

Forecast of Stock Trends and Investment Analysis

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Keywords: range; end-to-end difference; trading volume; time series; bp neural network algorithm; binary linear regression; particle swarm algorithm; k-line graph; looking back volatility algorithm

Abstract: Taking one day as the research cycle, we define the difference between the highest value and the lowest value of the stock price in a day as the extreme difference, and the difference between the stock closing price and the opening price as the beginning and end difference. First use the time series model to construct a trend chart of trading volume and time, and roughly estimate the missing value at 2020.03.26. After that, the correlation analysis between volume and range and end-to-end difference is carried out. On this basis, the bp neural network model was established, and the specific functional relationship between the volume and the range and the end-to-end difference was constructed to predict the missing value. The missing value was compared with the time series model to estimate the missing value. It was found that the difference was not large, so I accepted This missing value. For investment strategies and investment plans, first construct a binary linear regression function of trading volume, range and end-to-end difference, and then use matlab to find its extreme value, and record the data corresponding to the range and end-to-end difference when the extreme value is obtained (x1, x2) , By calculating the unbiased estimator of the continuous compound interest return u_i and its standard deviation, using the latter as the daily standard return, the index volatility in the next year can be calculated.

1. Stock selection plan and investment portfolio

1.1 Complete the missing data

We observed the attachment and found that the eight stocks in the attached agricultural company 001 to agricultural company 008 lacked trading volume on the last day, so we started to discuss this: First, the image of the change in trading volume of our agricultural company 001 over time:

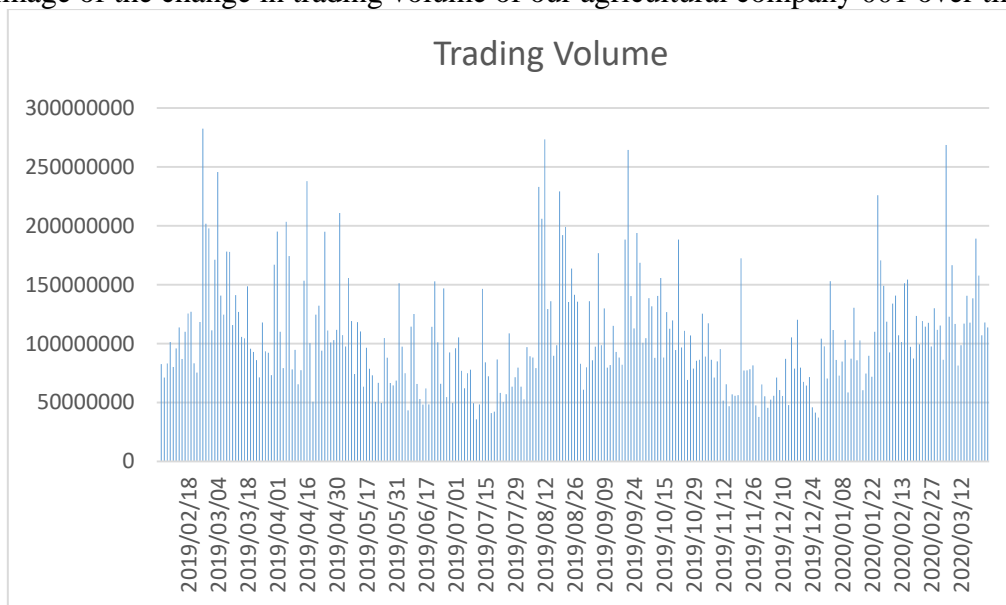


Figure 1 Change in stock trading volume of agricultural company 001

After a simple analysis, it is found that there are rules to follow in terms of changes in trading volume over time. Furthermore, we consider that taking one day as the research cycle, we call the difference between the highest value of the day and the lowest value of the day as the extreme difference, and the difference between the closing price and the opening price as the beginning-to-end difference. Then we conducted a correlation analysis on the volume of these two differences and found that the range is significantly correlated with the volume, and the gap between the opening and closing prices (the difference between the opening and closing prices) and the volume are not significantly correlated. As follows:

Correlations			
		Volume	Range2
Volume	Pearson Correlation	1	.254**
	Sig. (2-tailed)		.000
	N	280	279
Range2	Pearson Correlation	.254**	1
	Sig. (2-tailed)	.000	
	N	279	279

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations			
		Volume	Range1
Volume	Pearson Correlation	1	.687**
	Sig. (2-tailed)		.000
	N	280	279
Range1	Pearson Correlation	.687**	1
	Sig. (2-tailed)	.000	
	N	279	279

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 2

Therefore, we perform bp neural network analysis on the range and volume: take the top 100 values of the agricultural company 001's range, and the 100 values corresponding to the volume as the training set, perform neural network simulation training, and then take the rest The value is verified as a simulation set. Use the obtained function to make predictions, and finally get the defective trading volume: Agricultural company 001 has 106390000 trading volume on 2020.03.26.

By analogy: the remaining seven missing data are obtained: agricultural company 002 has 24502000 transactions on 2020.03.26; agricultural company 003 has 1,44410000 transactions on 2020.03.26; agricultural company 004 has transactions on 2020.03.26 : 11545000 times; agricultural company 005's transaction volume on 2020.03.26: 16399000 times; agricultural company 006's transaction volume on 2020.03.26: 10844000 times; agricultural company 007's transaction volume on 2020.03.26: 3841800 times; agricultural company 008 in 2020.03.26 The trading volume is: 11308000 times;

1.2 Stock selection plan and investment portfolio

Stock selection plan: Taking one day as the research object, we found that trading volume shows investment information. When the trading volume is large, the extreme difference in the previous day is relatively large, and the gap between the beginning and the end is relatively large. When the trading volume is small, the daily disparity is smaller, and the beginning-to-end difference is smaller. Therefore, we constructed a multiple linear regression relationship between volume, range and end-to-end difference: set range as x_1 , end-to-end range as x_2 , and volume as y . After SPSS analysis: $Y=183917507.3x_1+21681865.83x_2+34675041.7$. The extreme value of this function is obtained, and $x_1=1.0233$, $x_2=0.2286$ when the extreme value is obtained. In other words, when the range is 1.02 and the end-to-end difference is 0.2286, the trading volume takes the maximum value, and you can consider buying at this time.

Investment portfolio: We carried out ten-dimensional particle swarm planning on ten stocks, and got the weights of ten stocks, as shown in the following table:

Table1 Summary of the weights of ten stocks

Stock name	001	002	003	004	005	006	007	008	009	010
Actual weight	20.00	14.90	15.21	10.86	8.97	3.72	18.12	4.82	7.39	5.30
Weight ratio	18.2%	13.6%	13.9%	9.92%	8.91%	3.40%	16.5%	4.41%	6.76%	4.84%

2. Evaluation index analysis

Of course, to judge whether the stock selection plan and investment portfolio are reasonable, we should also comprehensively consider the following two aspects: trading volume and K-line chart. Through these two indicators, the modeling results are analyzed, and the stock investment plan is simply selected through the trading volume and K-line chart, and then the correctness and rationality of the modeling results are tested.

First of all, we look at the trading volume. The trading volume in the stock refers to the trading amount, which is used to describe the activity of the market and the scale of funds. When the trading volume is large, the supply exceeds the demand and the buyers increase; on the contrary, when the trading volume is small, the supply exceeds demand. The market is deserted and buying is scarce. The market is the result of the interaction of various forces. Although the trading volume is easy to be fake, and the main force of controlling the market often uses the majority of retail investors' little knowledge of technical analysis to make a fuss on various indicators, the trading volume is still one of the most objective elements. It can be said that trading volume is an objective response to whether a stock is active or not, and it is also an important basis for the masses to choose this stock, because the movement of stock market funds is the essence of stock price changes.

Secondly, the K-line chart is another major indicator for observing and analyzing the movement and changes of the stock market. By combining the four important stock parameters of the highest price, lowest price, opening price, and closing price in the form of a small rectangle and hatching, it can be Observe the real changes in the market intuitively, comprehensively and thoroughly. From the K-line chart, we can not only see the trend of stock prices (or the market), but also understand the fluctuations of daily market conditions.

The following will analyze the changes and volatility of each stock and the basis of the investment portfolio in combination with the trading volume-k-line chart of ten stocks.

According to the excel table and the agricultural company 001 chart below, it can be seen that the maximum trading volume is 282493504, while the minimum trading volume is 35822080. There is a big difference between the two. The figure also reflects that from 19/1/29 to 20/3/ During the 26th period, the fluctuation of trading volume was very obvious, and the fluctuation of K-line was also obvious. We define a concept of volatility range. The formula is:

$$\sum_{i=1}^n \frac{xHi - xLi}{xLi}$$

XHi was rated as the highest price in the i month and XLi was rated as the lowest in the i month. Price, n is the total month. That is, using each month as a cycle, calculate the highest and lowest prices that occurred in the month, then calculate the volatility of the month, and then sum the volatility of each month as the volatility of this stock. The volatility is The measurement of the uncertainty of the yield represents the risk level of this stock. The higher the volatility, the greater the risk, and the lower the risk, the smaller the risk. Stocks with too high or low volatility are not a reasonable choice. Too low volatility indicates small price changes, low trading volume, and sluggish stocks; while high volatility indicates high risks and belongs to the type of high risk and high return. , A little carelessness may not make ends meet and cause huge losses. The volatility of the agricultural company 001 stock is 2.11, which is relatively moderate. It can also be seen that the K line is flat and flat, and the overall range is not too large, so its investment is more reasonable.

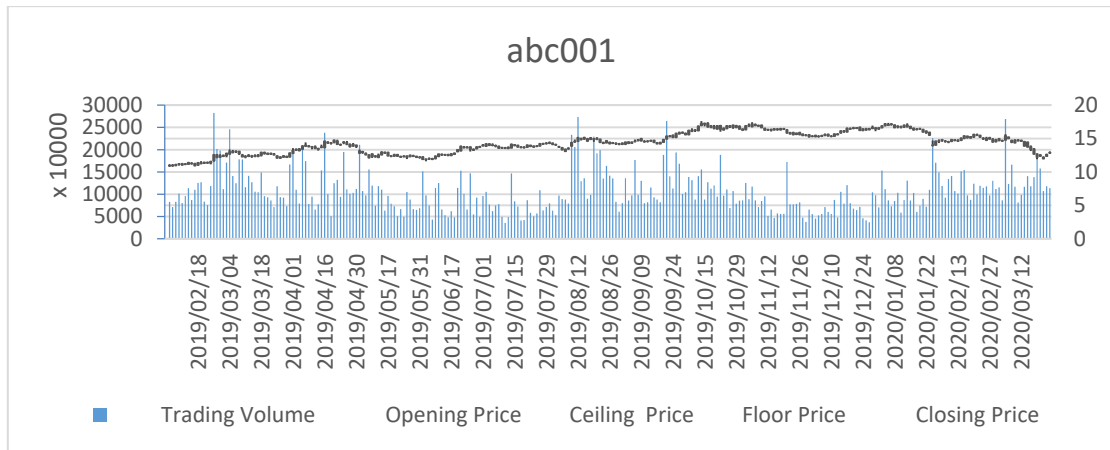


Figure 3 K-line chart of agricultural company 001 stock

As for the agricultural company 002, the K-line trend is similar to that of 001, with moderate fluctuations, and its fluctuation range is 1.73. However, it can be seen from the data and the 002 graph that its trading volume is smaller than that of 001. It makes a certain investment.

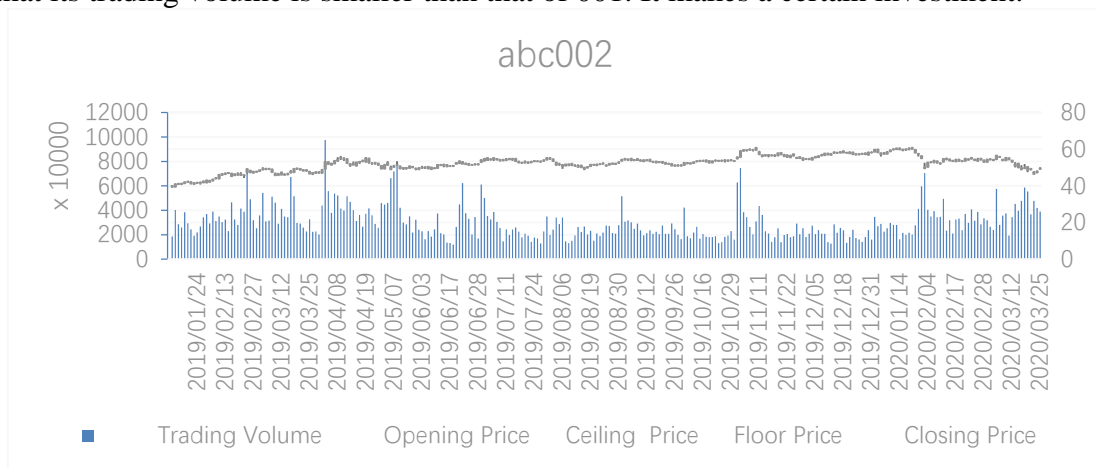


Figure 4 K-line chart of agricultural company 002 stock

The agricultural company 003 stock is different from the previous two stocks. The trading volume is very large, and the volume fluctuations are very obvious. The K-line fluctuation range is 4.35, and the maximum trading volume is 742883712. It is an extremely active and risky stock market. Stocks are also easier to attract the attention of large retail investors, so we also invest in them.

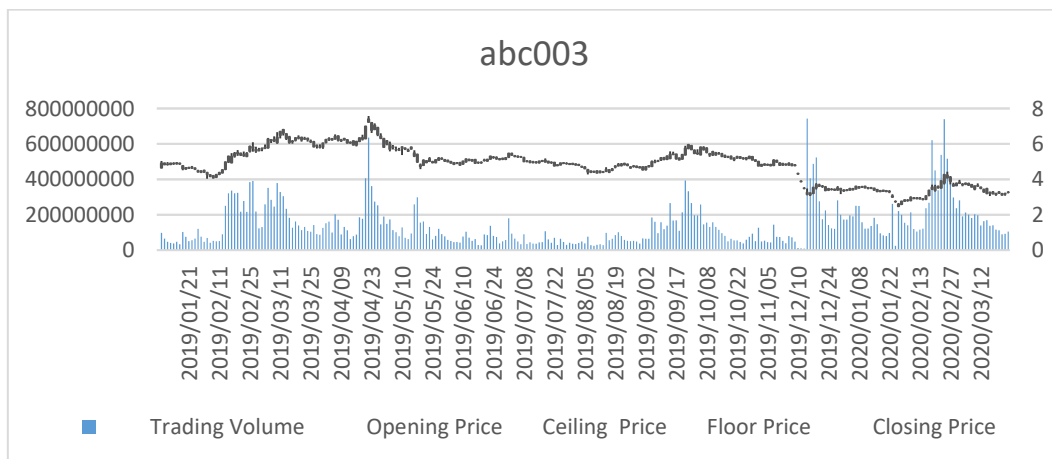


Figure 5 K-line chart of agricultural company 003 stock

Agricultural company 004 shares and agricultural company 005 shares have similar characteristics, as shown in the following figures 004 and 005, the trading volume is small, there is

a certain range of change, and the K line also has a certain range of fluctuations, respectively 1.85 and 2.31, but in 20 years Both stocks have the characteristics of rising prices and declining trading volume around March, so you should not buy too much at this time and you can choose to invest a small part of them.

We believe that we should not invest too much in the 006 stock of the agricultural company. From the data in the table, we can see that the trading volume of 006 is too small. Since June 2019, the trading volume has been hovering around 5 million. The market is deserted. I think it is difficult for the stock to make a large amount of profit and should not invest too much.

Agricultural company 007 stock is relatively special. Combined with the data in the table, it has the following characteristics: (1) The trading volume is small and basically balanced. (2) The K-line shows an overall growth trend, rising from around 200 to around 500 at the beginning. It is 2.61, which is growing rapidly. Combining the above two characteristics, the agricultural company 007 is a stock with a flat price increase. In this case, the market maker generally holds a heavier share, and the main force controls the market. The subsequent market is bullish, so we think we need to invest in it.

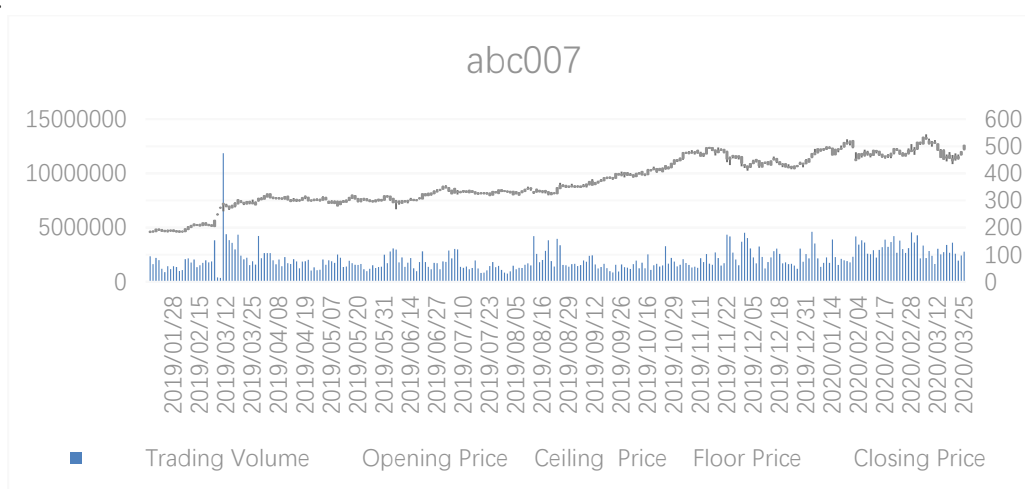


Figure 6 K-line chart of agricultural company 007 stock

Stock agricultural company 008 has a small trading volume, and it can be seen from the 008 chart that its volatility is not large, the market is not active, and the profit opportunity is small, so it should not invest too much money.

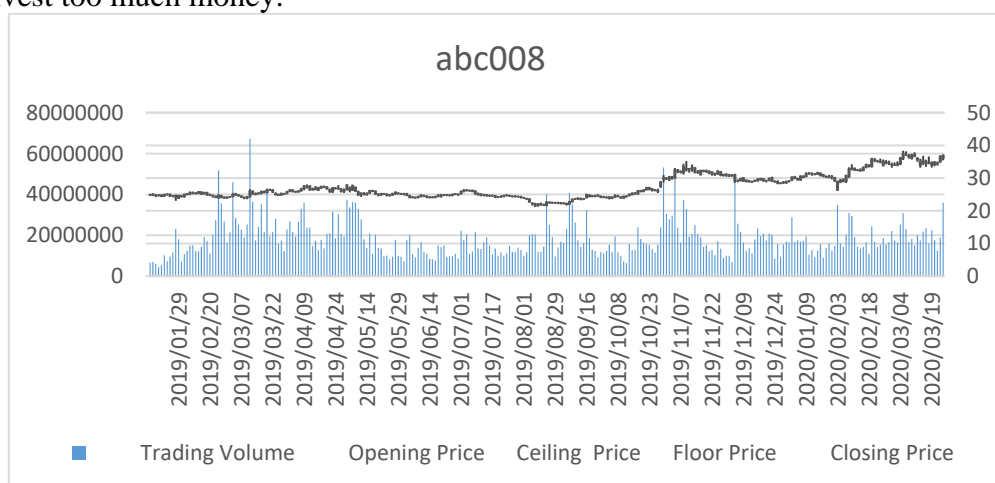


Figure 7 K-line chart of agricultural company 008 stock

The situation of stock agricultural companies 009 and 010 are similar. They have the following characteristics, as shown in the following two figures: (1) Large trading volume, 009 maximum trading volume is 459266208, 010 maximum trading volume is 310385184, and daily trading volume changes are relatively small (2) K-line fluctuation range is very small, 009 is 1.59, 010 is

1.04; based on the above two characteristics, it can be judged that the turnover rate of these two stocks is large, but because the K-line changes are not obvious, so a small amount of money is invested .

Through the above analysis of the volume-K line chart, we believe that the investment portfolio obtained through modeling is basically reasonable in terms of the two indicators of volume and K line.

3. Stock index fluctuations in the coming year

Taking the agricultural company 001 stock as an example, it is defined S_i as the stock price at the end of time period i , the stock price at the end of the next time period, and the continuous compound interest rate of return. Its value is $\ln(S_{i+1}/S_i)$, so the estimated standard deviation of is:

$$s = \sqrt{\left(\frac{1}{n-1} \sum_{i=1}^n ui^2 - \frac{1}{n(n-1)} \left(\sum_{i=1}^n ui\right)^2\right)}$$

What this formula obtains is an unbiased estimate of the standard deviation, n is the number of time periods, and one day is a time period here. There are 279 days of data in the table, so $n=279$. Therefore, according to the data in the table, we can get $\sum_{i=1}^n ui=0.157$, $\sum_{i=1}^n ui^2=0.128$, so $s=0.021$, and the annual volatility $\sigma=s \times \sqrt{n} \times 100\%=35.08\%$. This is the estimated value of the annual volatility with a standard deviation of $\frac{\sigma}{\sqrt{2n}} \times 100\% = 1.33\%$.

Therefore, we can estimate that the volatility of agricultural company 001 in the next year is 35.08%, and its standard deviation is 1.33%. In the same way, the volatility and standard deviation of agricultural company 002 to agricultural company 010 can be obtained, as shown in the table below.

Table 2 Summary table of index volatility of ten stocks in the coming year

	u_i	u_i^2	s	σ	$\frac{\sigma}{\sqrt{2n}}$
Agriculture Company 002	0.227	0.114	0.02	33.40%	1.27%
Agriculture Company 003	-0.404	0.335	0.034	56.79%	2.16%
Agriculture Company 004	0.0467	0.104	0.019	31.74%	1.21%
Agriculture Company 005	0.077	0.144	0.023	38.08%	1.45%
Agriculture Company 006	0.304	0.153	0.023	38.42%	1.46%
Agriculture Company 007	1.00	0.192	0.026	43.42%	1.65%
Agriculture Company 008	0.373	0.141	0.023	37.58%	1.43%
Agriculture Company 009	-0.100	0.066	0.015	25.05%	1.06%
Agriculture Company 010	-0.411	0.345	0.011	18.31%	0.71%

4. Investment advice

When people invest, they are essentially choosing among uncertain returns and risks. In order to determine the investment ratio of the industry's investment portfolio, it is necessary to evaluate and analyze its risks and select appropriate evaluation indicators for analysis. Grasp the law of stock index fluctuations, seek advantages and avoid disadvantages, formulate corresponding stock selection plans and investment portfolios to maximize investment returns or minimize investment risks.

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