

1. Database:

At present, the appended database contains Russell 2000 stocks' past 5 years' a million piece of data. Data updating, adding/dropping, and various inquiring functions are available at "Database_Carl" python file.

SQLite Manager - C:\Users\Carl\Desktop\Portfolio Go! v1.1\stock_data_October.db

Database Table Index View Trigger Tools Help

Directory > (Select Profile Database) Go

Structure Browse & Search Execute SQL DB Settings

TABLE stock_data

Search

Show All

Add

Duplicate

Edit

Delete

rowid	index	Symbol	Date	Close	Open	Volume	High	Low
537	0	FLWS	2016-08-10	9.2	9.25	114000	9.26	9.06
1074	0	SRCE	2016-08-10	34.34	34.540001	13400	34.599998	34.139999
1611	0	TWOU	2016-08-10	35.009998	35.169998	214400	35.549999	34.775002
2148	0	SIXD	2016-08-10	0.12	0.12	6500	0.2	0.12
2685	0	EGHT	2016-08-10	13.54	13.59	228100	13.63	13.46
3222	0	AVHI	2016-08-10	14.22	14.48	27900	14.48	14.2
3759	0	ATEN	2016-08-10	7.82	7.99	612700	8	7.78
4227	0	AAC	2016-08-10	17.17	18.120001	205600	18.360001	17.110001
4764	0	AAON	2016-08-10	27.35	27.27	100800	27.379999	27.110001
5301	0	AIR	2016-08-10	23.67	24.139999	82300	24.33	23.65
5838	0	ABAX	2016-08-10	49.529999	49.709999	80600	49.709999	48.990002
6375	0	ABY	2016-08-10	19.84	20.23	484800	20.42	19.790001
6912	0	ABEO	2016-08-10	3.76	3.85	56000	3.9	3.72
7449	0	ANF	2016-08-10	20.709999	20.690001	1153500	21.030001	20.629999
7986	0	ABMD	2016-08-10	123.459999	123.699997	364500	124.260002	121.459999
8523	0	ABM	2016-08-10	37.610001	37.200001	136600	37.610001	37.200001
9060	0	AXAS	2016-08-10	1.22	1.2	1246700	1.24	1.15
9597	0	ACTG	2016-08-10	6.27	6.3	504400	6.4	6.14
10134	0	ACAD	2016-08-10	31.08	34.080002	6760000	34.169998	31
10671	0	AKR	2016-08-10	36.889999	36.709999	1139600	36.970001	36.529999
11208	0	AXDX	2016-08-10	20.719999	22.129999	567200	22.129999	20.1

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SQLite 3.13.0 Gecko 49.0.1 0.8.3.1-signed.1-signed Exclusive Number of files in selected directory: 9

Windows Ink 工作区 ET: 1121 ms

Figure 1.1 database

2. Securities Research Module:

Knowing technical analysis of individual securities is important to launch a statistical arbitrage upon a big portfolio. So the Portfolio Go provides user-friendly data visualization tools for technical analysis.

Technical indicators currently include Candle Charts, Relative Strength Index, Moving Average Line (period configurable), Exponential Moving Average Line (smoothing factor configurable), Moving Average Convergence Divergence Line, Bollinger Band®, Trading Volume, On Balance Volume, and Stochastic Oscillator (KDJ Lines).

Investors could easily configure what (combinations of) indicator(s), and what time interval of the data to display. They could also choose to plot the information about more than one stock in the same chart, which is useful for pars-trading strategy.



