3.signal-rolling-agent

September 29, 2021

[1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
```

[2]:

```
df = pd.read_csv('../dataset/GOOG-year.csv')
df.head()
```

[2]:

```
         Date        Open        High         Low       Close   Adj Close  \
0  2016-11-02  778.200012  781.650024  763.450012  768.700012  768.700012
1  2016-11-03  767.250000  769.950012  759.030029  762.130005  762.130005
2  2016-11-04  750.659973  770.359985  750.560974  762.020020  762.020020
3  2016-11-07  774.500000  785.190002  772.549988  782.520020  782.520020
4  2016-11-08  783.400024  795.632996  780.190002  790.510010  790.510010

    Volume
0  1872400
1  1943200
2  2134800
3  1585100
4  1350800
```

[3]:

```
def buy_stock(
    real_movement,
    delay = 5,
    initial_state = 1,
    initial_money = 10000,
    max_buy = 1,
    max_sell = 1,
):
    """
    real_movement = actual movement in the real world
    delay = how much interval you want to delay to change our decision from buy␣
 ↪to sell, vice versa
    initial_state = 1 is buy, 0 is sell
    initial_money = 1000, ignore what kind of currency
    max_buy = max quantity for share to buy
    max_sell = max quantity for share to sell
    """
    starting_money = initial_money
    delay_change_decision = delay
    current_decision = 0
    state = initial_state
    current_val = real_movement[0]
    states_sell = []
    states_buy = []
    current_inventory = 0

    def buy(i, initial_money, current_inventory):
        shares = initial_money // real_movement[i]
        if shares < 1:
            print(
                'day %d: total balances %f, not enough money to buy a unit price %f'
                % (i, initial_money, real_movement[i])
            )
        else:
            if shares > max_buy:
                buy_units = max_buy
            else:
                buy_units = shares
            initial_money -= buy_units * real_movement[i]
            current_inventory += buy_units
            print(
                'day %d: buy %d units at price %f, total balance %f'
                % (i, buy_units, buy_units * real_movement[i], initial_money)
            )
            states_buy.append(0)
        return initial_money, current_inventory

    if state == 1:
        initial_money, current_inventory = buy(
            0, initial_money, current_inventory
        )

    for i in range(1, real_movement.shape[0], 1):
        if real_movement[i] < current_val and state == 0:
            if current_decision < delay_change_decision:
                current_decision += 1
            else:
                state = 1
                initial_money, current_inventory = buy(
                    i, initial_money, current_inventory
                )
                current_decision = 0
                states_buy.append(i)
        if real_movement[i] > current_val and state == 1:
            if current_decision < delay_change_decision:
                current_decision += 1
            else:
                state = 0

                if current_inventory == 0:
                    print('day %d: cannot sell anything, inventory 0' % (i))
                else:
                    if current_inventory > max_sell:
                        sell_units = max_sell
                    else:
                        sell_units = current_inventory
                    current_inventory -= sell_units
                    total_sell = sell_units * real_movement[i]
                    initial_money += total_sell
                    try:
                        invest = (
                            (real_movement[i] - real_movement[states_buy[-1]])
                            / real_movement[states_buy[-1]]
                        ) * 100
                    except:
                        invest = 0
                    print(
                        'day %d, sell %d units at price %f, investment %f %%,␣
 ↪total balance %f,'
                        % (i, sell_units, total_sell, invest, initial_money)
                    )

