

Arthur Samuel Checkers Agent;

being creative in machine learning in 1959.

Arthur Samuel was the first to prove in 1959 that, instead of common belief, a program could do more than it was explicitly programmed to do. How? He did it with a computer programme called Samuels Checkers agent. When Samuel was at IBM, he wanted to demonstrate the power of the uncompleted 701 computer and got the idea with a checkers program capable of beating the world champion.[1] Ground-breaking was that for training this program, he let the two algorithms compete against itself. It was thereby the first self-learning computer program. Because it had this self-learning experience, it eventually knew more about checkers than he knew himself and after some time even was beaten by his creation. When Samuel wrote the algorithm, the program knew only the rules of the game, a sense of direction and the chance of each sides victory at a given position.[2]

Only by possessing this great form of creativity and essentially working alone for almost ten years on this program, Samuel could accomplish this breakthrough. The checkers agent is now even being seen and discussed by AI researchers like Ian Goodfellow[3] that this self-learning program is an early form of Adversarial machine learning. This approach of training is especially in use now to train machine learning models.[4] An example of adversarial machine learning is when an input to a model has intentionally put in there by the programmer to fool the model and cause a malfunction.[5]

Samuel was very discreet in his work, and the importance of Samuels contribution to machine learning was therefore only widely recognized after his retirement in 1966 at IBM. He did not care about getting famous for his ground-breaking research.[1] Because he thought himself realistic in the difference in what he had accomplished and what is required to create human levelled AI. Nevertheless, Samuels papers on machine learning are still worth studying today. Proposals nowadays for research are often even less sophisticated than that of Samuels work in the 1950s.[6]

Back then, and sometimes still is, it was not common to reduce a complex machine learning problem to an understandable domain. However, the way Samuel worked is very convenient, to use a game in AI is more comfortable to compare it with the computer performance to that of people.[7] Other pioneers like Dietrich Prinz[9] programmed a chess game in 1951 that could predict the best outcome two moves away but could not play itself. Alex Bernstein, an experienced chess player, wrote a program in 1958 at IBM that could play the first full game of chess. Nevertheless, the difference is as Goodfellow said about Arthur Samuel at the ICLR2019 conference, as someone who thought of the first Adversarial Machine Learning techniques when no other would think this was possible.[10] Therefore, Samuel was a genuine machine-learning pioneer. Maybe a lonely one, but a creative one.

Weblink references

Arthur Samuels Paper: *Some Studies in Machine Learning Using the Game of Checkers*
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Arthur Samuels Memorial: *Arthur Samuel: Pioneer in machine learning (pdf)*
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