

Quantopian Algorithm - WGS Strategy R1.1

Goal : To be able to run this strategy without any human intervention. The strategy never stops on Interactive Brokers platform till it's manually forced to stop.

Dynamic Coding : The strategy will have to be dynamic to a point any changes made with numbers would be in the form of variable.

The Variables are :

- a. Current Date : Fed from google document - Date Field
- b. Google Document Link : The entire path would be a variable. And could be changed when required.
- c. Time of Order Execution : Refer to explanation mentioned below.
- d. Previous Day's Volume would be a variable : Ex: 100,000 - Which can be changed any time. The previous day's volume would be applicable to all recommended stocks for that day or next day , till changes are made to it.
- e. The variables needed to manage milking technique are mentioned below through initialize(context) :
 - i. Unrealized Gain / Loss Percent Step 1
 - ii. Unrealized Gain / Loss Percent Step 2
 - iii. Unrealized Gain / Loss Percent Step 3
 - iv. Unrealized Gain / Loss Percent Step 4
 - v. Unrealized Gain / Loss Percent Step 5
 - vi. Trailing Percent Stop Loss Step 2
 - vii. Trailing Percent Stop Loss Step 3
 - viii. Trailing Percent Stop Loss Step 4
 - ix. Trailing Percent Stop Loss Step 5

F. Variable for Min and Max Price

G. Variable for last minute volume - To address spread.

Handle Data : Calling data every minute would make the algorithm inefficient. In this strategy the at the time of order execution handle data will look for history volume for previous day for that stock and latest current price/ market price. The order execution will be based on market price. Partial fulfillments of orders will be all at latest market price.

Other Cross Checks

- a. Can trade Function - To ensure if the stock recommended for that day can be traded at the time of execution.
- b. Closed Traded - Should NOT be traded again (Buy or Short) at any given point of time unless it's been recommended again. A very risky situation if not done correctly.

Background and Daily Recommendation :

WGS recommendation comes from a predictive model which is outside Quantopian. It's designed to identify the breakouts when the predictive model qualifies stocks.

The daily recommendation for qualified stocks has 4 columns.

- a. Date
- b. Symbol
- c. Shares
- d. SLPercent

Explanation for the fields :

- a. Date - This would be the report date. The date would be the same for all rows for that day's recommendation. Refer to google document (link provided below).
- b. Symbol - This would be the stocks which gets qualified from predictive model. It could be any number of stocks depending on market's Bull or Bear conditions and the predictive model qualifying stocks.
- c. Shares - Would be the count of shares to purchase.
- d. SLPercent - It's the stop loss percent for every individual stock. It could be different depending on their individual volatility. The WGS algo strategy needs to take the stop loss percent and convert it into absolute value at the time of execution.

Scenarios :

- i. If the latest price before market opens for a stock is \$100 and the stop loss percent is 5% , then at the time of execution the absolute value of stop loss would be \$95.

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- ii. If the market opens high and the same stock has the latest price before market opens at \$105 then the absolute value of stop loss would be \$99.75.
- iii. If the market open low and the same stock has the latest price before market opens at \$95 then the absolute value of stop loss would be \$90.25.
- iv. Before Market Opens - Refers to the **1st minute bar** of the trading day with closing price.

IMPORTANT : The daily WGS recommendation will have to be **refreshed** in quantopian pipeline.

The daily recommendations MUST be in Google document and needs to be shared with others going forward for easy management. It would be shared through email address with link provided to them. The link provided would be a variable component in initialize(context) in Quantopian. So that any changes to this path can be easily managed.

The link for daily recommendation :

<https://docs.google.com/spreadsheets/d/1gJEclF1xHcgf8vRhizgpKwzUfDZp9ijkDmLKLEdT6yw/pub?output=csv>

The sequence of trade execution will be as per Google document as that would control externally the liquidity and indices preference of stocks which gets qualified. And the same sequence will be used to control available credit line and position fulfillment on FIFO basis as mentioned below in the document.

There could be days where there are NO recommendations if the market are bear or for some other reasons.

The data in google document which needs to get imported into Quantopian pipeline will be the column "F - Recommendation" from the Recommendation sheet.

Trade Execution :

The execution of orders for WGS Strategy for the recommended stocks mentioned above will be governed by the following factors.

The actual order execution happens ONLY if both the conditions mentioned **below** satisfies.

- a. Previous Day's Volume Check : The order happens only if previous days volume is over 200,000 for the recommended stock. It would be in the form of variable under initialize(context) section. WGS Strategy should be able to change the variable at any time.
- b. Time of Order Execution : It will be a variable. Since Quantopian is not able to handle the spread at this moment. The time of execution will be manually entered through a variable. Ex : 10m or 15m or 30m etc.

Order Fulfillment :

Order fulfillment would be governed on WGS Strategy under the following conditions.

- a. The Quantopian would hold a variable for total portfolio amount under initialize(context). Which can be changed at any time.
- b. There are 3 major components to manage portfolio
 - i. Credit Line - The amount an investors invests at the beginning.
 - ii. Credit Utilized - The total amount (buy + commission amount for single leg) on float for the stocks which are not settled.
 - iii. Available Credit = Credit Line - Credit Utilized.
- c. Order fulfillment and portfolio utilization will be based on "**available credit**" on FIFO (first in first out basis, which will be mentioned in google doc) for the stocks which are recommended for that day and gets filled or partially filled. Till available credit is fully utilized or get filled within the available credit.

