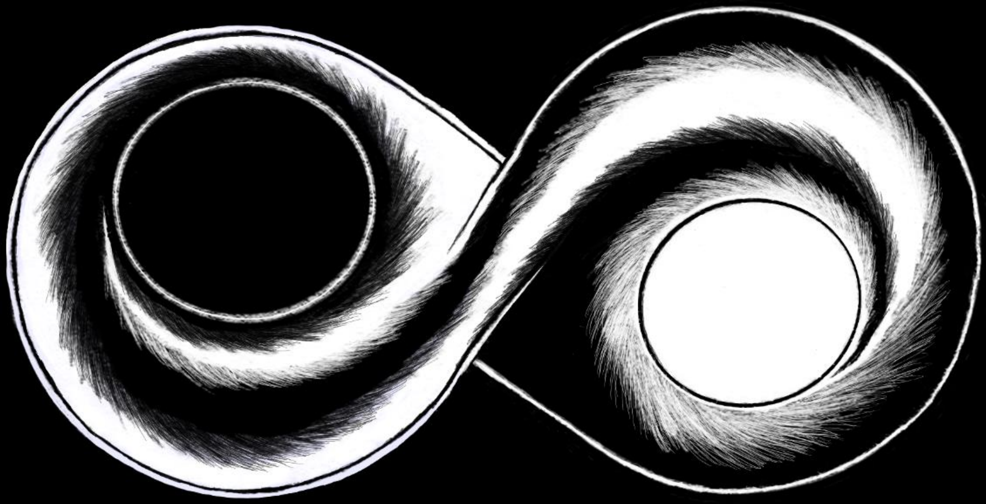

Infi-flux

In the realm of economics, product success hinges on a manager's understanding of the market where the product offers specific services. Put plainly, managers are typically tasked with addressing a set of straightforward questions. Some of these questions include the following:

- How big is the market?
- What is the structure of the market share occupied by the current players?
- And how much can we potentially make in revenue if we launch the product in the market?

This kind of question helps a manager/company to place their product strategically and in turn, helps them to gain an (competitive) edge in the market. This kind of question can be found in almost every field as an important standpoint of view where there is money is involved. What's the upper limit?

In this dialogue, we are trying to find out how much an investor/trader can make i.e Expected Returns if the person does not make any mistakes and places perfect trades every single time. This dialogue will give a guesstimate of the upper limit on the expected returns that can be made in particular instruments listed on any stock / Financial market around the world with a particular sentiment as bullish or bearish. Assumptions we made while designing this game are that the trades/orders placed by the game/algorithm are perfect every single time. And the trades are non-overlapping. Meaning, that when a trade is placed, no other trades are placed in that particular interval, not even a partial portion of the interval. For example, if a trade is placed from 9:30 to 10:00 a.m., no other trade is placed during that time. Not even a partial trade-like time range of 9:50 am to 10:30 am was also avoided.

Before we begin, we need to disclose that we have divided this dialogue into 2 major modules. Module 1 is very useful for intraday traders. Module 2 is designed for long-term traders after this module. For long-term traders.

Below is the link to the game / colab notebooks where the codes are written.

https://colab.research.google.com/drive/1m--OCPH1aMGt5CEDFaZ4LguOxPLrXHFm?usp=sharing

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Module 1

So like any other game, this game has some rules to follow. There are some prerequisites for this game. Those are

