Quant SC

Tuesday, March 2nd

Brain Teaser

Snowflakes are falling on the ground one after another. A particular snowflake is stellar with probability p if its previous particle was also stellar, and with probability q if the previous one was not. If you catch a random snowflake, what's the probability that it is stellar?

A: q / (1 - p + q)

Let x = P(the snowflake caught is stellar)

Then, P(the last snowflake was stellar) = x

P(the snowflake caught is stellar) = x = x*p + (1-x)*q

Thus, x = q / (1 - p + q) = P(the snowflake caught is stellar)

Recap from Last Week

- Build something interesting and different
  - Keep it simple
- Leadership structure
- Social events
- Have fun!

Survey Debrief

- Workshops otw
- Github resources
  - Create PRs to contribute
- Speakers/recruiting
  - CMU quant event
  - outreach!

Quant Share

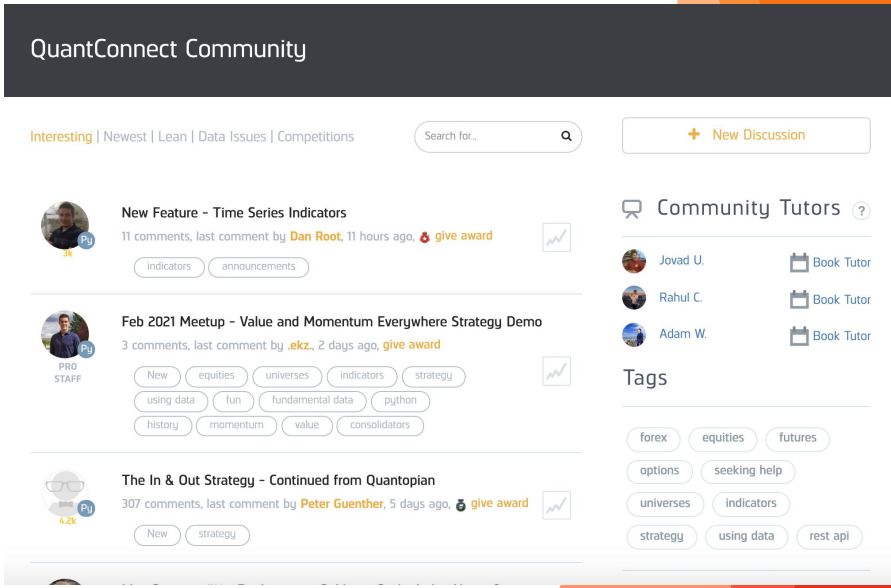
Richard Zhang

Intro to Implementation

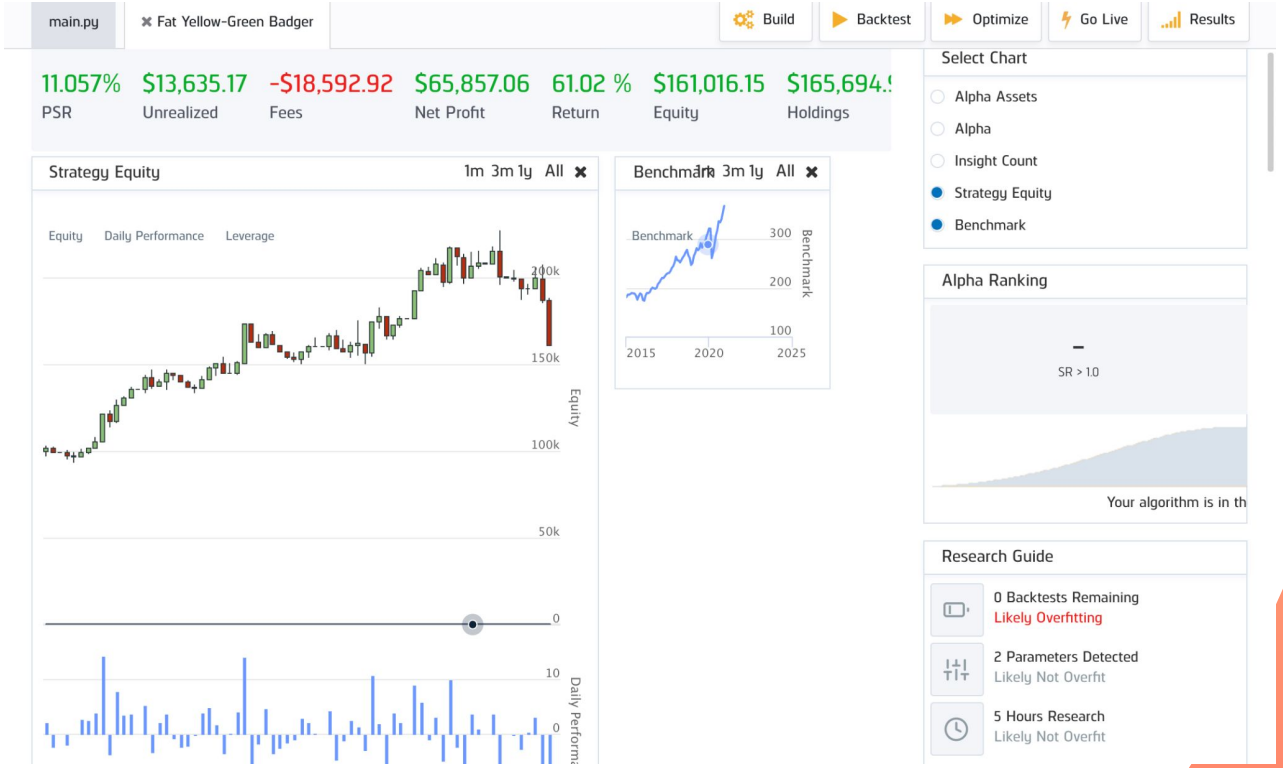
What is Quant Connect?

- Backtesting, paper trading, live trading
- Data feed
- Forums and algorithm frameworks

