

Reinforcement Learning in Portfolio Management

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Introduction

Prices:

$$S^k = (S_1^k, \dots, S_L^k)$$

Portfolio:

$$P^k = (P_0^k, P_1^k, \dots, P_L^k)$$

States:

$$State^k = (S^{k-N}, S^{k-N+1}, \dots, S^{k-1}, S^k, P^{k-1})$$

Rewards

$$R^k = R_{P^k * S^{k+1} - P^k * S^k} - \text{switch_cost}$$

- ① State: add major indexes, add cash/riskless asset into portfolio
- ② Rewards: Improve Reward function from return to return/risk
- ③ Frequency: Improve the price frequency means improving the sensitivity of agent

Build Environment: Backtest System

Logic of backtest system

```
initialize()  
while t in time.index:  
    pre_trading()  
    strategy_sigal()  
    strategy_order()  
    after_trading()
```

Github:

[https : //github.com/marsMa/rl_in_portfolio_management](https://github.com/marsMa/rl_in_portfolio_management)