- We are going to retrieve data from Yfinance, a popular Python library that allows programmatic access to Market data, Please visit their site https://finance.yahoo.com/. For us, the requirement is Interval and window.
    - For intraday purposes, -> the interval would be less than a day. (1m, 2m, 5m, 15m, 30m, 60m, 90m, 1h).
    - Every row of the data we are collecting will be a single candle of that interval, and the window is a collection of candles. The significance of the window means how long the trader spent in the market per trade and this duration is kept constant for every trade. CONSTANT time of execution for every trade.
    - For example: if the interval is 1 minute and the window is 30, that means the trade placed is 30 minutes long. If the interval is 2 minutes and the window is 30, that means each trade placed in the games is 60 minutes.
- Brokers/Exchanges have their Intraday square of time of their own. And closes earlier than the market closes, and some are considered active in terms of liquidity, and volatility during the market opens. So we kept one more parameter called intra_start and intra_end.
    - Intra_start: Skip (x) amount of candles as the day starts while considering the entering trades for the entire day. If the interval is 1 minute and intra_start is 10, 10 minutes of the day from the start will be skipped in consideration of calculation.
    - Intra_end: similar to intra_start but skip the candles at the end of the day. if the interval is 1 minute and intra_end is 10. 10 minutes at the end of the day will be removed. If the market closes at 3:30 and the interval is 1 minute. The trade will be placed till 3:20 pm.
    - You are free to control any parameter of the game according to your requirements.
- Constraints of Yfinance: data_days: Yfinance provides data for certain periods like 30 days for a minute data and 60 days for 2 minutes. These values are subjected to changes from Yinance. Provide this data in data_days.
- The trade_no: This parameter deals with how many trades you are going to make each day. And this parameter is kept constant every single day.
- The last parameter is the ticker_symbol, For a list of all the instruments listed on your stock exchanges. Visit your domestic stock broker's websites as they provide a comprehensive list of all the instruments and they all keep track of which instruments follow required government regulations of stocks that are to be followed by the specific governance in respective Finance sectors. And then Visit the Yfinance site **https://finance.yahoo.com/** to get their version of the ticker_symbol, As Yfinance operates globally, there is ambiguity in identifying different instruments around the globe. Yfinance uses its own classification concerning the stock exchange codes at the end of every respective instrument followed by a dot. Now without further ado, let us begin.

The game is plain and simple and is divided into 4 parts for a particular Instrument.

- Retrieving the data.
- Calculate every trade possible for each day.
- Get top non-overlapping trades for each day.

- To keep matters as simple as possible, we have used Mean (Average) as our aggregator. This conceptually will give a guess of what is upper limit or Expected Returns to generate output. Simplified below.

The game is programmed in Python. Each function is designed for one of the above tasks.

1. Retrieving the data.

   get_data(ticker, interval, data_days)

   This function gets the data from Yfinance, where one needs to provide the above parameters.

2. Calculate every trade possible for each trade.

   get_all_trades(window, df, intra_start, intra_end)

   It calculates every single trade for each candle using window property.

3. Get top non-overlapping trades for each day

   get_top_n_trades(trade_no,targets_dic)

   Get n top trades for each day using trade_no parameters.

4. Aggregators

   1] get_avg_top_n_trades(target_dic,trade_no),
   2] get_avg_top_n_trades_weekdays(target_dic)

   There are 2 versions of aggregators.

   The simple first one calculates the average of all trades done on each trade to give a guesstimate of the highest upper limit (best) possibility or Expected Return that could have been achieved for any day in the data provided.

   The other version does the same but for weekdays. It takes all specific days together and then performs aggregate. To simplify, it collects dates that occurred on Mondays, Tuesdays, Wednesdays .. so on, and then performs the aggregates giving the best estimate possible for the trade to have the best possible upper limit or expected Return for each particular weekday on the provided weekdays and then takes the average.

   Disclaimer: Codes are written by a Human being, so the game played is prone to errors. Please use your logic and feel free to edit and try out your version that caters to your requirements.

Outputs for both versions of aggregators are given below with respective Input parameters.

The simple aggregator - >

```
{
  "buy":{
    "0" : 92.73263888888889,
    "1" : 67.90755208333333,
    "2" : 52.046223958333336,
    "3" : 41.811848958333336,
    "4" : 26.041883680555557,
    "5" : 21.624348958333332,
    "6" : 8.09375,
    "7" : -5.401041666666667
  },
  "sell":{
    "0" : 108.32942708333333,
    "1" : 79.45768229166667,
    "2" : 62.911458333333336,
    "3" : 47.213541666666664,
    "4" : 35.688151041666664,
    "5" : 27.643446180555557,
    "6" : 17.344401041666668,
    "7" : 0.019791666666666666
  }
}
```

0,1,2,3,4,5,6,7 represent 8 trades of the variable trade_no provided in the code in descending order of the payout if 1 share was invested in a particular ticker provided of the respective buy and sell sentiment provided.