Figure 2.1 Chart Sample 1



Figure 2.2 Chart Sample 2



Figure 2.3 Chart Sample 3



Figure 2.4 Chart Sample 4

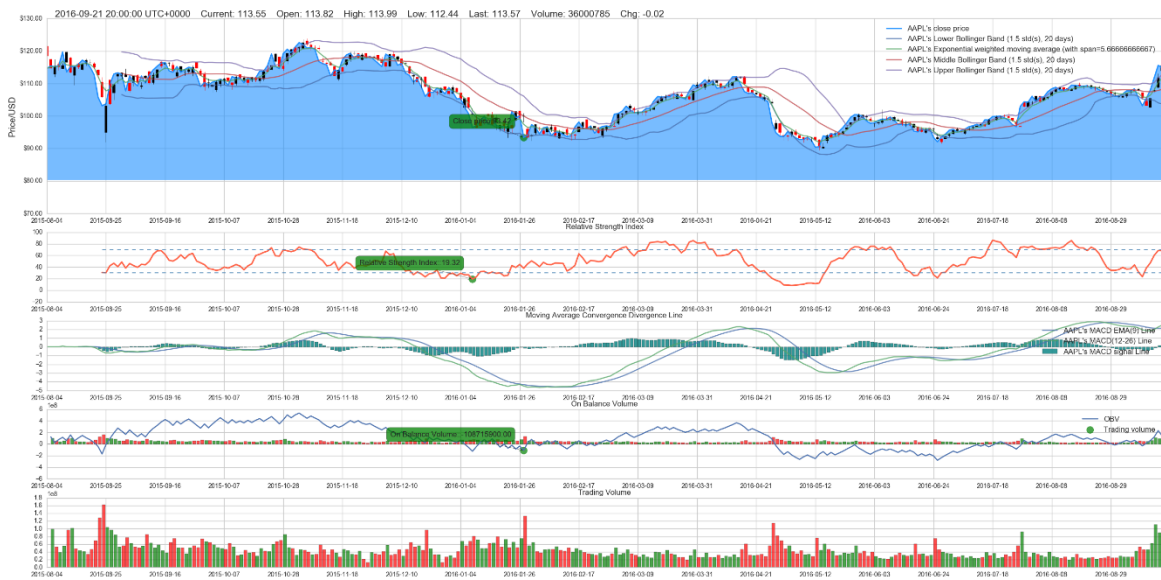


Figure 2.5 Chart Sample 5

3. Event-driven Trading Execution and Backtesting module:

Provide both Passive and Active portfolio management strategy testing tools. For passive management strategies, the positions of different stocks are unchanged through the entire investing period. The application will display the capital graph and position information of this strategy.

The Highest execution frequency is on daily base, since the highest frequency data in the database is daily data. (Hopefully, it could be upgraded later on). At the end of the day, the event-loop will check for whether there is a signal for position changing and finalize the transaction thereafter. This is also the procedure of backtesting. At the backtesting module, a strategy's Sharp Ratio, Turn-over Rate, Maximum Drawdown, Position and Capital Graph(animation effects), and PnL Graph will be provided.

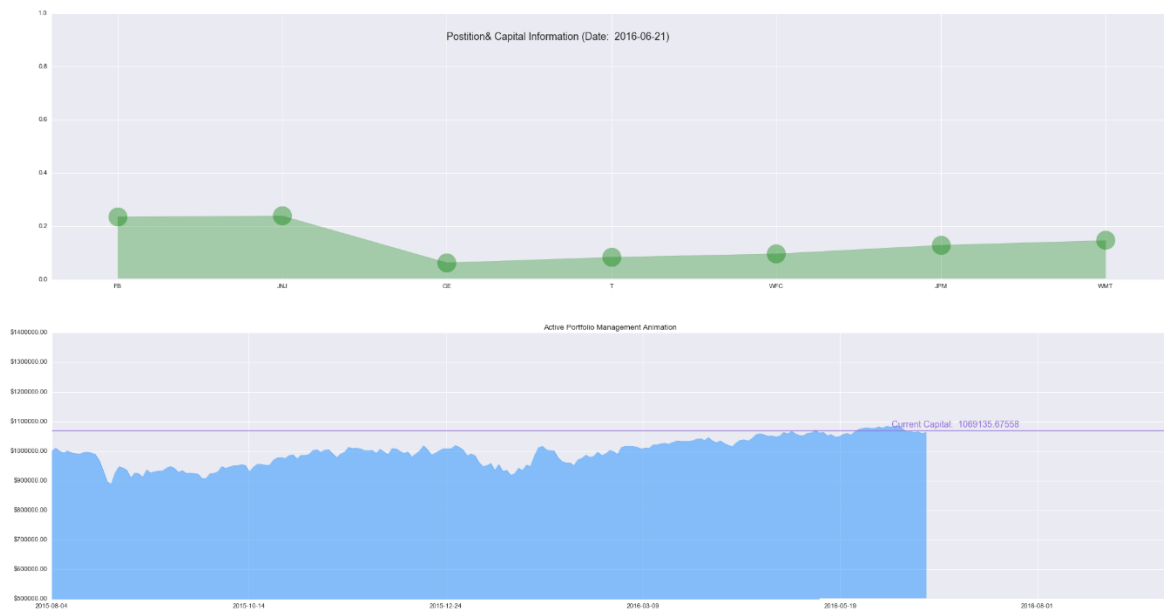


Figure 3.1 Backtesting process (animation)

As for active portfolio management trading strategy, there are two ways for an investor to implement their algorithms:

- I. Input a slice of Python script, in which they could specify what kind of market events would be considered as trading signals. They could, of course, use all the market information up to the specific date. Then Portfolio Go would try to execute accordingly their strategy.
- II. Portfolio Go also provides some basic operators that allow investors to construct their trading models by combining them into expression forms (or just using a single operator, if one is confident enough).

