Association Rules

Analyze the relationship of each’s cryptos’ return.

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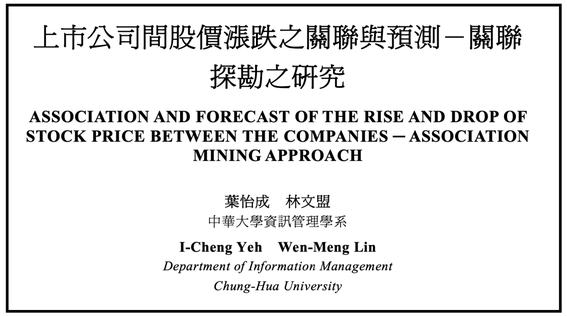
Before …

My interested field

- quantitive trading
- cryptocurrency
- decentralized finance



上市公司間股價漲跌之關聯與預測－關聯探勘之研究

ASSOCIATION AND FORECAST OF THE RISE AND DROP OF STOCK PRICE BETWEEN THE COMPANIES – ASSOCIATION MINING APPROACH

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19. **以大數據分析加密貨幣與實體貨幣之關聯法則**
國立中正大學 / 企業管理學系碩士在職專班 / 107 / 碩士 / 商業及管理學門 / 企業管理學類
研究生:詹文寧
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論文種類：學術論文
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20. **虛擬貨幣與美國金融股替代關聯規則分析**
國立中正大學 / 企業管理學系碩士在職專班 / 107 / 碩士 / 商業及管理學門 / 企業管理學類
研究生:陳俊升
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論文基本資料 | 摘要 | 外文摘要 | 目次 | 參考文獻 | 紙本論文 | 論文連結 | QR Code

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Most of financial issues applying mining association rule is to find the relationship or correlation of stocks' return, so I choose this topic. From lots of cryptocurrencies' hourly return, find the relationship by Apriori Algorithm.

Data

Origin data format for example. It will be n's DataFrame for n cryptocurrencies.

- Dataset from Binance exchange
- 2019/9/1 ~ 2021/9/30
- Hourly crypto price
- 60 crypto

Time	Open	High	Low	Close	Volume
2021/1/1 13:00	100	110	80	105	2500
2021/1/1 14:00	105	135	95	100	3200

$(18250, 60)$

Data Preprocessing

1. Fill n.a. from former value to get complete timeline DataFrame.
2. Concat each DataFrame with only one column - Close.
3. Calculate simple return from close price.
4. Classify to three discrete variables - Up, Down, Flat by custom parameter (%)
5. Covert DataFrame with Up, Down variables in one columns.

