DeepMind's AlphaZero breathes new life into the old art of chess

September 10 2020, by Peter Grad

Credit: Pixabay/CC0 Public Domain

"Of chess, it has been said that life is not long enough for it," chess master William Napier once said, "but that is the fault of life, not chess."

The game of chess itself has had a gloriously long life, with earliest recovered relics of the ancient game dating to the ancient Persian

Sasanian Empire in 600 AD.

The game has gone through hundreds of modifications, tweaks and enhancements over the centuries. Of an estimated 2,000 variations of the game, most have been developed only in recent years. One single version itself, known as Chess960 (created by world chess champion Bobby Fischer), has 960 variations of the game, with each version rearranging the standard positioning of all game pieces.

The game's appeal is universal. Interest was spurred over the past few decades with the introduction of computerized players. Computers proved to be formidable and, eventually, unbeatable foes. In 1997, IBM's massive Deep Blue won an unprecedented victory against a reigning world chess champion, Gary Kasparov. By 2007, a cellphone was able to vanquish tournament challengers with nine wins and one draw.

But increasing numbers of fans of the game have expressed consternation in recent years as players become more reliant on computerized chess engines for game preparation and strategy. There has been a notable decrease in the number of decisive games as well.

As chess grandmaster Vladimir Kramnik recently told Wired magazine, "For quite a number of games on the highest level, half of the game—sometimes a full game—is played out of memory. You don't even play your own preparation; you play your computer's preparation."

The folks at Google's DeepMind AI project set out to do something about it. They invited Kramnik to work with AI researchers as they unleashed AlphaZero, which in 2017 taught itself to beat experts at such games as chess, Go and Shogi. Their aim: "Creatively explore and design new chess variants" while preserving the game's basic principles.

AlphaZero was given nine parameters that altered key actions of the

game, and then was left on its own to learn the game and to devise new strategies to win.

"It is a system that can learn near-optimal strategies for any rule set from scratch, without any human supervision, by continually learning from its own experience," DeepMind said in a blog posted Wednesday.

Aside from the nine variables, AlphaZero began to learn chess from scratch. It did not know, for instance, that it can capture an opponent's piece. It basically learned in hours what humans require years to master.

The variables, introduced to bring new depth to the game, included such twists as barring castling—a move that protects one's king behind several pieces —and the concept of self-capture, where one can knock off one's own militia to achieve a strategic advantage. Another new element is the torpedo, which permits pawns to move two spaces at a time throughout the game.

"By learning near-optimal strategies for each variant with AlphaZero," the DeepMind blog states, "we determine what games between strong human players might look like if these variants were adopted. Our findings demonstrate the rich possibilities that lie beyond the rules of modern chess."

As AlphaZero progressed, it essentially reconstructed historic strategic development of game play, but did so in hours instead of centuries.

Some say the AlphaZero strategy proceeded more naturally than older chess engines. English grandmaster Matthew Salder marveled at AlphaZero's recreation and exploration of seemingly infinite chess strategies. It's like "discovering the secret notebooks of some great player from the past," he said.

Analyzing AlphaZero's strategies, applying variants and even redesigning the chess board (as was done with Fischer's increasingly popular Chess960), are all contributing to what might be seen as a reinvention of the centuries-old art of chess.

Kramnik seemed in awe of the new opportunities and challenges AlphaZero posed as it churned through hundreds of years of game play and added creative twists.

"After three moves you simply don't know what to do," the grandmaster said, almost as if he were learning the game all over again. "It's a nice feeling, like you're a child."

  More information: Assessing Game Balance with AlphaZero: Exploring Alternative Rule Sets in Chess, arXiv:2009.04374 [cs.AI] arxiv.org/abs/2009.04374

© 2020 Science X Network