Basic operators include:

- +/-Close (delay configurable): return a vector of (+/-) close price of portfolio stocks, with a specific delay.
- +/-Open (delay configurable)
- +/- Volume (delay configurable)
- +/- High (delay configurable)
- +/- Low (delay configurable)
- +/- Return (delay configurable)

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+/- Avg_return (period configurable)

RSI Value (delay configurable)

Volatility (period configurable)

Spot volatility (kernel type/deterioration parameter configurable)

Moving Average Value (delay configurable)

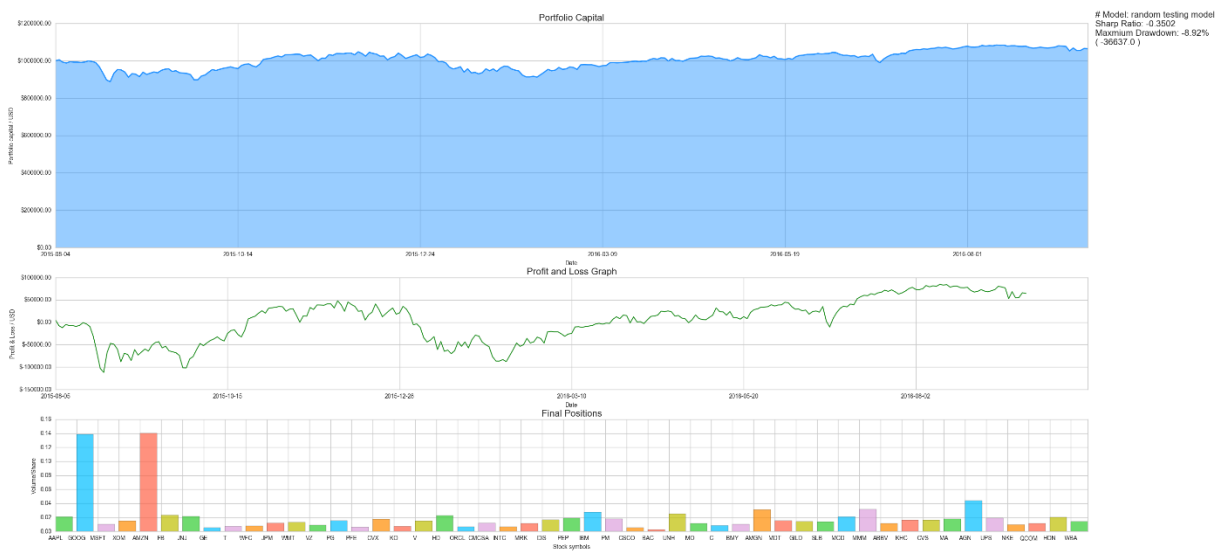


Figure 3.2 Backtesting result

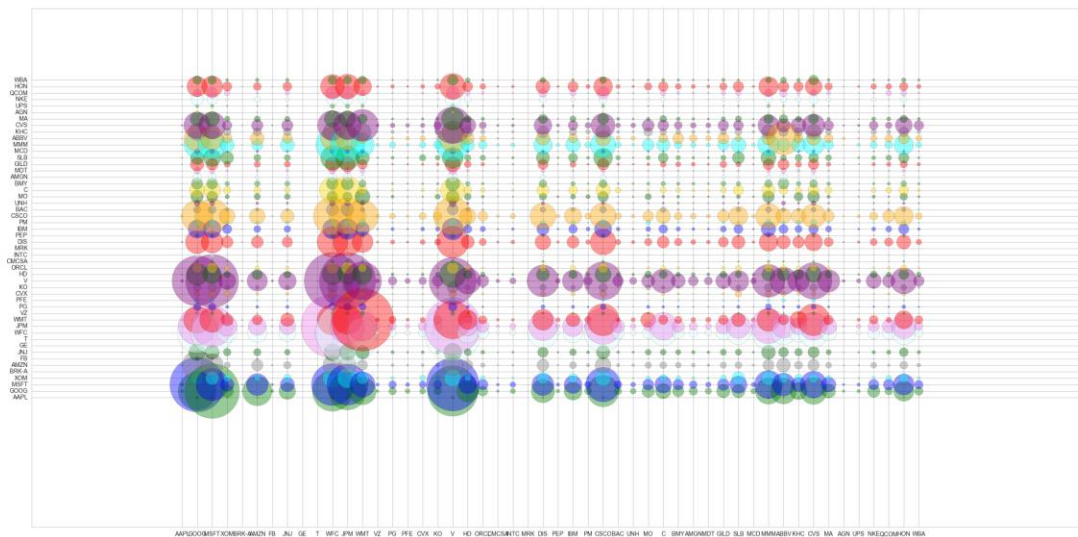


Figure 3.3 Portfolio Correlation Distribution

4. A machine-learning approach to simulate a trader's behavior (under-developing)

Market data is so abundant, sometimes overwhelming. When building up a machine learning model, of course, we want as much as possible data to train up the model. But the problem is, are we providing the model the right things to learn? Since the market is changing all the time, previous data may not be an ideal source to forecast future trend due to market regime shift. So we are facing a paradox: more amount of data or higher quality of data?

But there might be one thing that is at least more stable than the market: The human behavior. A trader, as well, has his or her own behavior pattern. Though occasionally deviated by some emotional pulse, they tend to make a similar decision under a similar situation. So it may be a solution to modeling the behavior of a successful trader than modeling the market. Instead of putting price process into the black box, I put the trader's decision process into the black box. The main challenge is to find the criterion for the training process. At this stage, I made a strong assumption: the traders' behavior is purely based on technical analysis and his "emotional noise". The specific algorithm is under developing.