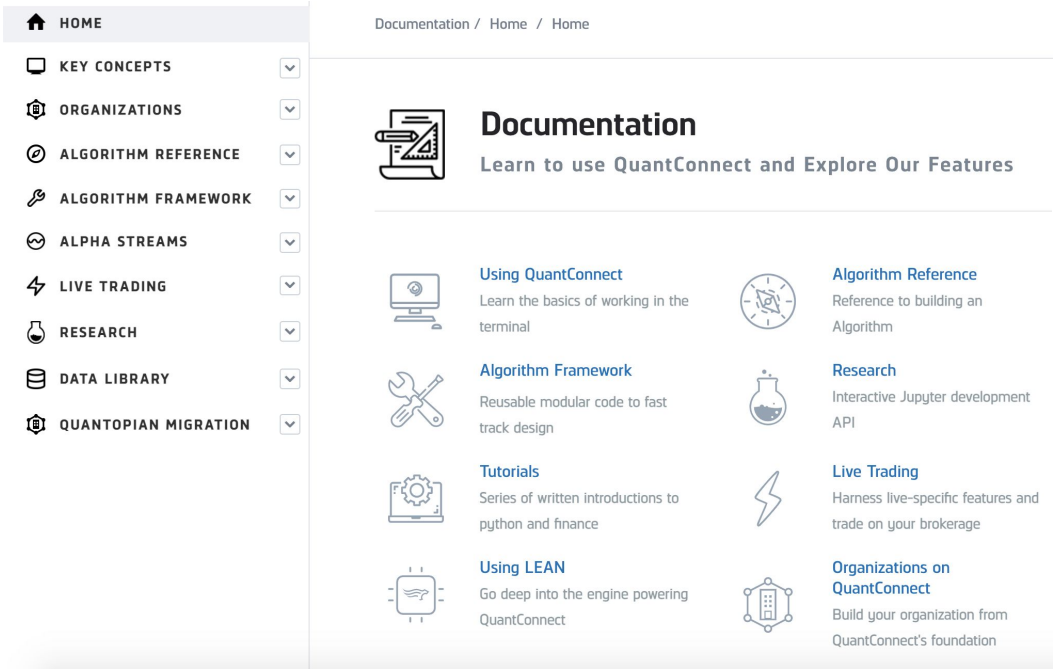
- Alpha Streams



Backtesting Display



Documentation



A Basic Algorithm Framework

1. Universe Selection
   Pick assets to trade
2. Alpha Creation
   Create trading signals
3. Portfolio Construction
   Set the targets for each asset to hold
4. Execution
   Execution method to reach targets
5. Risk Management
   Set logic to liquidate elements of portfolio during poor performance

Initialization

Topics to consider

- Start/End dates for backtesting
- Starting capital
- Positions, position concentration
- Scheduled functions
- Equities to track

Data

Options

AddOption
OptionChain
- AddOptionContract
- GetOptionContractList

SetFilter

Fundamental

Financial Statements
Industry Classifications
Third Party API Requests

Prices

AddEquity
Universe Selection

Universe Selection

AddUniverse

Coarse and fine selection

AddEquities

Trading

Explicit orders

SetHoldings(ticker, weight)

Liquidate(ticker)

Order Type	Summary
Market Order	self.MarketOrder("IBM", 100) Send a market order for 100 IBM at market price
Limit Order	self.LimitOrder("IBM", 100, 21.67) Submit a limit order for 100 IBM @ $21.67
Stop Market Order	self.StopMarketOrder("IBM", 100, 21.67) Submit a stop limit order for 100 IBM with stop price of $21.67
Stop Limit Order	self.StopLimitOrder("IBM", 100, 21.67, 22.00) Stop limit order for 100 IBM, stop price $21.67, limit of $22.00
MarketOnOpenOrder	self.MarketOnOpenOrder("IBM", 100) Market on open order for 100 IBM
MarketOnCloseOrder	self.MarketOnCloseOrder("IBM", 100) Market on close order for 100 IBM

OnData

- Rebalancing & Risk Management
  - New stocks, new weights
  - Error-checking
    - Delisted stocks
    - (Trailing) stop losses

```
    self.AddEquity("IBM", Resolution.Hour) ## Subscribe to hourly TradeBars

 def OnData(self, data):
    ## You can access the TradeBar dictionary in the slice object and then subset by
symbol
    ## to get the TradeBar for IBM
    tradeBars = data.Bars
    ibmTradeBar = tradeBars['IBM']
    ibmOpen = ibmTradeBar.Open      ## Open price
    ibmClose = ibmTradeBar.Close    ## Close price

    ## Or you can access the IBM TradeBar by directly subsetting the slice object
    ## (since you are subscribed to IBM equity data, this will return a TradeBar rath
er than a QuoteBar)
    ibmOpen = data['IBM'].Open         ## Open price
    imbClose = data['IBM'].Close       ## Close price
```

Flags and Scheduling Pt. 2

Use scheduling functions to set flags, then use flags to add greater control of flow to your program

- Ex: say you want to run a function weekly to liquidate your positions.
  - To do so, you can run a flagging function at the end of every day and build in logic to check if it's the end of the week
  - Then, in a liquidation function running every day, check if you should liquidate based on whether the flag is set
  - This can provide you with low-effort synchronized control over multiple functions

Team Reveals

Team 1

Lead: Rohan Sanjay

Kangmin

Alex G

Ryan

Team 2

Lead: Kai

Sagar

Alex B

Jennah

Team 3

Lead: Adam

Avi

Anuj

Team 4

Lead: Rohan Sanjay

Grace

Carson

Athena

Team 5

Lead: Steve

Tina

Rithik

Richard

Deliverable

Meet with your group and decide on what project you want to work on!