# Task3 Evaluation Indicators

NOTICE: From this part on, task will be divided, and format of input and output will be standardized.

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## For Haolan Zuo

1. Uniform some basic standards

* Merge A and HK stocks: Right join (drop redundant/not aligned data in A)
* Uniform measuring unit:
  + To USD 最好还是人民币吧，容易理解
  + Use daily exchange rate from Tushare
* Observation window for discount rate
  + Sliding window 按自然周滑动，每1周或2周更新 。我会提供了一个O-U过程python程序，输入窗口中的A-H差价数据，输出估计的均值和波动率（方差）。
  + Window size: Past 3 days = 60 \* 24 \* 3 secs （分钟数据？）
* Discount Rate
  + Change to Logarithmic form( for being more smooth) #需要测试才知道
  + Upper bound: ub = u1\* std (rolling\_sindow (DR)) # u1参数
  + Lower bound: lb = l1 \* std (rolling\_sindow (DR)) # l1 参数
  + 止损 lost= lo1\*std # 暂时不考虑

* Transaction costs
  + 1、佣金：每宗交易金额的0.25%，支付予证券公司
  + 2、股票印花税：每宗交易金额的0.1%，支付予香港政府
  + 3、交易徵费：每宗交易金额的0.003%，支付予证监会
  + 4、交易费：每宗交易金额的0.005%，支付予交易所
  + 5、中央结算收费：每宗交易金额的0.002%，支付予结算所(最低港币2元,最高港币100元)
* Risk free return
  + Not considered at present

1. Algo-trading

* Input:

Table 1 （此表建议按原始数据储存 开高收低 成交量 ….）

|  |  |  |
| --- | --- | --- |
| time | price\_H | price\_A |
|  |  |  |
|  |  |  |

* + time: minutes level
  + price\_H/ price\_A: USD
* Output: (交易信号)

Table 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| time | price\_H | price\_A | Value？改为return？可以不要 | signal |
| t\_buy |  |  |  | 1 |
|  |  |  |  | 0 |
|  |  |  |  | 0 |
| t\_sell |  |  |  | -1 |

* + value: Only change where signal ≠ 0 这个设置是没有必要的
  + signal: 1 for buy in; -1 for sell out; 0 for no operation

1. Calculation for return and accumulative return

* Input: the output of step 2
* Output: （交易结果）

Table 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| time | Value？可以不要 | return | return\_acc | signal(dropped) |
| t\_sell\_1 |  |  |  | -1 |
| t\_sell\_2 |  |  |  | -1 |

1. Visualization of return and value curve on time diagram

* Input: Table2 and Table3
* Output:
  + Diagram 1：Line chart of value curve
    - Value of portfolio only changes when sell operation is done
    - Show buy/ sell signals
  + Diagram 2: Diagram 1 with returns
    - Add return histogram to Diagram 1
  + Diagram 3: Timing diagram of accumulative return

## For Haolin Zhang

1. Evaluation Indicators

* In this part, your goal is to write functions (aka methods in Python)
* Input: Merged table of Table2 and Table3 (or two tables not merged, do as you wish)

Table 4 这个表可以，

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| time | Value（可以不要） | price\_H | price\_A | signal | return | return\_acc |
|  |  |  |  | 1 | NAN | NAN |
|  |  |  |  | 0 | NAN | NAN |
|  |  |  |  | 0 | NAN | NAN |
|  |  |  |  | -1 | Return\_i | Return\_acc\_i |

* Output Functions
  + annualized\_return (Table4.time, Table4.return)
    - return pandas.DataFtrame [[‘time’, ‘annualized\_return’]]
  + annualized\_return\_acc (Table4.time, Table4.return\_acc)
    - return pandas.DataFtrame [[‘time’, ‘annualized\_return\_acc’]]
  + maxdown (Table4.time, Table4.value)
    - return a number
  + 年化收益率/最大回撤
  + 最大回撤开始时间： 最大回撤结束时间：
  + 统计盈亏次数，计算盈亏比
  + 返回最大赢（%）
  + 返回最大亏（%）
  + MA(return, n)使用滑动窗口，计算收益率移动平均（方便后面做择时策略）--MA不是固定的值，不要在此计算，如果在此计算，可以增加多列，MA（5） MA（20），MA（60），MA（120），放在下表中
* Output charts:

Table 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| time | value | signal | return | MA (return) |
|  |  | 1 | NAN | NAN |
|  |  | 0 | NAN | NAN |
|  |  | 0 | NAN | NAN |
|  |  | -1 | return\_1 | MA(return, n) |

* n is the window size

1. Timing Strategy 择时策略=> Generate operation series

* Input: Table 5
* Output:

Table 6

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| time | value | signal | return | MA (return) | operation |
|  |  | 1 | NAN | NAN | 1 |
|  |  | 0 | NAN | NAN | 0 |
|  |  | 0 | NAN | NAN | 0 |
|  |  | -1 | return\_1 | MA(return, n) | If ? -1 : 0 |

* Pseudocode
* 对于signal序列

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | -1 | 0 | 0 | 1 | 0 | -1 |

对应的计算MA对比return生成择时策略

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | False |  |  |  |  | True |

生成新的operation 序列

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |