MAFS6010U Deep Learning Trading Course Project Instruction

About us

Professor

- YAO Yuan

Teaching Assistants:

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About Data

- You are provided with historical minute-level OHLCV data of 4 major crypto currencies – BTC (比特币), BCH (比特币现金), LTC (莱特币) and ETH (以太坊).
- Data download address:

https://drive.google.com/drive/folders/1jBqUZgipKoATfdIlbDCTqY5nb7m3ewlw

Data description

- Raw:

```
> head(data[1:7])
      Open time    Open    High     Low   Close    Volume    Close time Quote asset volume
1: 1548897600000 3472.94 3473.42 3470.51 3473.22  6.337525 1548897659999           22005.49
2: 1548897660000 3472.18 3474.90 3472.18 3474.11 10.836286 1548897719999           37640.75
3: 1548897720000 3473.32 3475.00 3473.28 3474.93 11.903773 1548897779999           41357.02
4: 1548897780000 3474.88 3476.00 3474.88 3476.00  6.548589 1548897839999           22759.42
5: 1548897840000 3475.97 3476.00 3474.99 3475.35 14.218963 1548897899999           49423.67
6: 1548897900000 3475.33 3477.38 3475.29 3477.30 25.551211 1548897959999           88817.24
   Number of trades Taker buy base asset volume Taker buy quote asset volume Ignore
1:              106                    2.631580                     9137.748      0
2:              100                    6.574967                    22839.740      0
3:              101                    6.469921                    22479.855      0
4:               60                    3.185345                    11070.812      0
5:               99                   11.468516                    39864.006      0
6:              137                   19.380782                    67368.860      0
```

- Prepared:

```
> head(data)
                 index    Open    High     Low   Close    Volume
1: 2018-04-28 06:04:00 9226.97 9228.91 9202.00 9215.83  52.82780
2: 2018-04-28 06:09:00 9215.47 9229.00 9204.01 9219.99  67.93998
3: 2018-04-28 06:14:00 9219.00 9249.00 9219.00 9240.00  98.68453
4: 2018-04-28 06:19:00 9239.99 9242.00 9230.00 9235.38  77.20300
5: 2018-04-28 06:24:00 9236.00 9270.36 9231.61 9257.40 181.10656
6: 2018-04-28 06:29:00 9260.00 9266.65 9240.00 9260.15 122.87200
```