Data Preprocessing

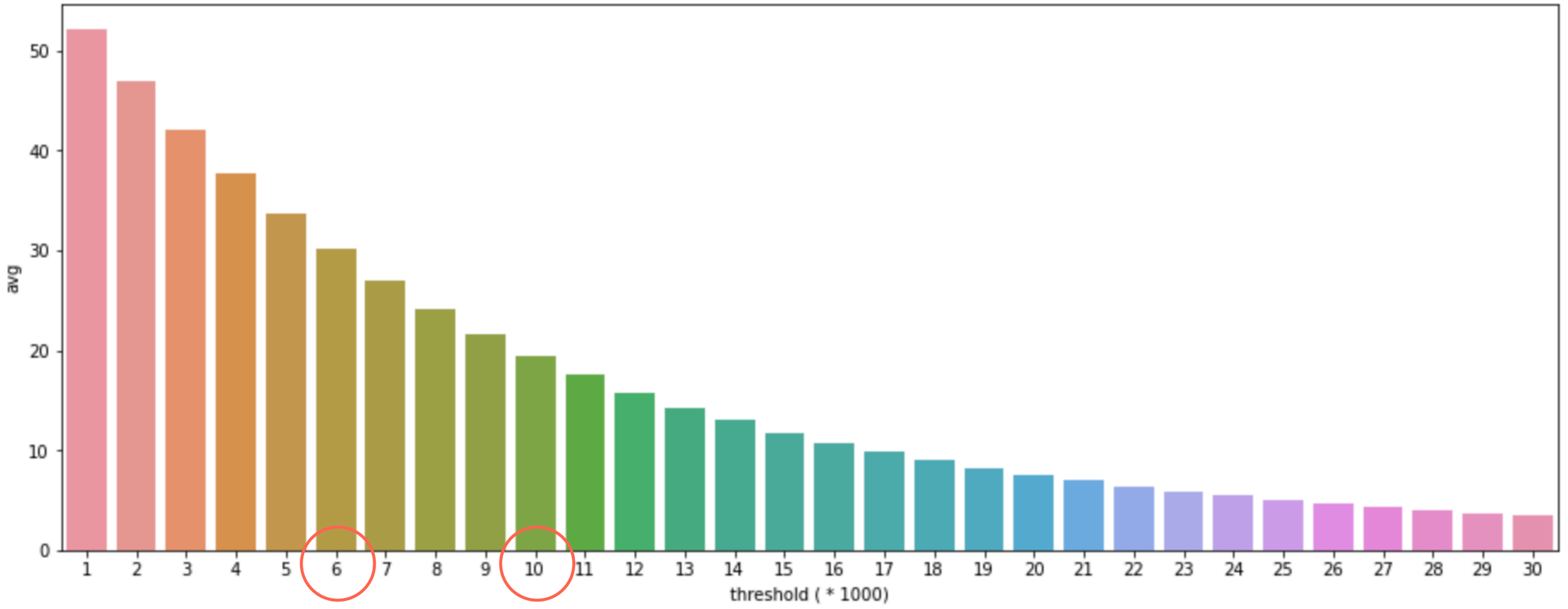
Preprocessing data format for example.

1	[BTC_up, ETH_up, BNB_down, FTT_down]
2	[ETH_up, XRP_up, FTT_up]
3	[BTC_up, BNB_down, FTT_down, PERP_down]
4	[PERP_down]
5	[BTC_down, ETH_down]
6	[BTC_up, BNB_down, FTT_down, PERP_up, CAKE_up]

$(18250, 1)$

Decide custom parameter (%) for hourly return

- Totally 60 crypto in this dataset in two year
- Find appropriate hourly return for analysis from 0.001 to 0.03
- Choose 0.006 and 0.01 to analyze in the end



Applying Apriori Algorithm

Final Result

Return threshold = 0.006
min_support = 0.16
min_confidence = 0.6
min_lift = 2.5

BAT_lower	→	ONT_lower
ONT_lower	→	BAT_lower
IOST_lower	→	ONT_lower
ONT_lower	→	IOST_lower
LINK_lower	→	NEO_lower
NEO_lower	→	LINK_lower
NEO_lower	→	ONT_lower
ONT_lower	→	NEO_lower
NEO_lower	→	VET_lower
NEO_upper	→	ONT_upper
ONT_upper	→	NEO_upper

Return threshold = 0.01
min_support = 0.105
min_confidence = 0.5
min_lift = 2

ALGO_lower	→	ATOM_lower
ATOM_lower	→	ALGO_lower
ALGO_lower	→	FTM_lower
CELR_lower	→	FET_lower
CELR_lower	→	ONE_lower
ONE_lower	→	CELR_lower
ENJ_lower	→	FTM_lower
FET_lower	→	FTM_lower
MATIC_lower	→	FTM_lower
ONE_lower	→	FTM_lower
TOMO_lower	→	FTM_lower
VET_lower	→	FTM_lower
ZIL_lower	→	FTM_lower

Observation

- All relation is same direction, such as upper to upper.
- Most relation is lower to lower.
- That is totally different result from two different parameters. I guess I can lighten the range to see more relation, but that is too much to observe.
- Most relation are relative. Like A to B and B to A.
- Maybe we can compare the result with correlation coefficient, and use in portfolio optimization in the future.