Technical Pattern Analysis

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Overview

Problem Description

- Within common technical analysis methods, K-line pattern analysis is widely used and recognized as a handy empirical method.
- Conduct trade simulation in China stock market and make binary buy-hold policy based on k-line pattern analysis
- Examine performance of policies based on pattern analysis

Details

Binary Buy-Sold Policy

Given policy state as $\{-1, 0, 1\}$, which stands for $\{buy, hold, sell\}$, set P_t^n as policy made at time t by n^{th} pattern and P_t as policy at time t. Get P_t by voting method,

$$P_t = \mathbb{I}\{\sum_{i=1..n} P_t^n\}$$

Market Assumption

Assume market do not support short sell, no trading commission, infinite share volume, do not support day trading

Simulation Detail

Set trading period as (2018.06.01, 2018.11.01) with daily frequency, choose $SZ50$ as investment portfolio, equally distribute initial holding value into each share of \$50000

Portfolio trading(2018.06.01-2018.11.01)

Combine 5 patterns to get each period's buy-sell policy and the final holding value shows a 7% positive return while single period return implicates a continuous return fluctuation that during the first 4 months, cumulative return fluctuates around the initial value. Variance of single period return reaches 47% implicating a highly unstable variantion.

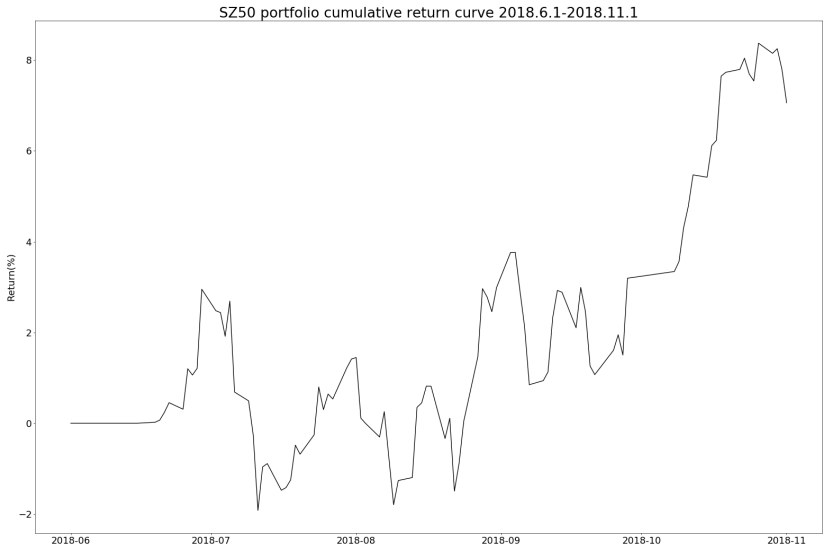


Figure: Holding Value

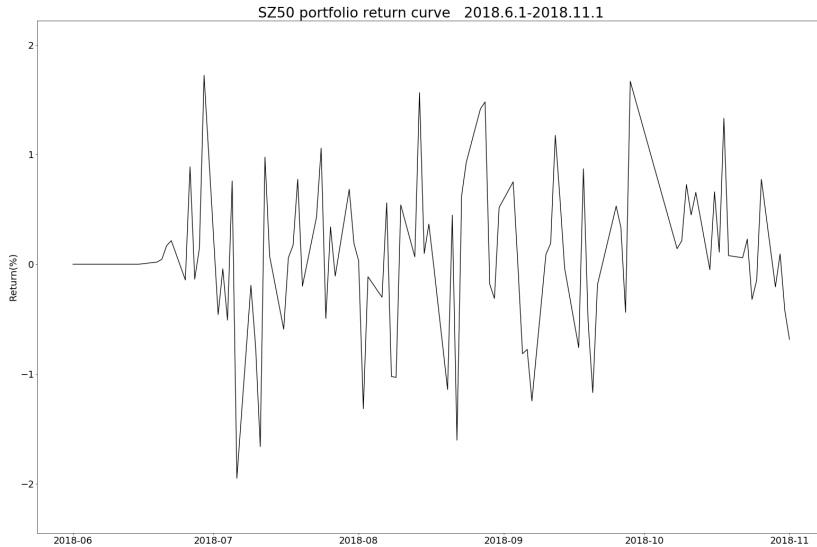


Figure: Single Period Return

Portfolio Trading

Select two arbitrary shares to see the pattern policy on single share. Blue line stands for sell signal and red line for buy signal

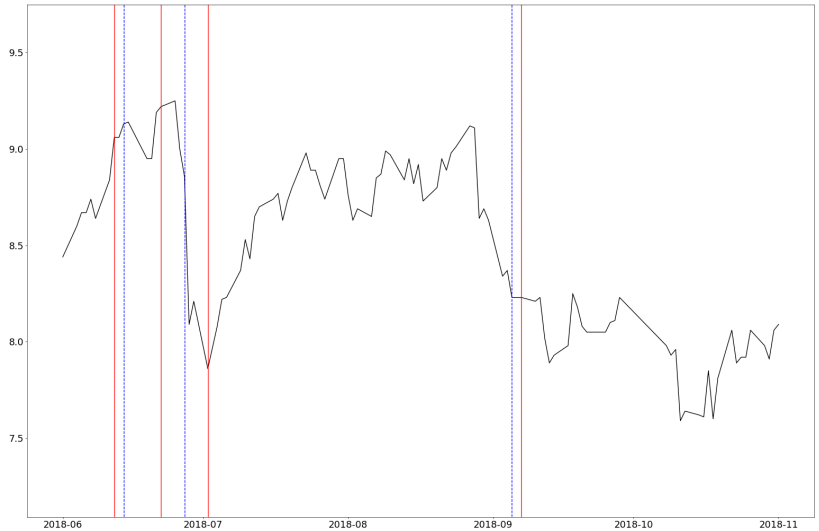


Figure: DaQin Railway(601006)

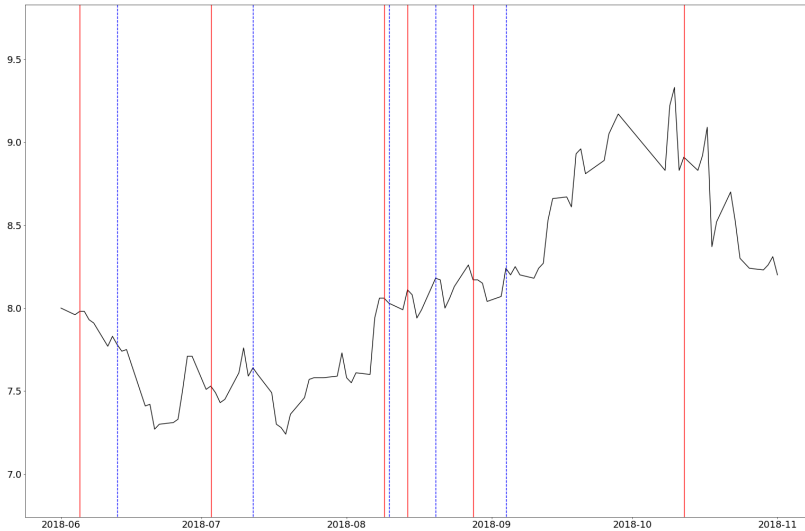


Figure: SinoPec(601857)

Portfolio Trading(2018.01.01-2018.06.01)

According to the considerable performance of the specific pattern policy, we decide to test it on another time series to examine the generalization of the policy. The policy brings a 3% increase of initial values and variance of single period return is 49%.

