WELCOME TO COMPSOC

WEEK 6 – INTRO TO QUANT AND ALGORITHMIC TRADING

DISCLAIMER

- I AM NOT A FINANCIAL ADVISOR AND THIS SESSION IS **NOT** FINANCIAL ADVICE
- NEITHER MYSELF OR THIS PRESENTATION SHOULD BE SOLELY RELIED UPON IN MAKING INVESTMENT OR TRADING DECISIONS
- DURING THIS SESSION, THERE WILL BE **NO** MANUAL OR AUTOMATED EXECUTION OF REAL TRADES
- INVESTING AND TRADING INVOLVES RISK. PAST PERFORMANCE IS **NOT** INDICATIVE OF FUTURE RESULTS
- ANY PREDICTIONS, FORECASTS, OR OPINIONS EXPRESSED DURING THIS SESSION ARE SOLELY THOSE OF MYSELF AND DO **NOT** REPRESENT GUARANTEES OR PROMISES OF SPECIFIC FINANCIAL OUTCOMES
- YOU SHOULD CONDUCT YOUR OWN INDEPENDENT RESEARCH BEFORE MAKING ANY INVESTMENT OR TRADING DECISION
- YOU SHOULD SEEK PROFESSIONAL GUIDANCE BEFORE MAKING ANY INVESTMENT OR TRADING DECISION
- YOU SHOULD UNDERSTAND THE RISKS INVOLVED BEFORE MAKING ANY INVESTMENT OR TRADING DECISION
- YOU ARE SOLELY RESPONSIBLE FOR THE INVESTMENT AND TRADING DECISIONS YOU MAKE
- IT IS POSSIBLE FOR THE VALUE OF YOUR ENTIRE INVESTMENTS OR TRADES TO FALL TO ZERO. YOU ARE ENCOURAGED TO **NOT** INVEST OR TRADE WITH MONEY YOU CANNOT AFFORD TO LOOSE
- THE STOCK MARKET CAN BE IRRATIONAL FOR LONGER THAN YOU CAN BE SOLVENT. YOU ARE ENCOURAGED TO **NOT** INVEST OR TRADE WITH MONEY THAT YOU WILL REQUIRE AT A MOMENTS NOTICE
- YOU ARE ENCOURAGED TO SEEK PROFESSIONAL HELP IF YOU ARE STRUGGLING WITH GAMBLING

PLEASE SPEAK TO SOMEONE IF YOU HAVE A GAMBLING ADDICTION

BeGambleAware.org®

0808 8020 133

GamCare

Gambling Support **Starts Here**

PLEASE SPEAK TO SOMEONE IF YOU HAVE A PROBLEM WITH DEBT

StepChange
Debt Charity

0800 138 111

WHAT CAN I DO WITH THIS INFORMATION?

- Develop your own trading strategies
- Develop bots and scripts to automate repetitive tasks
- Absolutely nothing

- Quantitative Developer
  - Citadel
  - Jane Street
  - Marshall Wave
  - QRT
  - Rothesay
- Software Engineer
  - American Express
  - BBC
  - JP Morgan
  - Waterstones

A WORD ON ENGINEERING

- Quant Engineers
  - Develop and optimise infrastructure
  - Focus on low level development (C++)
- Data Engineers
  - Data pipelines and ingestion
  - Cleaning and processing data
- Machine Learning Engineers
  - Design, train, and deploy models
  - Work with quant researchers to turn statistical models to ML algorithms
- Network Engineers
  - Optimise the network infrastructure
  - Minimise latency between data centres, trading venues, and internal systems

WHY BE AN ENGINEER AT THESE FIRMS?

- Cutting-edge technology
  - Investment by Jump Trading into radiowave towers
    - https://tinyurl.com/33stukbk
  - Custom hardware (e.g. FPGA) to embed their algorithms next to exchange servers
- Quantifiable and complex problem-solving
- Compensation
  - Jane Street 2022 (London) - £615k
  - Quadrature 2022 (London) - £3.6 million
    - https://tinyurl.com/3sx58frd

Company Location | Date	Level Name Tag	Years of Experience Total / At Company	Total Compensation (GBP) Base | Stock (yr) | Bonus
Jane Street London, EN, United Kingdom | 23/10/2024	L1 Full Stack	0 yrs 0 yrs	£250,001 175K | N/A | 75K
Jane Street London, EN, United Kingdom | 13/10/2024	L1 Full Stack	0 yrs 0 yrs	£250,000 175K | N/A | 75K
Jane Street London, EN, United Kingdom | 05/10/2024	L1 Full Stack	0 yrs 0 yrs	£250,000 175K | N/A | 75K
Jane Street London, EN, United Kingdom | 02/10/2024	L1 Full Stack	0 yrs 0 yrs	£250,000 175K | N/A | 75K

The information provided regarding companies and associated salaries is self-reported and may not reflect reality. These salary figures have not undergone independent verification by CompSoc or Ghosal Fund.

DIFFERENT FLAVOURS OF QUANTS:

- Q-measure quants: create new pricing models.
- Structurers: create new financial products.
- P-measure quants: create new trading strategies, relying on statistical and ML approaches.
- Model validation quants: validate and test models/strategies
- Quant developers: yep. Code.
- Quant traders: apply and validate/veto algorithmic decisions.
- Risk quants: risk calculation and management.

And much more…

SKILLS REQUIRED:

- Programming:
  - C++ for high-frequency application development
  - Python for ML
  - R/Matlab/SAS for statistical analysis.
  - Git
- Mathematics:
  - Calculus
  - Algebra
  - Probability and Statistics (Basic distributions and probability, Bayesian Statistics, Regression, Hypothesis Testing)
- Financial Knowledge:
  - Portfolio theory
  - Derivatives, specific products, etc.

FINANCE TERMINOLOGY

Stock/Share

A literal share of ownership in a company that you can own.

Equity

The total portfolio value if all holdings were sold at current market rates.

Holdings

The absolute sum of the items in the portfolio.

Net Profit

The dollar-value return across the entire trading period.

PSR (Probabilistic Sharpe Ratio)

The probability that the estimated Sharpe ratio of an algorithm is greater than a “safe” benchmark.

Return

The rate of return across the entire trading period.

Unrealised

The amount of profit a portfolio would capture if it liquidated all open positions and paid the fees for transacting and crossing the spread.

Volume

The total value of assets traded for all of an algorithm's transactions.

THERE WILL BE MORE FUNKY FINANCE TERMS

IF YOU DON'T UNDERSTAND SOMETHING, PLEASE ASK!

HOW TO TRADE ALGORITHMICALLY

- Do a LOT of research
- Develop a hypothesis and strategy
- Develop an algorithm
- Backtest the strategy
- Deploy
- Profit?

QUANTCONNECT

www.quantconnect.com

HYPOTHESIS!

BUY SPY. IF THE PRICE MOVES 10% UP, OR DOWN, SELL.

AFTER SELLING, WAIT FOR 1 MONTH, THEN BUY AGAIN.

WHAT IS WRONG ABOUT THIS TRADING STRATEGY?

No consideration for price increase higher than 10%

No consideration for the whipsaw effect

No consideration for more complex tax calculations

No consideration for higher transaction costs

What if there are changes in the economic conditions during the waiting period?

NEW HYPOTHESIS!

BUY QQQ. HOLD IF THE PRICE GOES UP.

SELL IF THE PRICE DIPS BELOW 5% OF THE MAXIMUM VALUE IT HELD.

AFTER SELLING, WAIT FOR 1 MONTH, THEN BUY AGAIN.

WHAT IS WRONG ABOUT THIS TRADING STRATEGY?

A HISTORICAL EXAMPLE

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- No consideration for fundamental analysis
- No consideration for market or seasonal trends
- No consideration for macro changes
- No consideration for Japanification
- What if its just one bad day?
- No diversification
- Most importantly, there is no goal.

NOW IT'S YOUR TURN!

THINGS TO LOOK OUT FOR

Look ahead bias: your algorithm is not handling time correctly and is looking at simulated future outcomes, before the simulated present.

Survivorship bias: you trained a model with assets that are no longer available (i.e. inclusion and removals from SP500).