The second weekday aggregator ->

```
{
  "buy":{
    "Monday":{
      "0" : 79.611328125,
      "1" : 63.7001953125,
      "2" : 53.548828125,
      "3" : 42.2177734375,
      "4" : 27.1298828125,
      "5" : 23.9296875,
      "6" : 16.4697265625,
      "7" : 2.3515625
    },
    "Tuesday":{
      "0" : 73.240234375,
      "1" : 56.8701171875,
      "2" : 50.6591796875,
      "3" : 45.31640625,
      "4" : 34.3251953125,
      "5" : 28.197265625,
      "6" : 11.625,
      "7" : -5.255859375
    },
    "Wednesday":{
      "0" : 83.6875,
      "1" : 68.5478515625,
      "2" : 44.435546875,
      "3" : 33.080078125,
      "4" : 13.4140625,
      "5" : 6.330078125,
      "6" : -7.8251953125,
      "7" : -27.89453125
    },
    "Thursday":{
      "0" : 108.03125,
      "1" : 69.88411458333333,
      "2" : 54.549479166666664,
      "3" : 48.41015625,
      "4" : 26.615885416666668,
      "5" : 25.104166666666668,
      "6" : 10.555989583333334,
      "7" : 1.8932291666666667
    },
    "Friday":{
      "0" : 132.97916666666666,
      "1" : 85.40364583333333,
      "2" : 59.536458333333336,
      "3" : 41.641927083333336,
      "4" : 29.809895833333332,
      "5" : 26.69921875,
      "6" : 10.98046875,
      "7" : 16.6484375
    }
  },
  "sell":{
    "Monday":{
      "0" : 85.607421875,
      "1" : 58.7255859375,
      "2" : 44.4052734375,
      "3" : 30.9794921875,
      "4" : 23.0107421875,
      "5" : 19.599609375,
      "6" : 9.775390625,
      "7" : -16.643229166666668
    },
    "Tuesday":{
      "0" : 104.3916015625,
      "1" : 73.375,
      "2" : 45.7763671875,
      "3" : 38.78515625,
      "4" : 30.251953125,
      "5" : 17.60546875,
      "6" : 15.1845703125,
      "7" : 3.1025390625
    },
    "Wednesday":{
      "0" : 107.7080078125,
      "1" : 85.6142578125,
      "2" : 64.7099609375,
      "3" : 48.5771484375,
      "4" : 38.3525390625,
      "5" : 28.80859375,
      "6" : 20.068359375,
      "7" : 2.35546875
    },
    "Thursday":{
      "0" : 125.87630208333333,
      "1" : 98.85286458333333,
      "2" : 94.86979166666667,
      "3" : 71.765625,
      "4" : 56.8359375,
      "5" : 53.561197916666664,
      "6" : 41.947916666666664,
      "7" : 22.440104166666668
    },
    "Friday":{
      "0" : 127.15755208333333,
      "1" : 87.60677083333333,
      "2" : 76.07682291666667,
      "3" : 53.7265625,
      "4" : 35.139322916666664,
      "5" : 24.28125,
      "6" : 2.0807291666666665,
      "7"  : -18.28515625
    }
  }
}
```

For weekdays, to make it simple in explaining the definition of the two aggregator functions, we have performed a group-by operation on weekdays, Meaning we collected each weekday whenever the day encountered and then took the average with only weekday. For example, we collected data for every Monday and took the Aggegrate.

