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CS35L

March 4, 2015

MarioAI

One of the fastest growing fields in Computer Science currently is using Machine Learning to model data and regress and classify. In this endeavor, the main problem, in a simplified generalization, is to minimize a cost function that evaluates how close to the actual data the regression is able to model. Given a cost function, the parameters used to generate classifications and decisions are then fine tuned using a technique called gradient descent that effectively reduces the error between the estimated values and the real values.

With this in mind, a team of engineers and graduate students at the Tuebingen University in Germany attempted to use social interactions to model cognitive functions. With four main stages through the processing of the game, the Motivation System, Reasoning, Action Control, Schematic Knowledge, each character gets data from each other to mimic social interactions. The motivation system feeds the current snapshot of the obstacles and decides the current fitness of the character. With a given fitness, the character can either decide to accept a decision suggested by the other character or to use the static environment variables to make a decision on which button to press(up/down/left/right).

Artificial intelligence using this process seems very possible, because it's simply a plug-in from different neural networks to compile a decision constructed by different parameters. Given the number of characters in the game is N, then when the neural networks are trained, they

can be extremely robust because there are N randomly initialized points that converge to different local minimas. These minimas may not be the best-correct answers individually, but together they create a lower local minima to benefit all characters.

In the previous era, machine learning using neural networks was not a very viable option simply because Moore's Law did not scale the computers up to the appropriate computational power to be able to support a neural network. Nowadays, a neural network is feasible even with our modern laptops, but given a situation where we need to utilize the power of sociability between neural networks, our computation power may be inadequate. If we want the AI to understand the world with a view point of an organism within a society, there needs to be an extremely large amount of neural networks all interacting with each other, and as the number increases, the interactions will grow factorially.

I personally believe that the effects of this algorithm may prove to be very important in the future. When there is enough computational power, companies could utilize this to implement social behavior in driving cars, essentially allowing automation of massive amounts of cars at once. If an AI was fine-tuned to do a job, it may be only capable of performing that task(weak AI). However, it doesn't have the ability to replace white collar jobs because it does not have the ability to have social interactions. By effectively inputting human behavior as other neural networks, the model may be able to even replace white collars.

I believe the article however, does not address a lot of the technicalities discussed here. It's missing parts of an essential research paper with an Abstract and Theorems provided. The university research group also didn't explain their method of machine learning(does it utilize SVM or Neural Networks? Decision Tree pruning?), and whether they were successful so far.

Their demo of the product was not very accurate in respect to what their program actually did. The research paper itself is not made for academia, but rather for layman to understand their general idea.

The general idea of the MarioAI project is very novel and could serve as an inspiring basis for social interactions. With enough computational complexity given the Moore's Law growth factor, our computers may one day be able to simulate multiple neural networks running in parallel and creating a society based off of them. However, this is extremely hard to model and we will likely not see the concrete results for a long time. Using Mario, a simple game to describe the very basics of a habitable world, was a brilliant idea. When Mario's world is solved using Neural Networks, we will be one step closer to solving ours.

Works Cited

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