Alphago – An AI in Gaming

Gopal Agrawal¹, Prof. Zalak Trivedi², Dr Seema Mahajan³

¹²Computer Engineering, Indus University, Ahmedabad
³Head of Department, Computer Engineering, Indus University, Ahmedabad

Abstract: Today with the gaming industry evolving at very high rate and making a huge place for itself in the market. Gaming industries are looking for new ways to improve the gaming experience for the consumer. This paper discusses the use of AI in gaming as well as the biggest breakthrough in the history of AI – AlphaGo.

Key words: Artificial Intelligence, Modelling

I. INTRODUCTION

Artificial Intelligence plays a key in majority of modern video games. It is most traditionally used in video games as Non-Player Characters (NPC) which often simulates human-like intelligence. Besides the traditional use, it is also used in player experience modeling, procedural content generation and data mining on user behavior.

In player experience modeling, AI is used to determine the ability and emotional state of a player, in order to adapt the game accordingly. This can be used to dynamically change the game difficulty, which changes the difficulty of the game in real-time depending on the player’s ability.

Use of AI to dynamically generate elements of game environment like environmental conditions, levels and even music or interactive stories is known as procedurally generated content in games. The widest of procedurally generated content generation was seen in the game No Man’s Sky (2016).

Data mining on user behavior with the help of AI allows the game developers to tune game play in order to determine how people use the game, what parts they play most and what causes them to stop playing.

II. GO

Go is a strategy board game for two players. The aim is to surround more territory than the opponent. Despite the simple rules, the game is very complex, even more complex than chess. It is played on a board with 19x19 grid lines. Beginners often play on a 9x9 or 13x13 boards. The game is played using colored stones; white for one player and black for another. Stones are the playing pieces of the game.

III. AlphaGo

Alpha Go is a narrow AI, computer program developed by Alphabet Inc.’s Google Deep Mind in London to play the board game Go. In October 2015, it became the first Computer Go program to beat a human professional Go player without handicaps on a full-sized 19x19 board. In March 2016, it beat GO world champion Lee Sedol in a five-game match, the first time a computer Go program has beaten a 9-dan professional without handicaps. AlphaGo research project was formed around 2014 to test how well a neural network using deep learning can compete at Go.

How AlphaGo Works

AlphaGo's algorithm uses a Monte Carlo tree search to find its moves based on knowledge previously "learned" by machine learning, specifically by an artificial neural network (a deep learning method) by extensive training, both from human and computer play.
Play Style - program's style as "conservative". Alpha Go’s play style strongly favors greater probability of winning by fewer points over lesser probability of winning by more points.

1. Monte Carlo tree search (MCTS)
In computer science, Monte Carlo tree search (MCTS) is a heuristic search algorithm for some kinds of decision processes, most notably those employed in game play.
- Selection: start from root R and select successive child nodes down to a leaf node L. The section below says more about a way of choosing child nodes that lets the game tree expand towards most promising moves, which is the essence of Monte Carlo tree search.
- Expansion: unless L ends the game with a win/loss for either player, either create one or more child nodes or choose node C from them.
- Simulation: play a random play out from node C. This step is sometimes also called play out or rollout.
- Back propagation: use the result of the play out to update information in the nodes on the path from C to R.

2. Deep Learning
It is a class of machine learning algorithm that
- Uses a series of a lot of layers of nonlinear processing units for extraction of features and transformation. Input to each successive layer is the output of the previous layer.
  The algorithms may be supervised or unsupervised and applications include pattern analysis (unsupervised) and classification (supervised).
- Learning of multiple levels of features or representations of the data is the basis of deep learning.
  Higher level features are derived from lower level features to form a hierarchical representation.
- Are part of the broader machine learning field of learning representations of data.

3. Machine Learning
Machine learning is the subfield of computer science that provides the computers with the ability to learn without being explicitly programmed. It focuses on the development of programs which change when exposed to new data. Machine learning is a method used to make algorithms that lend themselves to prediction. Machine learning has evolved from pattern recognition and computational learning theory, which are widely used in AI.

The process of data mining and machine learning are similar. They search through data to identify patterns. But machine learning uses this extracted pattern data to change the program actions accordingly. Machine learning algorithms are often categorized as being supervised or unsupervised. Supervised algorithms can apply what has been learned in the past to new data. Unsupervised algorithms can draw inferences from datasets

IV. CONCLUSION
Artificial intelligence is a fast growing field and a hub of a lot of new research. Games and gaming have evolved since when AI was mixed with games. AI has revolutionized gaming and taken it to heights which wouldn’t have been possible without it. AI systems are giving tough competition to human players and this is pushing players to work harder and become even better. AI is becoming smarter by beating players in new and different games. But it must be kept in mind that AI is only a part of the game to enhance the experience of a player and not hinder or make it unpleasant.

REFERENCES