

Group Members

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Link to the github repository

<https://github.com/rjiang1/StockTrade.git>

Game Rules

States

The state of the game at each turn is the number of the shares of stock the player holds, the cash player has currently and the current day's information of the stock AAPL.

State Representation

The player states are represented as class Player which has attributes portfolio and cash.

The stock states are represented as class Stock which has attributes ticker and price.

Valid Actions

- Buy - Enter B/b to buy a stock and then the player has to enter number of stocks he/she want to buy, one cannot buy stock worth more than his/her cash balance.
- Sell - Enter S/s to sell a stock and then the player have to enter number of stocks he/she want to sell, one cannot sell stocks whose count is more than what he/she actually owns.
- Do Nothing/ Hold - Enter H/h, the player will be shown next day apple stock.
- Exit - Enter E/e the player will be exited out of prediction game and his/her portfolio, profit/ loss will be shown.

Game Over

The game is over after the n days player's prediction(n is what the player gave as input at first) or when the player enters the action Exit.

Winner/score Determined

TotalCash will be calculated as cash Balance + total shares cost that one holds according to n+1 day apple stock open price. And the player ends up in profit [win] i.e., totalCash > 10000 (starting balance) or loss i.e., totalCash < 10000.

Example

How many days of stock you want to predict?5
Player your Shares : {'Apple': 0} your Cash: 10000

Day 1 apple stock: Open-->127.14250200000001

High-->127.485001

Low-->123.832497

Close-->125.010002

Volume-->155552400.0

4 things you can do
1. Buy(B/b) 2. Sell(S/s) 3. Hold(H/h) 4. Exit(E/e)

what you want to do?!!!!
s
How many shares you want to sell--> 5
Sorry you dont own that many stocks, Try again!!!

Player your Shares : {'Apple': 0} your Cash: 10000

Day 1 apple stock: Open-->127.14250200000001

High-->127.485001

Low-->123.832497

Close-->125.010002

Volume-->155552400.0

4 things you can do
1. Buy(B/b) 2. Sell(S/s) 3. Hold(H/h) 4. Exit(E/e)

what you want to do?!!!!
b
How many shares you want to buy--> 100
Sorry you cant afford that many stocks, Try again!!!

Player your Shares : {'Apple': 0} your Cash: 10000

Day 1 apple stock: Open-->127.14250200000001

High-->127.485001

Low-->123.832497

Close-->125.010002

Volume-->155552400.0

4 things you can do
1. Buy(B/b) 2. Sell(S/s) 3. Hold(H/h) 4. Exit(E/e)

what you want to do?!!!!
h
Player your Shares : {'Apple': 0} your Cash: 10000

Day 2 apple stock: Open-->126.012497

High-->126.442497

Low-->124.577499

Close-->124.807503

Volume-->187630000.0

4 things you can do
1. Buy(B/b) 2. Sell(S/s) 3. Hold(H/h) 4. Exit(E/e)

what you want to do?!!!!
h
Player your Shares : {'Apple': 0} your Cash: 10000

Day 3 apple stock: Open-->127.58000200000001

High-->131.0

Low-->126.0

Close-->129.03999299999998

Volume-->225702700.0

4 things you can do
1. Buy(B/b) 2. Sell(S/s) 3. Hold(H/h) 4. Exit(E/e)

what you want to do?!!!!
h
Player your Shares : {'Apple': 0} your Cash: 10000

Day 4 apple stock: Open-->132.759995

High-->134.800003

Low-->130.529999

Close-->134.179993

Volume-->152470100.0

4 things you can do
1. Buy(B/b) 2. Sell(S/s) 3. Hold(H/h) 4. Exit(E/e)

what you want to do?!!!!
b
How many shares you want to buy--> 2
Player your Shares : {'Apple': 2} your Cash: 9734.48001

Day 5 apple stock: Open-->137.58999599999999

High-->137.979996

Low-->127.0

Close-->131.399994

Volume-->200119000.0

Game is over.

Problem extension

We varied the size of the problem instance in our experiments by letting the player set the number of days he/she wants to predict the stock transaction.

For the actions, we have added an exit action in the first version of the experiment, which allows players to exit the game at any time.

And for the different numbers of players, The problem can be extended to two, three players or more players. They all predict according to the same stocks' information and the player who ends up in the highest profit win the game.

For the different numbers of stocks, we can add more stocks' information except AAPL, like GOOG, MSFT, etc in the future. Then when the players do the buy, sell or hold action, players need to not only set the number of shares but also choose which stock to trade.

Language and Libraries

Python, numpy, pandas, pytorch/tensorflow/keras