets.

The study of machine language represents an exciting and valuable direction in artificial intelligence research. Imagine a future where AI development is no longer limited to fixed programs and predefined rules, but allows intelligent agents to freely evolve in a specific environment, communicating and collaborating through spontaneous language.

More information: Yuqi Wang et al, Emergence of machine language: towards symbolic intelligence with neural networks, *National Science Review* (2024). [DOI: 10.1093/nsr/nwad317](https://doi.org/10.1093/nsr/nwad317)

Provided by Science China Press

Citation: Emergence of machine language: Towards symbolic intelligence with neural networks (2024, February 22) retrieved 27 April 2024 from <https://techxplore.com/news/2024-02-emergence-machine-language-intelligence-neural.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.