

Section IV: Discussion

The data gathered so far provides a baseline. Unfortunately, conclusive data was not able to be gathered. The simple test environment with the working code shows that with some more time, the code for the simple crypto game will work. It also showed a significant difference between the black box AI and the random model, providing further verification that this model works. Based on the data gathered so far, it can be concluded that the black box AI was successfully implemented in the code. For the white box AI, the problem may be that it was only given the signs of the values, and not the values themselves.

This data will be built upon by future researchers, including myself.

Future Research

The results gathered thus far will bring researchers closer to developing a more accurate ensemble gray box AI. If there is a correspondance between the performance of an ensemble model and the performance in a communication-based game like Simple Crypto, this would give researchers a new angle to attack this problem from. This would allow advanced techniques used to produce better reinforcement learning models to also be altered and used for an ensemble gray box AI. Since the literature on theoretical reinforcement learning is large, there are numerous insights that would be very useful to bring to attack the problem of inaccurate gray box AI.

One way this result may not support the data is if communication a black and white box AI agent is not related directly to the performance of a gray box AI. This is a valid point, and this could be addressed in a study that attempts to correlate performance in the simple crypto or

other communication based task with the performance of a gray box AI model created by using the black box AI to generate additional data for the white box AI. However, this research is outside the scope of this project and would have been infeasible to cover in a short period of time. It is a topic that would take a team of researchers to effectively address.

Further research into this topic may include testing different types of black box and white box agents in the simple crypto game to see if the trend that groups of similar AI models perform better than vastly different AI models. It would be worthwhile to examine a more diverse range of algorithms such as stochastic models, recurrent networks, and differently shaped neural networks.