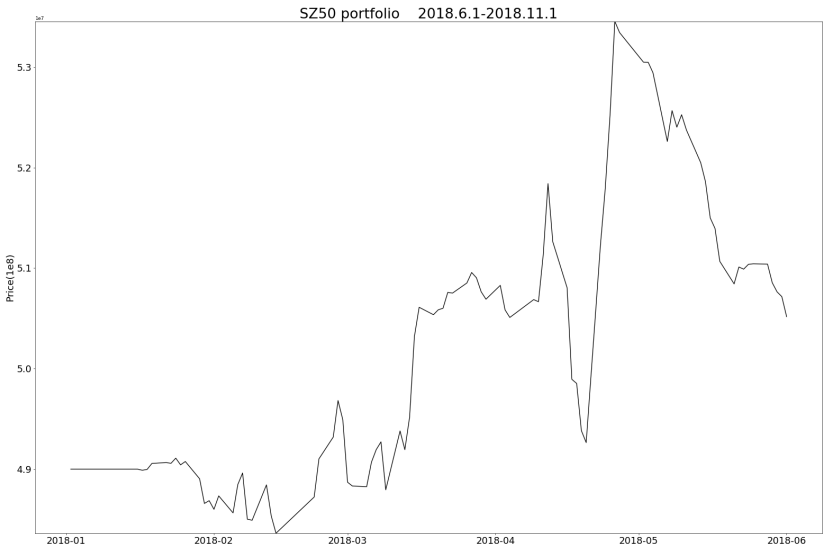


Figure: Holding Value

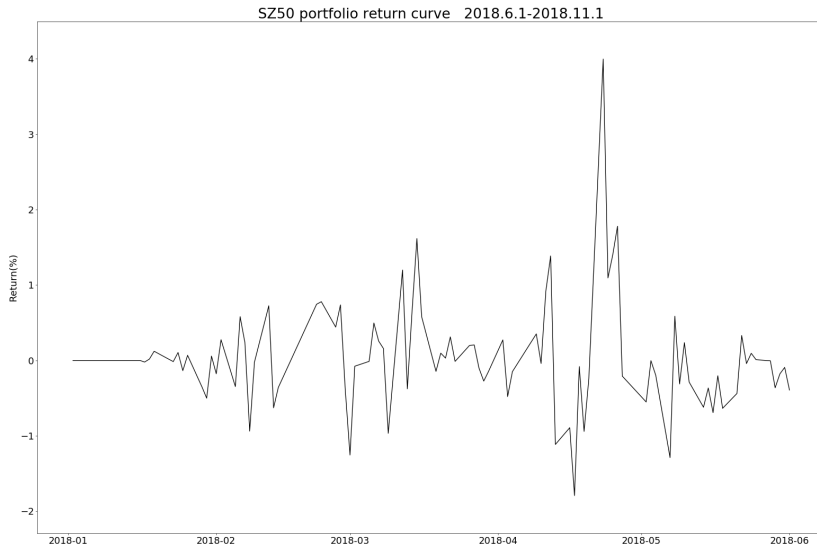


Figure: Single Period Return

Portfolio Trading(High Frequency)

Implement pattern analysis on high-frequency price data during 2018.06.01-2018.11.01. Ignoring limitation of daily trading.

Figure: Holding Value

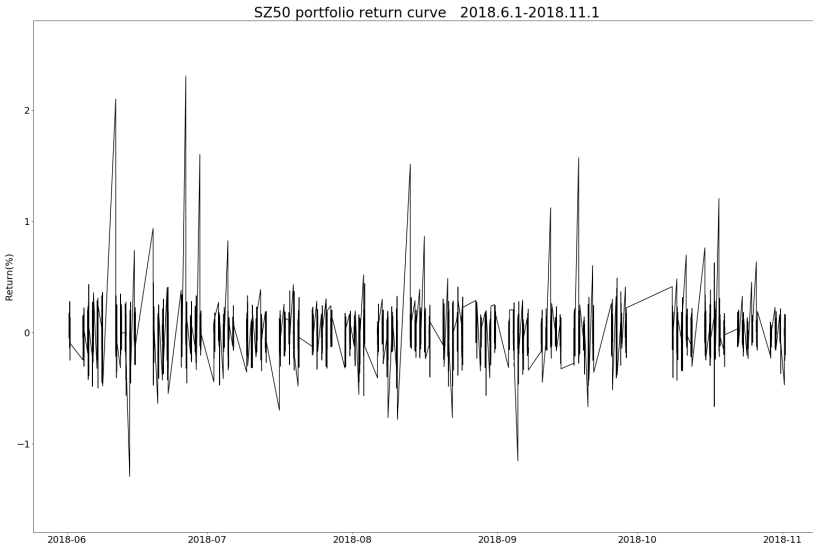


Figure: Single Period Return

Portfolio Trading(High Frequency)

