* Comparison with HATS
  + Dataset
    - SNP500
  + Metrics
    - Average Daily Return
    - Sharpe Ratio
    - Classification?
      * ~~3 classes~~
      * ~~2 classes~~
      * ~~ROC?~~
      * ~~@5, @10?~~
  + Discussion
    - Ablation study
      * GGD
      * Graph
    - Graph Learning

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | MLP | ... | HATS | Ours | Ours-Graph | Ours-GGD |
| Phase 1 |  |  |  |  |  |  |
| ... |  |  |  |  |  |  |
| Phase 12 |  |  |  |  |  |  |
| Average |  |  |  |  |  |  |

Table: Average Daily Return

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | MLP | ... | HATS | Ours | Ours-Graph | Ours-GGD |
| Phase 1 |  |  |  |  |  |  |
| ... |  |  |  |  |  |  |
| Phase 12 |  |  |  |  |  |  |
| Average |  |  |  |  |  |  |

Table: Sharpe Ratio

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | No graph | HATS’s graph | Graph 1 | Graph 2 | Graph 3 |
| Daily return |  |  |  |  |  |
| Sharpe ratio |  |  |  |  |  |

Table: With Different Graphs

* Comparison with Other SOTA
  + Dataset (Transaction cost optimization for online portfolio selection)
    - SNP500
    - NYSE (O) contains 36 large cap stocks from the NewYork Stock Exchange, and 5651 price relatives ranging from 7 March 1962 to 31 December 1984.
    - ~~NYSE (N) has 23 remaining survived stocks till 30 June 2010, totalling 6431 price relatives.~~
    - TSE contains 88 large cap stocks from the Toronto Stock Exchange (TSE) and 1259 price relatives, ranging from 4 January 1994 to 31 December 1998.
    - The final MSCI data-set is a collection of global equity indices that are the constituents of MSCI World Index.† It contains 24 indices that represent the equity markets of 24 countries around the world, and consists of 1043 trading days ranging from 1 April 2006 to 31 March 2010.
  + Metrics (The kelly growth optimal portfolio with ensemble learning, MAPS: Multi-agent reinforcement learning-based portfolio management system)
    - ~~Cumulative return (daily average return)~~
    - ~~Sharpe ratio~~
    - ~~Volatility~~
    - ~~Turnover rate~~
    - ~~Maximum drawdown~~
    - Reverse engineer

Summary:

Profit factor: 1.18

Sharpe ratio: 1.11 ± 0.58

Ulcer index: 4.31

Information ratio (wrt UCRP): 1.22

Appraisal ratio (wrt UCRP): 0.97 ± 0.46

UCRP sharpe: 0.67 ± 0.51

Beta / Alpha: 1.12 / 12.198%

Annualized return: 26.49%

Annualized volatility: 23.78%

Longest drawdown: 104 days

Max drawdown: 28.81%

Winning days: 54.8%

Annual turnover: 377.8

* + - Current fee logic is wrong...
  + Methods
    - Simple baselines
      * BAH
      * BNN
    - Popular
      * PAMR (Li et al. 2012)
      * OLMAR (Li et al. 2015)
    - SOTA
      * HATS
      * Online Portfolio Selection with Cardinality Constraint and Transaction Costs based on Contextual Bandit （Method 1）
      * The kelly growth optimal portfolio with ensemble learning （Method 2）
  + Discussion
    - Transaction fee

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Dataset | Metrics | Ours | baselines | ... | HATS | Method 1 | Method 2 |
| SNP500 | Cumulative return |  |  |  |  |  |  |
| Sharpe ratio |  |  |  |  |  |  |
| Volatility |  |  |  |  |  |  |
| Turnover rate |  |  |  |  |  |  |
| Maximum drawdown |  |  |  |  |  |  |
| ... | Cumulative return |  |  |  |  |  |  |
| Sharpe ratio |  |  |  |  |  |  |
| Volatility |  |  |  |  |  |  |
| Turnover rate |  |  |  |  |  |  |
| Maximum drawdown |  |  |  |  |  |  |
| ... | Cumulative return |  |  |  |  |  |  |
| Sharpe ratio |  |  |  |  |  |  |
| Volatility |  |  |  |  |  |  |
| Turnover rate |  |  |  |  |  |  |
| Maximum drawdown |  |  |  |  |  |  |

Table: results without transaction fee/ results with transaction fee c=...