                current_decision = 0
                states_sell.append(i)
        current_val = real_movement[i]
    invest = ((initial_money - starting_money) / starting_money) * 100
    total_gains = initial_money - starting_money
    return states_buy, states_sell, total_gains, invest
```

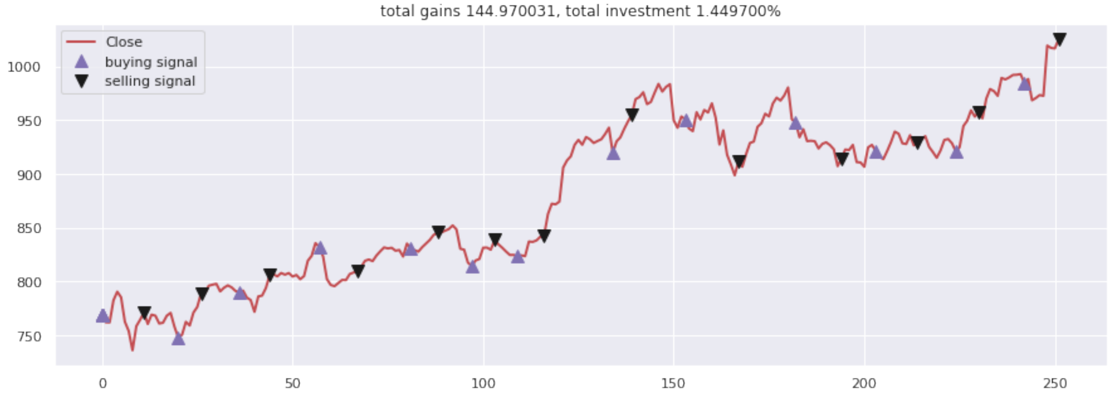
[4]:

```
states_buy, states_sell, total_gains, invest = buy_stock(df.Close,␣
 ↪initial_state = 1,
                                                         delay = 4,␣
 ↪initial_money = 10000)
```

```
day 0: buy 1 units at price 768.700012, total balance 9231.299988
day 11, sell 1 units at price 771.229980, investment 0.329123 %, total balance
10002.529968,
day 20: buy 1 units at price 747.919983, total balance 9254.609985
day 26, sell 1 units at price 789.289978, investment 5.531340 %, total balance
10043.899963,
day 36: buy 1 units at price 789.909973, total balance 9253.989990
day 44, sell 1 units at price 806.150024, investment 2.055937 %, total balance
10060.140014,
day 57: buy 1 units at price 832.150024, total balance 9227.989990
day 67, sell 1 units at price 809.559998, investment -2.714658 %, total balance
10037.549988,
day 81: buy 1 units at price 830.630005, total balance 9206.919983
day 88, sell 1 units at price 845.539978, investment 1.795020 %, total balance
10052.459961,
day 97: buy 1 units at price 814.429993, total balance 9238.029968
day 103, sell 1 units at price 838.549988, investment 2.961580 %, total balance
10076.579956,
day 109: buy 1 units at price 823.349976, total balance 9253.229980
day 116, sell 1 units at price 843.190002, investment 2.409671 %, total balance
10096.419982,
day 134: buy 1 units at price 919.619995, total balance 9176.799987
day 139, sell 1 units at price 954.960022, investment 3.842895 %, total balance
10131.760009,
day 153: buy 1 units at price 950.760010, total balance 9180.999999
day 167, sell 1 units at price 911.710022, investment -4.107239 %, total balance
10092.710021,
day 182: buy 1 units at price 947.799988, total balance 9144.910033
day 194, sell 1 units at price 914.390015, investment -3.525002 %, total balance
10059.300048,
day 203: buy 1 units at price 921.280029, total balance 9138.020019
day 214, sell 1 units at price 929.080017, investment 0.846647 %, total balance
10067.100036,
day 224: buy 1 units at price 920.969971, total balance 9146.130065
day 230, sell 1 units at price 957.789978, investment 3.997960 %, total balance
10103.920043,
day 242: buy 1 units at price 984.450012, total balance 9119.470031
day 251, sell 1 units at price 1025.500000, investment 4.169840 %, total balance
10144.970031,
```

[5]:

```
close = df['Close']
fig = plt.figure(figsize = (15,5))
plt.plot(close, color='r', lw=2.)
plt.plot(close, '^', markersize=10, color='m', label = 'buying signal',␣
 ↪markevery = states_buy)
plt.plot(close, 'v', markersize=10, color='k', label = 'selling signal',␣
 ↪markevery = states_sell)
plt.title('total gains %f, total investment %f%%'%(total_gains, invest))
plt.legend()
plt.show()
```


total gains 144.970031, total investment 1.449700%
Close
buying signal
selling signal
1000
950
900
850
800
750
0
50
100
150
200
250

[ ]: