DeepMind's AI gamer is a better teammate than human players

30 May 2019
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Artificial intelligence can already beat humans at video games like StarCraft II and Dota 2, but now they've also mastered the art of working cooperatively.

DeepMind has trained AIs to team up to play Quake III Arena, a first-person shooter video game. They can outperform human players and are also able to successfully work with human teammates.

Up until now, AI has not been able to master the complexity of games that require teamwork and interaction between multiple players.

A group of 30 AIs were collectively trained to play five-minute rounds of Capture the Flag, a game mode in which teams must retrieve flags from their opponents while retaining their own.

Pitted head-to-head in teams of two, the AIs learned to navigate, tag and evade opponents, gaining experience from their environment and the game's score.

The AIs learned independently as they each played a total of 450,000 games – about four years of real-time game play.

Training the AI gamers in fixed duos initially led to some slacking off. "One of them can basically become a freeloader and just sit in the corner and do nothing," says DeepMind's Max Jaderberg.

To encourage lazy AI players to up their game, the researchers randomly paired AIs for different rounds, and also made them play in different environments to learn the general rules of the game.

They then ran tournaments in which human players were randomly matched with human or AI teammates and opponents. The human players were not told whether their fellow players were people or AI. To mask the AI's near-instant reaction time, the team added a 267-millisecond delay, which is comparable to human gamers, says Jaderberg.

A team of two humans captured on average 16 fewer flags per game a team of two AI gamers.

Mixed human–AI duos also outperformed teams of two humans, and human players said they preferred playing with teammates who were AIs.

This may be because AI teammates were more goal-directed and cooperative, says collaborator Wojciech Czarnecki.

More broadly, the research improves on the ability of AIs to learn from scratch how to see, act and cooperate in complex new environments.