

SIT740 Research and Development in Information Technology

Distinction Task 7.3: Writing a mini literature review

AlphaZero[4th]:

The successor of AlphaGo the AI system that defeated the world champion at his own game. While AlphaGo learnt the game by playing thousands of matches with amateur and professional players, AlphaGo Zero learnt by playing against itself, starting from completely random play.

AlphaZero takes a totally different approach, replacing hand-crafted rules with a deep neural network and algorithms that knew nothing beyond the basic rules. Its creative response and ability to master these three complex games, demonstrates that a single algorithm can learn how to discover new knowledge in a range of settings, and potentially, any perfect information game. (Silver et al. 2018)

Literature Review:

In games, artificial intelligence (AI) is used to generate responsive, adaptive or intelligent behaviours primarily in non-player characters (NPCs) like human-like intelligence. The advances in technology has brought us to a point where AI algorithms are learning without human interference and excelling in each challenge in few days of computations which humans took years to master at.

A landmark for artificial intelligence was achieved in 1997 when Deep Blue defeated the human world chess champion (Feng-Hsiung Hsu 1999). This was the key to the door of infinite knowledge and possibility that AI will go onto achieve in the later decades. As a proof AlphaGo, a computer program that combines advanced search tree with deep neural networks. A program which went on to beat a world champion at his own game (Silver et al. 2016). A few years later a successor for the latter was released it was AlphaZero, a single system that taught itself from scratch how to master the games of chess, shogi, and Go, beating a world-champion program in each case. This powerfull program surpassed all the capabilities of its predecessor (Silver et al. 2018). The field of application AI vast spread amongst many other strategic games. Notably Dota 2 is a multiplayer online battle arena (MOBA) where OopenAI Five which defeated Dota's own world champion in two successive games. OpenAI five observes the game after extracting the present game state from Dota developer's API with one layer which contains 1024- unit LSTM (Agrawal & Guja 2020).

While it all started with IBM's Deep Blue playing an hard game like chess with supervised learning ,which followed by programs like ALphaGO defeating a much more complex game called GO whose successor Alpha Zero which was able to do this without human interference learning by itself playing against itself surpassing the performance in not only GO but also in games like chess and shogi.

Where does this all end, while we can confidently say that technology keeps on changing, evolving, learning from metadata every second to say. There is no end to what technologies like AI can achieve, while a brief picture has been portrayed by many sci-fi movies it is not cliché to say that it is not far where what we humans envisioned is embedded in the daily products and amongst us.

References:

- [1] AGRAWAL, H & GUJA, S 2020, "REINFORCEMENT LEARNING IN OPENAI FIVE", CLIOJOURNAL.ORG, RETRIEVED 26 MAY 2020, <[HTTP://CLIOJOURNAL.ORG/INDEX.PHP/0976-075X/ARTICLE/VIEW/136](http://CLIOJOURNAL.ORG/INDEX.PHP/0976-075X/ARTICLE/VIEW/136)>.
- [2] FENG-HSIUNG HSU 1999, "IBM'S DEEP BLUE CHESS GRANDMASTER CHIPS", IEEE MICRO, VOL. 19, NO. 2, PP. 70-81.
- [3] SILVER, D, HUANG, A, MADDISON, C, GUEZ, A, SIFRE, L, VAN DEN DRIESSCHE, G, SCHRITTWIESER, J, ANTONOGLU, I, PANNEERSHELVAM, V, LANCTOT, M, DIELEMAN, S, GREWE, D, NHAM, J, KALCHBRENNER, N, SUTSKEVER, I, LILICRAP, T, LEACH, M, KAVUKCUOGLU, K, GRAEPEL, T & HASSABIS, D 2016, "MASTERING THE GAME OF GO WITH DEEP NEURAL NETWORKS AND TREE SEARCH", NATURE, VOL. 529, NO. 7587, PP. 484-489.
- [4] SILVER, D, HUBERT, T, SCHRITTWIESER, J, ANTONOGLU, I, LAI, M, GUEZ, A, LANCTOT, M, SIFRE, L, KUMARAN, D, GRAEPEL, T, LILICRAP, T, SIMONYAN, K & HASSABIS, D 2018, "A GENERAL REINFORCEMENT LEARNING algorithm that masters chess, shogi, and Go through self-play", Science, vol. 362, no. 6419, pp. 1140-1144.