Libratus - artificial intelligence has just defeated 4 players in poker games

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Artificial intelligence **Libratus** has just beaten **4 players** in poker games, thanks to a new **AI** training method, instead of the current conventional techniques.

For nearly three weeks, Dong Kim sat at a Pittsburgh casino and played poker with a machine. However, Dong Kim is not just an ordinary poker player and the machine he is playing is not a normal poker machine like other machines.

Dong Kim , now 28, is one of the best poker players in the world. Meanwhile, the other poker machine - Libratus was created by two computer science researchers at Carnegie Mellon University, just an artificial intelligence system running on a **Pittsburgh** supercomputer. For 20 consecutive days, 4 players in poker games have matched Libratus with Texas Hold'Em no-limit, a particularly complex form of poker, including betting strategies to help people. Play must pass dozens of times to drop cards.

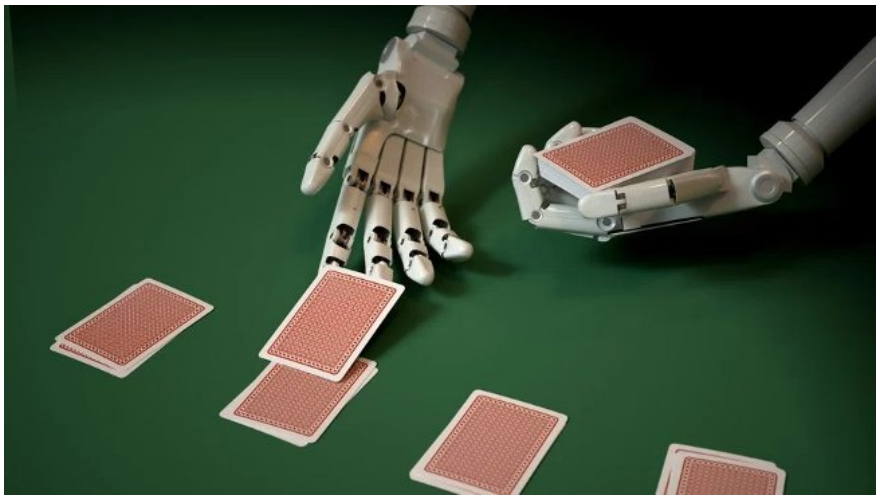
After half the time of the match, Dong Kim began to feel like the Libratus poker machine could see his song. " *I don't think it's cheating. It's just that I think it's good.* " Dong Kim said. That's great, in fact, Libratus not only defeated Dong Kim but also defeated the other top 3 poker players in the world - this is the first time an artificial intelligence can do so.

During the competition, Libratus creators are still hesitant to share how this artificial intelligence system works - how it can be so successful, how it can imitate it directly. sensing people in a way that no machine has ever

done. However, according to what the researchers have revealed, Libratus has reached not only a single AI, but it is based on three different systems but works together.

Note that today's modern AI artificial intelligence is operated by many technologies at once, not one technology. *Deep neural networks* are receiving a lot of attention in recent days and for positive reasons: " *They provide power for everything from image recognition to language translation or search. However, the success of the artificial neural network also brings a new breeze to many other AI techniques, to help the computer imitate. or even surpass human talent* ".

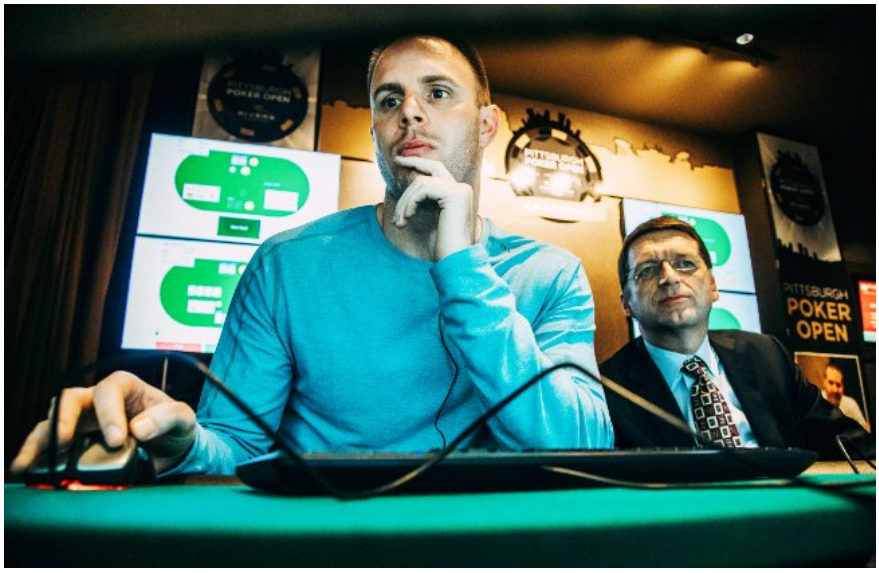
However, Libratus did not use this artificial neural network. Libratus is primarily based on another AI form, also known as " *Reinforcement Learning*", an extremely rigorous testing and error reporting method.Basically, the poker Libratus machine plays this game itself over and over again.



Google's Deep Mind Laboratory used an intensive learning method in building AlphaGo, which defeated Lee Sedol in the early part of last year. However, there are important differences between these two systems. AlphaGo learned to play Go from analyzing the 30 million human moves, before shaping its skills by playing with itself. But Libratus, by contrast, learns to play poker completely from scratch.

Through an algorithm called **Counterfactual Regret Minimization** , it started by playing randomly and eventually, after months of training with trillions of poker cards, it reached the process Not only does it challenge the best players, it also plays in the way that the best players can't do - play with a wider range of bets and randomize these bets. Therefore, the opponent will play more difficult to guess the cards that Libratus is holding.

" *We provide AI with a game description. We don't tell it how to play. It then develops a strategy completely independent of human play and can be very different. it's different from the way people play this game*, "said Noam Brown, a graduate student at Carmegie Mellon University - CMU, who created this AI system with his professor, Tuomas Sandholm.



However, that is only the first stage. In the Pittsburgh match, a second system will analyze the status of the match and focus on the attention of the first system. With the help of this second system, a " *person ending the game* " detail in a research paper Sandholm and Brown put forward, the first system does not have to test the entire scenario that it can examine. break out in the past. And it just needs to run through a few scenarios. The special thing is that Libratus not only learns before the game, it continues to learn even while playing.

Although these two systems alone are more than enough to play poker effectively. But Dong Kim and other players still find models in computer play and exploit it. That's why Brown and Sandholm created a third system. Every night, Brown will run an algorithm that can identify those models and remove them. " *It can calculate this overnight and everything will be ready the next day* ," Brown said.

If you feel that this seems unfair, you still have to accept it, because that's how AI works. However, not only does AI do so but people can also often combine processes, actively improve, run and enhance AI. In short, Libratus is really an important milestone, it shows us that a new type of AI can play an important role in everything from Wall Street deals to cyber security. auctions and political negotiations.

" *Poker is one of the most difficult games that AI breakthroughs in, because you only see a piece of information about the state of this game. There is no single optimal move. Instead, AI will have to randomize their actions to make opponents unsure when it deceives them,* "said Andrews Ng, who supports Google's central AI lab and is now chief scientist at Baidu.

Libratus has done this best. It does randomize how to place your bets to the point of being beyond the thoughts of the best players. If that doesn't work, Brown's night-running algorithm will fill those gaps. A financial trader can work the same way. The same thing happens with a diplomat. So Libratus is a strong statement: **A machine can also fool a person.**

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