PDF REPORT of Quant Project

Paper-8 Reinforcement Learning
Prepared by Aarav Nigam

EDA Files

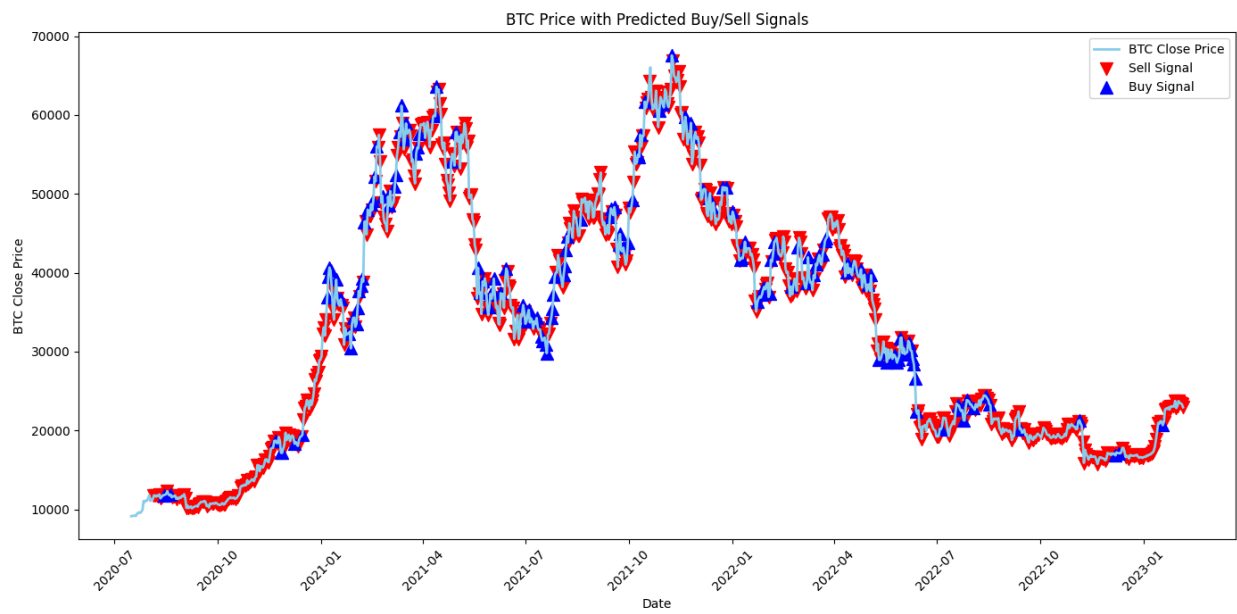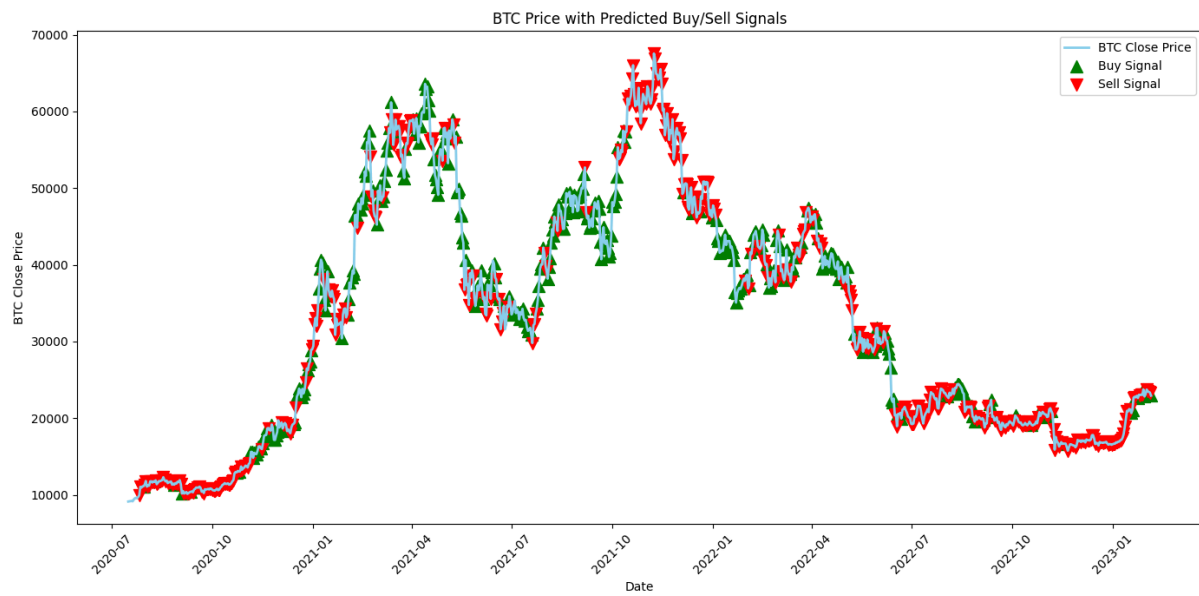1) Website EDA: https://aarav-nigam.github.io/QuantProject/

