Angry Birds: The rise of the machines

October 24 2013

Jason Li and Arnaud Jutzeler Credit: © Alain Herzog

An EPFL team has won an international artificial intelligence competition with software able to reproduce a human-like way of playing the famous video game.

Do you own a smartphone? If you do, you have probably come across the "Angry Birds" game phenomenon. The game's goal is to crush pigs by catapulting angry birds towards them. It holds no less than the record of being the most downloaded game of all time on mobile platforms. Jason Li, postdoctoral researcher at EPFL, together with Mirko Katanic and Arnaud Jutzeler, devoted part of their spare time to create a program able to reproduce the way humans play this game. Their "agent" is the result of several months of work and became the "Angry Birds" world champion in August at the Beijing International Joint Conference on Artificial Intelligence (IJCAI). Beyond the recreational aspect, analysis

guidelines similar to the ones used in their program could have some applications in the future, e.g. in the processing of surveillance videos.

Alongside the lectures organized within the IJCAI's framework, there were some recreational activities planned for its participants. Among them, there was the first international artificial intelligence Angry Birds competition. Competitors-machines had to be able to automatically solve the famous game's levels. In order to do so, they were only given access to the same information available to humans, thus forcing them to think as such. As a server transmitted screenshots displaying the game's status updates it was then up to the machines to decide which strategy to use and which action to take.

As part of the artificial intelligence research community, Jason Jingshi Li decided to embark upon the challenge, submitting it as a semester project. He also created a team under the "Beau Rivage" pseudonym, which was the name of the establishment where they would go to celebrate their eventual victory.

Once in Beijing, the EPFL team managed to obtain very encouraging scores from the outset. Since the contest allows alterations and improvements between rounds, Jason Li managed to qualify for the final thanks to the effective support of a team member that remained in Switzerland. He was attentive during the games and took advantage of the time difference by requesting changes to the engineer back in Switzerland, who had the time to improve the program while Jason Li enjoyed a much needed break. That is how his freshly updated program was able to beat its last opponent and result victorious at the grand finale.

Not a goal in itself but a means for learning

This competition's real objective goes beyond the work on Angry Birds. The game only serves as a fun platform to stimulate research and as a

training ground. This is a common practice in artificial intelligence. "At the beginning, researchers were interested in chess. Then, once the problem was considered as solved, they became interested in the game of Go, simpler in its rules but much more complicated when it came to implementing the required artificial intelligence, "said Jason Li.

In this competition, the goal of its participants is to create a "perfect" intelligence able to beat any person at analyzing the game by using the same tools available to people on their smartphones. "What we're trying to do here is to understand and define intelligence in order to emulate it" said the researcher. The knowledge gained in the development of this program could then be applied to many areas of artificial intelligence.

A model that has proven its worth...

In the case of Angry Birds, the "Beau Rivage" team used the principle of "exploitation vs. exploration." The strategy consists in identifying which tactics to use depending on the level the player is at. Firstly, the researchers determined a way of defeating every type of level the player may encounter. Then, they created an algorithm responsible for selecting the strategy most likely to work based on previous attempts. Therefore, the software's only limitation is that it requires making some attempts on each level before solving it, just like humans. "Our algorithm was custom-made for this competition, which is why we were also able to overcome the more complicated levels, while other teams did better on the simpler ones," said Jason Li.

... or almost!

Despite their good performance, Jason Li and his team have not managed to create a piece of software able to beat any human in this game. Indeed, their score was not enough in the "man vs. machine"

competition held at the same time as the main contest and whose objective was to defeat an experienced human player's ten fingers. "The goal remains attainable. The only conclusion we can draw from this is that we're still not good enough! "-joked the researcher.

Provided by Ecole Polytechnique Federale de Lausanne