Alpha Trading with the WorldQuant Brain Platfrom

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Abstract: We provide a guide to use the WorldQuant Brain platform. We overview some trading concepts and give some explicit examples of alpha (α) signals.

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1 Introduction

WorldQuant Brain [1] is an online simulation platform to build alpha (α) signals and test them using market data. However, it is hard to find resources and documentation on the use of this platform. In this report we overview and provide some examples of alpha signals.

2 Trading

2.1 Turnover

Reducing turnover. In order to reduce turnover we can add a condition on the trading. Instead of trading at each market open, it will trade only when event is True:

```
event = volume>adv20;
alpha = news_cap;
trade_when(event, alpha, -1)
```

2.2 Decay

Decay: Averages the alpha in a time window. For example if the alpha=1 from Monday to Thursday and then in Friday we have alpha=10, there will be suddenly a lot of trading. But if decay=5, then this will take the alpha average over the last 5 days so instead of 10 it iwll do 10+1+1+1+1/5=2.8 which be less trading.

Increasing the Decay helps to reduce the Turnover.

2.3 Truncation

This is the maximum weight for a given stock. It can limit the maximum loss; reducing this parameter helps with the concentration.

The following instruction will tell you will tell you what's the maximum weight assigned:

```
max(alpha) > 1 : 1 ? 0
```

2.4 Datafields

There are three types of datafields in the BRAIN platform:

- Matrix: Market data is in a matrix. X: stocks Y: time. Can be used to create alphas directly based on datafields descriptions.
- Vector: Data stored accross three axis. X: stocks Y: time Z: time (intraday).
- Group: Stock classification based datafields. Can be used to improve specific alpha performance by neutralizing the alpha by the datafields.

2.5 Operators

Different operators:

```
vector_neut(a,b)
```

This operator calculates a new vector a2 such that a2 is orthogonal to b. It can be used to neutralize an alpha vector over some particular risk.

3 Alphas

3.1 American market

1. Trade based on volume and price difference. If the volume is larger than the 20-day average, then trade based on the price difference of the last 5 days.

   ```
   event = volume>adv20;
   alpha = (-ts_delta(close,5));
   trade_when(event,alpha,-1)
   ```

   Region: USA
   Universe: Top3000
   Delay: 1
   Neutralization: Subindustry
   Decay: 2

Truncation: 0.01
Pasteurization: Off
Unit Handling: Verify
NaN Handling: Off

2. A simple Price Reversion alpha

```
SMA_30 = ts_mean(close,30);
rank(SMA_30 - close)
```

Region: USA
Universe: Top3000
Delay: 1
Neutralization: Subindustry
Decay: 4
Truncation: 0.08
Pasteurization: Off
Unit Handling: Verify
NaN Handling: Off

3. Price weighted average. vwap is the daily volume weighted average price. The following alpha uses vwap to implement Price Reversion:

```
(vwap-close)/vwap
```

Region: USA
Universe: Top3000
Delay: 1
Neutralization: Subindustry
Decay: 15
Truncation: 0.08
Pasteurization: On
Unit Handling: Verify
NaN Handling: Off

In Fig. 1 we present the results for this alpha signal.

4. More on price reversion but with a condition on the volume

Aggregate Data

Sharpe	Turnover	Fitness	Returns	Drawdown	Margin
1.88	41.65%	1.04	12.63%	9.18%	6.06‰

Year	Sharpe	Turnover	Fitness	Returns	Drawdown	Margin	Long Count	Short Count
2016	0.46	40.58%	0.11	2.50%	9.18%	1.23‰	1523	1535
2017	1.10	40.93%	0.38	5.00%	5.33%	2.44‰	1515	1517
2018	0.77	42.09%	0.26	4.62%	6.69%	2.20‰	1514	1533
2019	1.84	41.75%	0.98	11.89%	4.62%	5.70‰	1500	1534
2020	4.05	42.36%	3.65	34.42%	2.75%	16.25‰	1522	1509
2021	3.03	45.32%	3.10	47.58%	2.93%	21.00‰	1548	1532

Figure 1: Results for the price weighted average alpha.

```
twenty_day_SMA = ts_mean(close, 20);
trade_when(volume>=ts_sum(volume,5)/7.5,
           rank(twenty_day_SMA-close),-1)
```

Region: USA
Universe: Top3000
Delay: 1
Neutralization: Subindustry
Decay: 4
Truncation: 0.08
Pasteurization: On
Unit Handling: Verify
NaN Handling: Off

5. Implied volatility.

```
alpha = ts_decay_linear(ts_delta(implied_volatility_call_60, 25)
                        > 0, 20);
```

Region: USA
Universe: Top3000
Delay: 1
Neutralization: Sector
Decay: 4
Truncation: 0.08
Pasteurization: On

Unit Handling: Verify
NaN Handling: Off

6. Sentiment data. A stock with less sentiment volume (buzz) compare to the average sentiment volume of the last quarter (60 trading days) might imply lower risk of overraction and is better to invest.

```
buzz = ts_backfill(-vec_sum(scl12_alltype_buzzvec),20);
ts_av_diff(buzz, 60)
```

Region: USA
Universe: Top3000
Delay: 1
Neutralization: Sector
Decay: 4
Truncation: 0.08
Pasteurization: On
Unit Handling: Verify
NaN Handling: Off

3.2 Chinese market

1. Volatility of daily turnover in last 20 days

```
rank(-mdl175_volatility*log(volume))
    *(1+group_rank(mdl175_revenuettm, sector))
```

Region: CHN
Universe: Top3000
Delay: 0
Neutralization: Sector
Decay: 3
Truncation: 0.08
Pasteurization: On
Unit Handling: Verify

Aggregate Data

Sharpe	Turnover	Fitness	Returns	Drawdown	Margin
3.84	10.04%	5.20	22.93%	6.72%	45.65‰

Year	Sharpe	Turnover	Fitness	Returns	Drawdown	Margin	Long Count	Short Count
2016	5.15	10.30%	5.96	16.73%	1.02%	32.48‰	1232	1431
2017	6.81	9.71%	10.10	27.51%	1.55%	56.65‰	1357	1584
2018	3.22	10.19%	3.87	18.05%	3.83%	35.42‰	1360	1593
2019	3.73	10.08%	5.25	24.72%	6.72%	49.03‰	1363	1595
2020	2.29	10.03%	2.85	19.34%	5.54%	38.54‰	1360	1588
2021	17.37	9.64%	47.65	94.06%	0.47%	195.16‰	1383	1556

Figure 2: Results for the price weighted average alpha.

NaN Handling: Off

2. Volatility of daily turnover in last 20 days with an event threshold

```
# Volatility of daily turnover in last 20 days
event = volume>adv20;
alpha = rank(-mdl175_volatility*log(volume))*(1+
        group_rank(mdl175_grossprofit, subindustry));
trade_when(event, alpha, -1)
```

Region: CHN
Universe: Top3000
Delay: 0
Neutralization: Industry
Decay: 6
Truncation: 0.05
Pasteurization: On
Unit Handling: Verify
NaN Handling: On

In Fig. 2 we present the results for this trading signal.

References

[1] "Worldquant brain." https://platform.worldquantbrain.com/.