   The Website and Automated EDA report is just for getting a quick reference of the data in an interactive way

2) The statistical EDA and findings are mentioned in EDA.ipynb. It includes inferences of different columns and their details.
3) The visual statistical findings are mentioned in Visualization_EDA.ipynb. It includes plotting. Data from different methods and extract important information.

   (An LSTM function is also attached (just for testing data))

RL Models

1. Based On the research paper, I had to implement an Ensemble of RL agents, For this, I first created a model that takes data and trains on Stock market env. It takes the data of the previous 20 days to predict the signal of the next day.
2. The model tries to maximize the Reward function given in the research paper.
3. After the proper working of a single agent, I wrote the code where I can create an array of agents, all trained under different parameters to provide an overall good solution.
4. The benefits lie in the point that an Ensemble of many weak agents provides results comparable to a Strong Agent.
5. The whole codebase is written in a modular fashion so that all hyperparameters can be changed without Disturbing the code, by simply changing the first few cells

BTC Price with Predicted Buy/Sell Signals

BTC Price with Predicted Buy/Sell Signals

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Agent  0  Training:::
Episode: 1, Total Reward: -23.162693915399583
Episode: 2, Total Reward: 13.519753009410167
Episode: 3, Total Reward: -74.91041584008819
Episode: 4, Total Reward: 75.38297097612124
Episode: 5, Total Reward: -72.55997608912377
Episode: 6, Total Reward: 33.088446964665316
Episode: 7, Total Reward: -23.590381877027355
Episode: 8, Total Reward: 33.75778476912598
Episode: 9, Total Reward: 66.12906794459474
Episode: 10, Total Reward: 82.76174303249577


Agent  1  Training:::
Episode: 1, Total Reward: -0.571239958706941
Episode: 2, Total Reward: 16.713772725682396
Episode: 3, Total Reward: 120.70159972096127
Episode: 4, Total Reward: 103.11519202722013
Episode: 5, Total Reward: 116.76822059794269
Episode: 6, Total Reward: 130.82471517822876
Episode: 7, Total Reward: 148.96182917526167
Episode: 8, Total Reward: 152.4143692735641
Episode: 9, Total Reward: 159.65457700436812
Episode: 10, Total Reward: 169.57427069019369
Episode: 11, Total Reward: 162.1172271282652
Episode: 12, Total Reward: 173.30830362035852
Episode: 13, Total Reward: 183.45975712829025
Episode: 14, Total Reward: 189.77184844885426
Episode: 15, Total Reward: 187.88544219970768


Agent  2  Training:::
Episode: 1, Total Reward: -5.636729232219205
Episode: 2, Total Reward: -12.988669714113815
Episode: 3, Total Reward: 36.86861330711364
Episode: 4, Total Reward: 49.029156438999976
Episode: 5, Total Reward: 54.18065186427876
Episode: 6, Total Reward: 87.07570544571503
Episode: 7, Total Reward: 112.51363446075399
Episode: 8, Total Reward: 155.74695742224523
Episode: 9, Total Reward: 153.8648343457101
Episode: 10, Total Reward: 161.0149244146381
Episode: 11, Total Reward: 166.33569153390508
Episode: 12, Total Reward: 163.1682268664976
Episode: 13, Total Reward: 173.48714691589888
Episode: 14, Total Reward: 176.6424664988865
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Reward gains of the Array of Agents