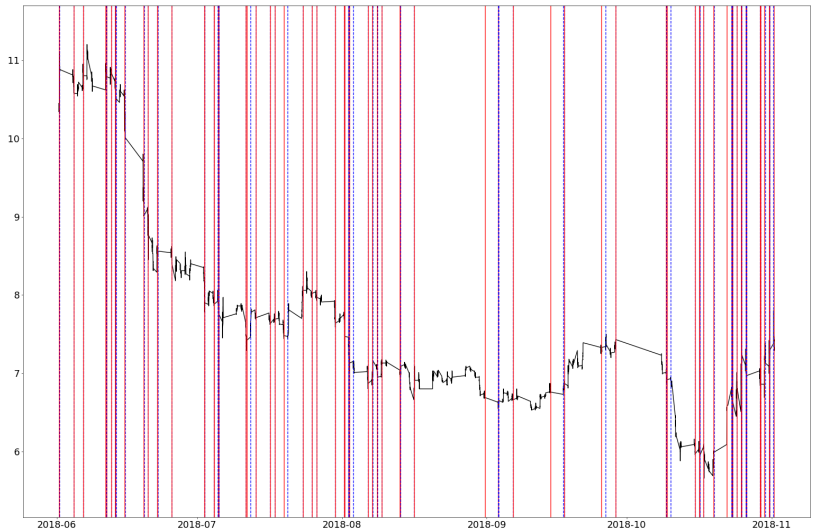
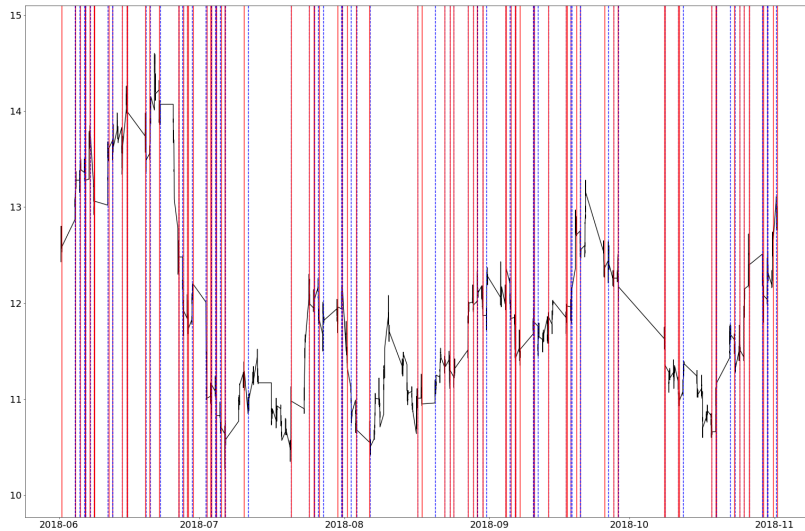


Figure: 601878



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Discussion

- The simulation trading result shows the implementation of pattern analysis on portfolio trading could guarantee a positive return
- Pattern analysis has a tough weakness that if viewing combination of patterns as parameters, it is hard to decide the optimal combination of patterns since they are non-quantitative
- Observation from the distribution of pattern policies on high-frequency data, despite dense distribution. Distribution has sparse areas and isn't uniformally dense which implicates that specific pattern may have prediction for certain price trend.
- Using "voting" method to combine pattern policies could bring about a prediction with large noise.

The End