Problem Chosen	2022 MCM/ICM Summary Sheet	Team Control Number
C		2210390

Analysis and Supression of Opioid Spread

Summary

We propose a model using the deep reinforcement learning DDPG[**?**] algorithm to exploit the data characteristics of daily prices of volatile assets: gold and bitcoin over the last five years in order to decide whether traders should buy, sell or hold assets in their portfolios. The results show that using an initial $1,000, from September 11, 2016 to September 10, 2021 according to the trading strategy given by the model, our portfolio [C,G,B] was able to reach a value of $143,322.3 at the market price of that day.

We used the ARIMA model to predict the daily prices of the two volatile assets for the next year and applied our trading strategy, which eventually succeeded in maximizing the total return, verifying that our model produced the best strategy.

We also perform a sensitivity analysis on the transaction costs to demonstrate the robustness of our model. The results show that the transaction cost of both assets, being a fixed percentage of the transaction amount, can significantly affect the choice of trading strategy.

key words : deep reinforcement learning(DRL); deep deterministic policy gradient(DDPG); Autoregressive Integrated Moving Average(ARIMA); portfolio management