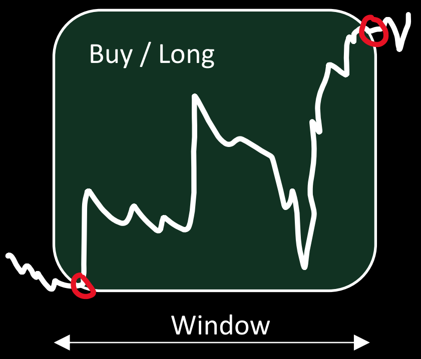
```
# input parameters for the above outputs.

data_days = 30
window = 25
trade_no = 8
intra_start = 20
intra_end = 20
interval = '1m'
ticker = '^DJI'
```

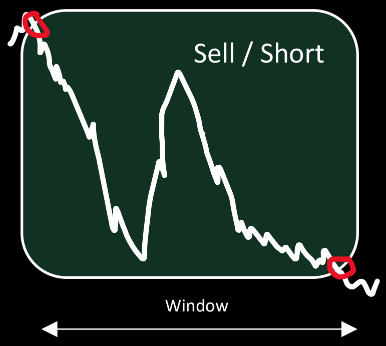
Explanation of the output.

Trade_no -> 8, hence Keys of the dictionary are [0, 1, 2, 3, 4, 5, 6, 7]

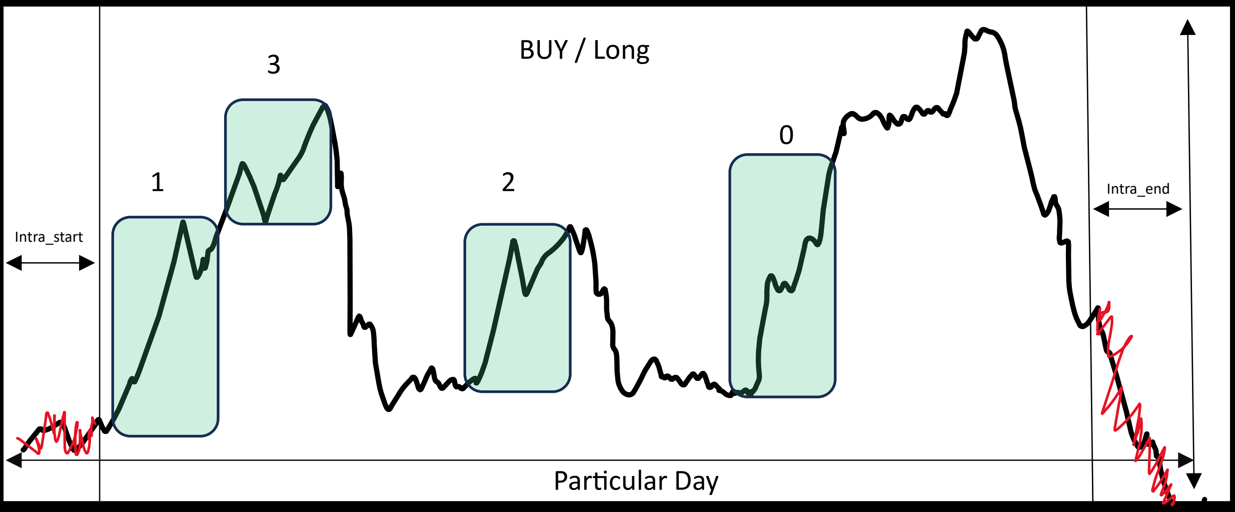
Also, the values are calculated when only **one share** is invested in the instrument.

Buy and sell represented the long and short position on the instrument taken on respective aggregators. As you noticed, the trade is arranged by the quality of a trade considering the parameters provided like the duration of the trade which is the window.





If trade_no is 4. The below diagram summarizes the whole game.



So, 4 trades [0, 1, 2, 3] (non-overlapping for particular sentiment [**trade can be overlap in-between Buy and sell sentiment**]) were picked with constant window size maximizing long position on these instruments. Please understand that the diagram is mathematically inaccurate.

This was the overall game that could be used by intraday investors/traders to gauge their market potential. Some conceptual notes.

