

[The original, German version of this article appeared on April 17, 2022, as part of the AI column “Aus dem Maschinenraum der KI” in the economics section of the German Sunday newspaper Welt am Sonntag, p. 26.]

[Translated with www.DeepL.com/Translator (free version) - AI technology made in Europe, see https://en.wikipedia.org/wiki/DeepL_Translator, and subsequently polished and modified by the author.]

Put up or shut up

The French Hybrid AI system Nook beats world champions at Bridge

Just 4 months old, but the year 2022 has been already a quite turbulent year for artificial intelligence (AI). First, Ilya Sutskever, chief scientist of the Californian AI company OpenAI, provoked on Twitter with the claim that some largest artificial neural networks are already "slightly conscious." While he did not refer to any specific AI system, he probably had OpenAI's own text and language program GPT-3 in mind. GPT-3 is an autoregressive language model based on deep neural networks that can use its 175 billion parameters to generate human-like text, infinitely many (sometime more, sometime less) meaningful sentences with only a finite number of statistical rules.

Only shortly after the Sutskever tweet, Gary Marcus, professor emeritus at NYU and founder and CEO of Robust.AI, renewed his criticism of this type of AI research. According to Marcus, AI research must go beyond deep neural networks and purely statistical methods and combine them with symbolic techniques. Very much like the human brain, a deep neural network such as GPT-3 is a black-box whose “inner logic”—its knowledge and rules—is not explicit represented but has to be carved out actively. In contrast, symbolic AI approaches represent their knowledge and rules explicitly and thus give us a much more direct insight into their solution paths.

Hybrid AI, however, aims at combining both directions and seems to be just as provocative as "slightly conscious" AI. One reaction on Twitter was, "Deep learning works, symbolic models don't. It's that simple." And Yann LeCun, director of AI research at Meta/Facebook and 2018 Turing Prize winner, followed with, "Indeed. Put up or shut up."

Do not worry! First, a conscious AI, even a slightly conscious one is (fortunately) still a distant dream. Second, symbolic AI systems work! Just in December 2021, a symbolic AI bot outperformed all deep learning ones by a large margin in the role-playing game NetHack, which is considered one of the most difficult video games of all time. To be fair, however, no agent got close to winning the game and in turn the NeurIPS 2021 NetHack challenge.

Or let's take a look at the game of Bridge—for Omar Sharif, the Doctor Zhivago in the Hollywood movie of the same name, "the second nicest thing in the world." A few days ago the French start-up NukkAI managed something no one else had ever achieved before: its AI system Nook beat eight world champions at Bridge.

Bridge is a trick-taking card game using a standard 52-card deck. Typically, it is play by four players in two competing partnerships. What at first glance looks like Skat or Doppelkopf is much more complicated. Unlike chess or go, the players in bridge have only incomplete information and must constantly react to the behavior of the other players at the table. Because team play is essential for success, bridge presents a real challenge to current AI

systems. Well, until Nook came along! At the Nukkai Challenge bridge tournament in Paris at the end of March this year, it won 67 of the 80 rounds played.

Nevena Senior, a many-times world bridge champion for England and one of Nook's challengers praised Nook's gameplay. Nook is very good at "reading" the behavior of its opponents and taking advantage of their mistakes. She was impressed by the strength of an AI system in a discipline that takes humans many years of learning to master.

And Nook is a hybrid AI system! In addition to statistical techniques, Nook also learns symbolic rules and background knowledge. It "learns in a way that is much closer to human beings" as British AI scientist Steven Muggleton puts it.

Unlike the well-known deep learning breakthroughs in chess and Go these rules make the Nook's decisions explainable by design. "It was fascinating to see how the players analyzed the game of the machine after the events and tried to improve," commented French mathematician and Fields Medal winner Cédric Villani.

For Germany and Europe, Nook shows that funding AI broadly, from deep neural learning, over constrained satisfaction to symbolic reasoning and planning pays off. Hybrid AI has a strong tradition in Europe, and I am a bit proud to have been able to contribute to laying its foundation. Nook's win is not symbolic! It is a turning point for AI—a turning point that comes from Europe! Europe can do AI. Chapeau Nukkai!

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