

Go Board Game AI Engine Proposal

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The purpose of this project is to develop a model to play against a human player in the game of Go. Just as chess is a common board game that is widely played by many individuals in America, Go is a popular game played more commonly in Asian countries. Our motivation for creating an AI Go model simply comes from our enjoyment of playing the game; since we know how to play the game and are also studying about machine learning, we thought it would be interesting and provide a good opportunity to learn about ML by coding our own Go model.

There already exist many AI models for Go but understanding the algorithm behind the reinforcement learning of the pre-existing models and developing a new model can help improve the model's ability against human opponents. We will study various search tree algorithms and how to create a deep neural network to create our reinforcement learning model. The most well known model is AlphaGo, Google's AI which uses self-play and reinforcement learning. Developing all of the components of the game and model will be too complex for a semester project, so components of the board and other necessary features will be taken from a pre-existing open source Go AI model. This model is KataGo, an open-source model. This model uses a CNN as well but includes some advanced concepts of play such as ladders and liberty status. We will also use Jupyter and Colab notebooks to run and train our model, Tensorflow with Keras will be used to create the neural network, and finally the OpenAI Gym will be used for our main reinforcement learning environment.

<https://github.com/lightvector/KataGo/tree/master/python>.

For this project, a new model will be developed that will look to improve the performance compared to KataGo if possible. This model could be difficult to test with the complexity of the model so while the model can be created, training and testing of the model could be difficult due to the limitations of our machines, so we will also consider rescaling the board to smaller dimensions. The algorithm can still be studied to understand the methods of existing models. Our goal is that this project will result in a new completed model that plays against human opponents while gaining understanding of neural networks and the advanced search tree algorithms that factor into creating a self-playing Go AI model. This project will not be for the MS project requirement.

Timetable

Due Date	Task	Team Member
9/16	Proposal Due	Kyu and Sira
9/23	Explore KataGo	Kyu and Sira
9/30	Research Models and Decide Model	Kyu and Sira (individual research then share together)
10/13 - 10/14	Create and have finished Model; Project Progress Report Due	Kyu and Sira
10/28	Combine and test Go Model on KataGo board	Kyu and Sira (test together modify different components individually)
11/18	Modify and Debug Go Model + Start writing report	Kyu and Sira (split and write individual parts to report)
12/2	Finish Report and Presentation, make final changes to Go Model	Kyu and Sira
12/6	Final Project Due	Kyu and Sira