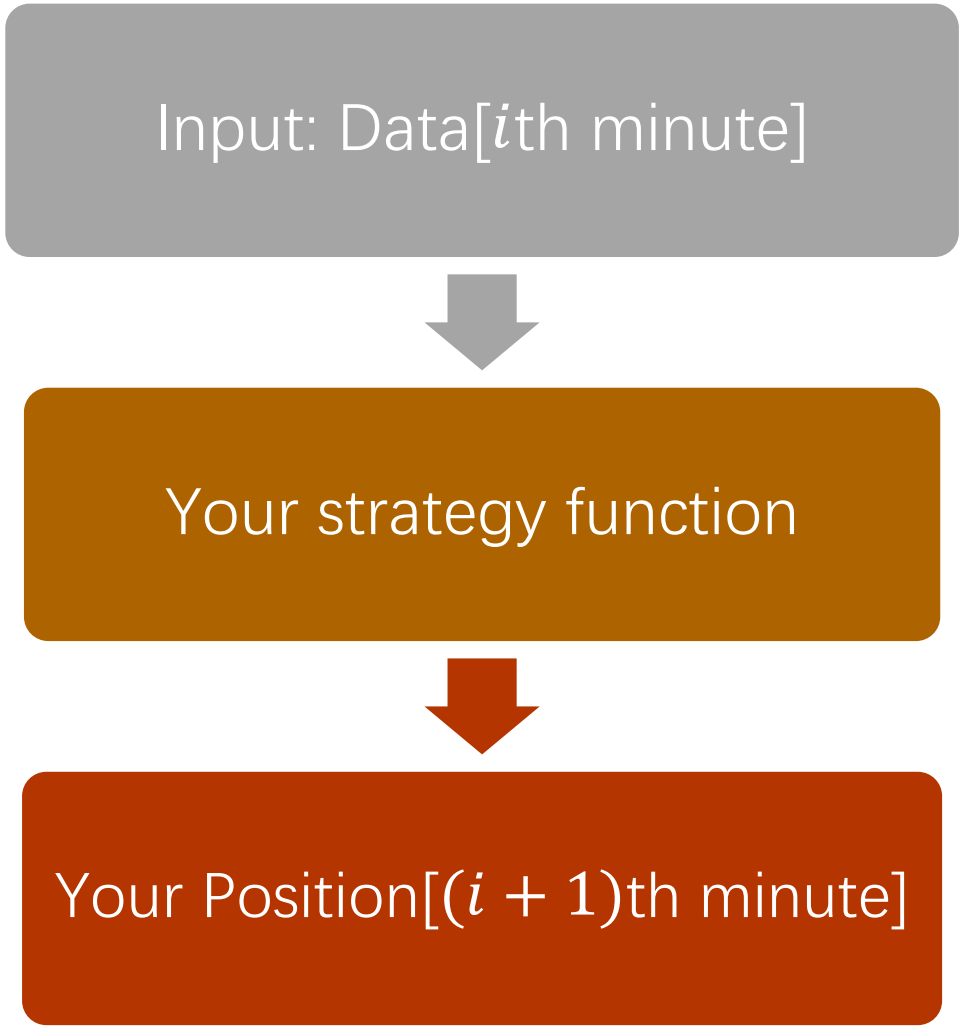
Number of files and Trading periods

- Cryptocurrencies available:
  - Your strategy should work for EVERY CRYPTO
  - Minute bar: BTC, EOS, ETH, TRX
  - High Frequency: BTC, BCH, ETH, LTC

- Training:
  - High Frequency: 3weeks
  - Minute bar : 9months
- Testing:
  - One week testing (immediately after data given)