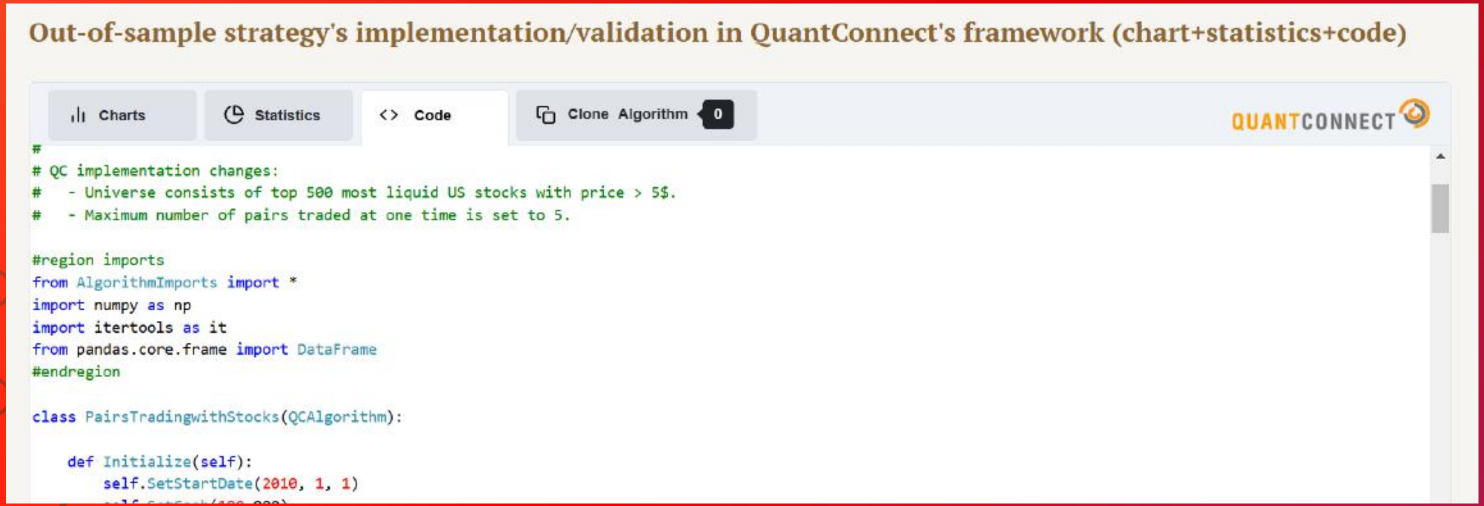
PDT Rule: FINRA requires margin accounts to hold at least $25,000 to day trade. This high entry barrier is to intentionally discourage inexperienced traders.

TAX: You will be required to pay tax in the profits you make. You are encouraged to speak with a tax advisor for assistance with your specific trades/investments.

DON'T FEEL LIKE CREATING A STRATEGY?

ID	Title of Strategy	Period of Rebalancing	Markets Traded	Indicative Performance	Volatility	Keywords
1	**Asset Class Trend-Following**	Monthly	bonds, commodities, equities, REITs	11.27%	6.87%	asset class picking, momentum, trend-following
2	**Momentum Asset Allocation Strategy**	Monthly	bonds, commodities, equities, REITs	14.49%	11%	asset class picking, momentum, rotational system
3	**Sector Momentum – Rotational System**	Monthly	equities	13.94%	18.38%	momentum, rotational system, sector picking

https://quantpedia.com/screener/?screener_tab=screener-classic



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HTTPS://GITHUB.COM/LUCOMPSOC/ALGOTRADING

WE LEARNED EVERYTHING FROM THESE GUYS, PLEASE CHECK THEM OUT!

LU GHOSAL FUND

- LINKEDIN.COM/COMPANY/LUIFS-INVESTMENT-FUND/

LOUIS

- TRADEOPTIONSWITHME.COM
- YOUTUBE.COM/@TRADEOPTIONSWITHME

QUANT CONNECT

- QUANTCONNECT.COM

QUANTPEDIA

- QUANTPEDIA.COM

QUANTOPIAN:

- HTTPS://COMMUNITY.QUANTOPIAN.COM/C/QUANTOPIAN-LECTURES

QUANTSTART

- HTTPS://WWW.QUANTSTART.COM/

FREECODECAMP

- HTTPS://WWW.FREECODECAMP.ORG/

PY QUANT NEWS

- HTTPS://WWW.PYQUANTNEWS.COM/

COMING UP!

- SOCIAL WEEK 6: KAHOOT
- WEEK 7: INTRO TO MACHINE LEARNING
- WED 13TH: ASSESSMENT CENTRE WORKSHOP
- FRI 15TH: MEAN REVERSION TRADING STRATEGY BLACK SCHOLES WORKSHOP

GOOD LUCK!!!

Lancaster University
GHOSAL FUND

BE CAREFUL WHEN ALGO-TRADING NAKED. NOBODY ENJOYS A BARE MARKET