Stop Loss Adjustments / Milking Techniques

There are 2 components for Stop Loss / Milking Technique

Stop Loss as per daily recommendation comes in "percentage". An example :

Date	Symbol	Shares	SLPercent
7/15/2016	ELVN	100	2.5

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Which means at the point of execution (please refer to all conditions satisfied as per Trade Execution mentioned above).

Example : If price of ELVN is \$150 and the stop loss percent is 2.5%, then the stop loss absolute amount will be :

$$150 - ((2.5/100) * 150) = 146.25$$

There could be 3 scenarios of a latest closing price :

(i) Same as previous day's closing price:

Next Day Opening Price (latest price) : \$150

Stop Loss : $150 - ((2.5/100) * 150) = \146.25

(ii) Market opening with gap down

Next Day Opening Price (latest price) : \$145

$145 - ((2.5/100) * 145) = \141.37

(ii) Market opening with gap up

Next Day Opening Price (latest price) : \$160

$160 - ((2.5/100) * 160) = \156

IMPORTANT : The absolute amount of stop loss **DOES not change** till the following happens.

Milking technique under WGS Strategy happens **without conventional Target Price**.

This can be explained in a tabular format.

Step	% Unrealized Gain / Loss	Stop Loss Technique	Amount / Percent
1	Below 0.25%	Stop Loss - Absolute Amount	Stop Loss at entry level
2	=> 0.5	Stop Loss = Trailing Percent	0.25%
3	=>1.5%	Stop Loss = Trailing Percent	1.00%
4	=>2.5%	Stop Loss = Trailing Percent	1.50%
5	=>3.0%	Stop Loss = Trailing Percent	2.00%

Milking technique goes through 2 type of Stop Loss Adjustments:

1. Stop Loss (Absolute)
2. Trailing Stop Loss Percent

The **shifting of gear** from Stop Loss Absolute to Trailing Stop Loss Percent happens only based on Percentage Unrealized Gain/Loss on real time basis.

a . No changes to initial stop loss (absolute) at the time of positioning till Percentage Unrealized Gain / Loss Percent reached step 1.

b. **Switching of gear** happen when it comes to step 2 of unrealized gain / loss % from Stop Loss Absolute to Stop Loss Trailing Percent.

c. Looping continues within step 2, 3, 4 and 5. Till the realized gain/loss percent crosses the limit mentioned in column B for % Unrealized Gain / Loss.

IMPORTANT : All the parameters mentioned above from step 2 onwards would be in the form of variable under initialize(context) section . So that changes can be made at any point of time if there are changes in strategy. Step 1 Stop Loss Percent will come from Google document which Quantopian converts in absolute amount at the time of order execution.

Partial fulfillment of orders would also be governed by stop loss adjustment / milking technique.

Scenarios :

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Settlement happens when both Buy and Sell gets fulfilled if not it's considered "on float". The float can be there for 1 day or even for 15 days depends on Bear conditions of the market.

But at the same time the predictive model **may** recommend the same stock again after 5 days with a different stop loss percent and number of shares.

So quantopian pipeline should handle the open positions accordingly within 2 different scenarios of stop loss :

- a. For stocks which did not exceed 0.25% of Unrealized Gain/Loss Percent (on real time) , Quantopian would continue holding it on Stop Loss Absolute terms. Positioned initially when the stock was bought.
- b. The stop loss techniques changes gear (from Stop Loss Absolute to Trailing Stop Loss Percent) when stocks exceed 0.25% of Unrealized Gain/Loss Percent (on real time), Quantopian would hold them on Stop Loss Trailing Percent where the Milking Technique begins. Trailing stop percent will continue TRAILING within the milking technique steps as mentioned above. The previous stop loss absolute amount as set initially with then get cancelled.
- c. The moment the Unrealized Gain / Loss Percent (On real time) goes to the next step as shown above, the Trailing Stop Percent will get amended with the new percent.
- d. And this technique continues till the Trailing Stop Loss Percent reached step 5 as shown above. If not it exits on the basis of Trailing Stop Percent at any step mentioned above.

It is mandatory to ensure the above 4 points are executed correctly for all stocks which are "On Float". Extra caution would be needed to ensure there are no shorting at ANY given time of trade execution. In WGS strategy it's only directional trading, which is ONLY BUY.

MEASURE of Successful coding and Disclaimer:

Programmer will not be accountable for the strategy. Returns (ROI) from this strategy will be totally outside the scope of the programmer.

But the programmer will be responsible to ensure the following :

- a. Codes written in Quantopian will have to be explained with # - so that going forward it's clear what each sections are doing and can be easy to troubleshoot.
- b. No errors in executing the strategy in Quantopian while back testing or full back testing.
- c. No error in API while connecting with Interactive Broker. The programmer may use their own paper trading platform (Quantopian or Interactive Broker) or ask WGS to provide the same during the testing phase. Can be decided later.
- d. At the time of delivery all functionalities mentioned in this document will be validated with different scenario testings using WGS Quantopian and Interactive Broker Accounts (paper and live). All scenario tested WITHOUT ERRORS would be **considered successful** completion of this project.