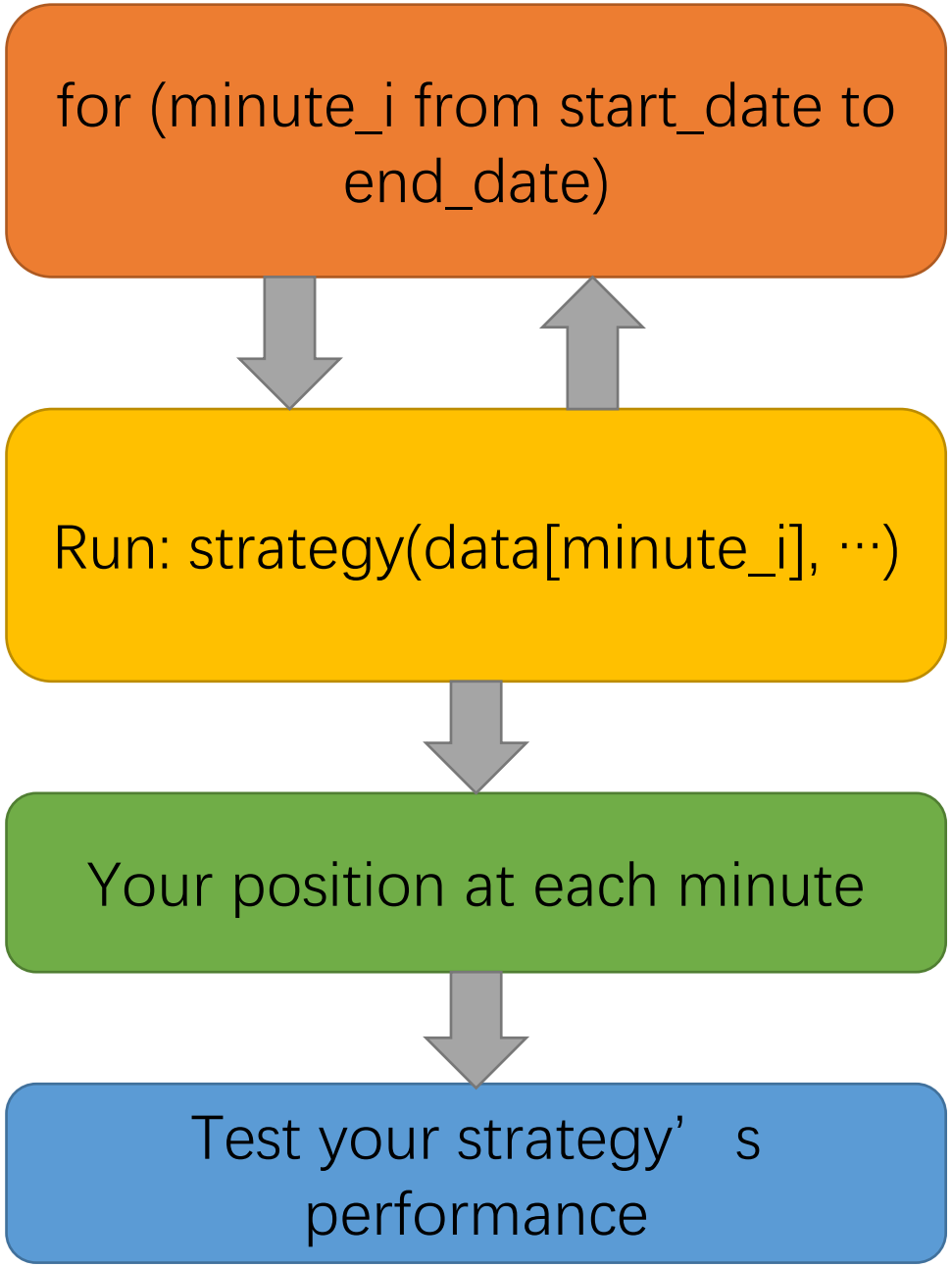
Your job

- Write a high frequency or minute-level trading strategy function. Given data from **one minute**, it can output **its desired position next minute**, which implies how will you trade (long/short) assets next minute in R or Python 3.



Your job

- Submit your strategy **weekly** (deadline is usually Friday mid-night) to cdldl@connect.ust.hk. TA will test your strategy's performance using **data from next week**.
- The testing program, several demos and this instruction are also provided to you.



Position

- Your position can be either:
  - 1 for long
  - 0 do nothing
  - -1 for short
- Bonus mark for people that gives a position with a volume:
  - Separate modelling must be made for volume
  - Volume is in the interval [0,infinity]
  - Your volume should be as close as possible from REAL volume at time t+1. Performance metrics: RMSE

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N} (Predicted_i - Actual_i)^2}{N}}$$

Trading Guideline

- The initial cash is $ 100,000 (US Dollars)
- At one minute, your strategy should make decision about longing / shorting different crypto currencies next minute by giving your **desired position next bar (minute, hour, day)**.
- **The transaction rate is 0.0005 for each trading action**. For example, suppose you strategy will short 5 BTC next minute, and the average price of BTC is $9000 next minute, then your transaction cost will be 9000*5*0.0005 = $2.5. Suppose after 1 hour, the average price turns to 9500 and you want to close your position, then you need to pay another 9500*5*0.0005 = $ 23.75 as transaction cost (TA will take care of transaction costs)

Performance evaluation

The Formula for Sharpe Ratio Is

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

where:

R_p = return of portfolio

R_f = risk-free rate

σ_p = standard deviation of the portfolio's excess return

Grading scheme for only one crypto (100points)

- Look ahead bias:
  - Minus 50points
- High Frequency / minute bar file:
  - Sharpe > 10: 100points
  - Sharpe > 6: 70points
  - Sharpe >3: 30point
- Bonus:
  - Innovative strategy: 50points
  - Volume within RMSE metrics: 50points
  - Dealing with High Frequency data: 30points

Work Submission

- Create a folder whose name is your team name (avoid special characters)
- In this folder, there must have a “ “strategy.py” file. You can also add other facility files in this folder. See the comments in demos for more information.
- Then zip your folder in a single .zip or .rar file. Submit it to the following mail address or my Wechat:

cdldl@connect.ust.hk

Work Submission

- One week later, TA will test your strategy on new coming data and publish a leaderboard to you.

	A	B	C	D	E	F	
1	**Team Name**	**Programming Lan**	**Weekly Return**	**Sharpe Ratio**	**Maximum Dropdow**	**Rank**	**Comments**
2	BOOM	Python	11.00%	9.79	-1.10%	1st	
3	Yogurt	Python	4.70%	8.94	-1.30%	2nd	
4	BugCreatingMachine	R	3.73%	14.33	-4.23%	3rd	
5	Hearthstone	R	2.83%	11.06	-2.00%		
6	SoFarSoGood	Python	2.30%	3.58	-2.90%		
7	TangTangTang	Python	1.50%	3.15	-2.10%		
8	General	R	1.13%	3.71	-2.11%		Yellow alert. Submission doesn't follow the guideline.
9	dreamtoomore	R	0.83%	3.15	-2.38%		
10	anchor	Python	0.30%	3.42	-0.40%		

Demos

- Moving average
- R: Arima (5min bar)
- Python: LSTM (1hour bar)

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