This game can help intraday investors/purposes with

- Risk management.
- Strategy moves like time duration for a particular trade, and frequency of moments to capture by investing.
- Realistic Expectations
- Trading size and goal-setting
- Volatility, current/recent market conditions/sentiment
- Shortlisting of potential instruments.
- Improves the learning curve by comparing your trades placed with the ones this game generates and may help you improve your understanding of the trade.
- Keeps emotions in check with sentiments of constant long or constant short on instruments.
- Scaling strategy
- Portfolio management (multiple instruments).
- Diversification with the correlated instrument having the same sentiment.
- And so on. The possibilities are endless.

Before we began this project, we were faced with the dilemma of whether to focus on developing an Intraday strategy or a long-term trading strategy. We looked for common challenges and questions that both sectors are interested in. One of these questions was “What’s tomorrow? So, we ended up with our flagship products **-> DayBreak & MidDay**

Module 2

Only one parameter is added and that is Looper in #days. This parameter helps the get_data capability to loop through days much faster when you are dealing in days or month intervals. The unit of the looper is in days.

For long-term investors, a suffix is added to functions.

Those are get_data_lng(ticker, intercal, data_days, looper),   get_all_trades_lng(window, df), get_top_n_trades_lng (trade_no) #again with no overlaps.

Most of the long-term traders are hedge/pension/mutual funds, and institutional traders and have huge resources to analyze the market. We know folks have software with just one click that generates automated reports that deal with portfolio management, potential back-tested targets that could have been achieved, etc. Long-term Analysis is all about Fundamental Analysis and this requires a core understanding of the Business itself and an innate ability to see different possible futures that are possibly related to the specific industry. For Example, the Future of the Automotive Industry? Fundamental Analysis is not easy. When it comes to Financial Markets, nothing is EASY. But we believe that correct updated knowledge will help investors to navigate through a chaotic financial market/system. We will not go in-depth with fundamental analysis or technical here. But what can we do here is what could be achieved with this game of curiosity for long-term traders.

- Volatility
- Strategy Refinement
- Realism Check
- Market/Sector sentiment
- Clear and check your past Assumptions that you had with particular instruments but refused to invest as you may have deemed too Risky.
- Continuous learning
- Learning Curve
- Risk Return trade-off and potential losses are also visible in all_trade functions.
- Instrument comparison
- Portfolio Creation
- Systematic/unsystematic risk management
- Movement of different Industries.
- One can build correlation modules with different types of Instruments and Industries.
- Supply and Demand state analysis by different Instruments and industries.
- Current market Sentiment and its moment.
- See the effects of dividends distributed on the market.
- Pattern Recognition by core fundamental analysis like stock splits, dividend
- Portfolio Diversification.
- Effect of News Sentiment on Instruments.
- Using advanced techniques like Kelly and Monte Carlo to further Refine Capital Allocation.
- Economic Indicator Correlation by checking for particular timestamps.
- Momentum and mean Revision analysis.
- The margin of safety.
- Market Efficiency
- Stress Testing
- Major Governance changes correlation or impacts. Regulatory Changes.
- Leverage and Risk Exposure
- Modern Portfolio theory (efficient Frontier)
- Arbitrage cases search
- Factor investing.
- Trend following
- Event-Driven impacts
- Passive Investing
- Distressed Asset Investing
- Paris Trading
- Sector Rotation
- Liquidity Provision (entry & exit scenario)

The above points could be achieved by constructing bases by tuning the parameters like time duration, no of trades, and different timeframes of this Game. And some external data collection. We have only used MEAN. More applications of GOC are possible If complicated concepts are introduced like probability distributions, etc.

This game helps you get an idea of targets based on a simple strategy that depends on the number of trades, duration of each trade, etc. If you are proficient with coding, you can mix in the concept of different probability distributions, and apply for different durations for each trade and the frequency of those trades, omit the days where you do not trade, and develop more advanced Games that represent close to your trading/investing habits. The Game of Curiosity was developed keeping the generic mentality of investing/trading ecosystems.

Please subscribe to our newsletters under our guide section to get updates related to our innovative products and free updates like these documents.

References:

1] https://www.investopedia.com/terms/s/stop-lossorder.asp

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We wish you the best.

Happing Investing

Hope this helps

Thank you

Be careful

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