

Infi-flux

Vision: Make everyone interested in Financial markets.

You can view our website's About section where our Vision statement is mentioned. Reading this statement, to get everyone interested in Financial markets, we (you) should at least know something about the Financial/stock markets. So, the question to be asked is what does it take to know about Financial/stock markets, the basic requirements, and qualifications to survive and grow in Financial markets?

The answer to this simple question is a complex one. What are the prerequisites? Like Education and knowledge requirements. It includes understanding types of instruments of the Financial market like stocks (equity), bonds, MF, ETFS, etc. Concepts of dividends, interest rates, inflation, compounding, and much more. How these factors holistically shape the economy and Financial markets. Concepts of corporate finances, ability to model future cash flows of a firm, risk-return trade-offs, asset allocations, diversification, Demand, and supply concepts, the system of Financial markets itself, how instruments are traded, the role of Exchanges, Individual investors, type of investors, and what they think of the markets. Basically what others think of the demand for each instrument. Ability and skill to read balance sheets, income, and cash flow statements to understand past, and present and to guess the future performance of the particular company while keeping in mind the competitors and external factors related to that company, like possibilities of pure disruptions. Then there is something we call level 2 in this dialogue, Fundamental and technical analysis. These two fields have still been researched. And folks trying to come up with their version of their strategy. More requirements can be big economic indicators like GDP, unemployment rates, inflation rates, interest rates, and the currency market itself. Also, one needs to have an understanding of human psychology to guess the behavior of the investors and what their next move is going to be. Also, able to guess the overall sentiment of the market. And the list goes on. And believe us, the list does not stop. Financial markets are chaotic and continuously evolving. Exhibiting behaviors that are never seen before. Concepts that were uncorrelated before are now perfectly correlated today. Vice versa is also a possibility. Most of the time partially correlated. For one to guess the Financial markets, one has to be on toes to keep track of these variables. To summarise this dialogue. Study the past, know the present, and guess the future.

By asking this question, we do not want to inflict fear that the Financial markets require such a knowledge base to survive or grow. But we also do not deny the fact that "it's not an easy task to gain an understanding of the Financial markets". The next question for someone who wants to start getting interested in the stock markets is what is the cost in terms of time and money for the knowledge that one has to pay to acquire the above knowledge base? The answer is, It's some degree probably a bachelor in economics, commerce, or Finance. But if we talk about in-depth advanced requirements, then a professional certification like CFA, FRM, CFP, CMT, or a Master in Business Administration (MBA) full-time course which spans 2 years. The requirement for the MBA is a bachelor's degree which is at least four years in most countries. Most of the Prestigious MBA degrees require a work experience of at least 2 years in a full-fledged corporate firm. The requirement for a bachelor's degree is a high school diploma and some entrance examination preparation in most countries with language proficiency. A high school diploma requires good performance in common subjects and is generally completed around 18-19 years of age. If we sum it up from here to the end of the MBA degree. It's 1-2 years for entrance preparation + 4 (bachelor's) + (2 work-ex) + (2 years MBA) and still, the student does not have the practical capabilities to apply to the market. It takes at least 2 more years to learn about the knowhow of the Financial markets and how to apply the knowledge gained during the degree studied. So, to sum it up, a journey of 10-11 years. A decade of struggle just to know the basics of how Financial markets work. This is just the time; we won't even try to guess the monetary cost and the ruthless competition one needs to face. Even after this kind of struggle, the fact is they are not even considered

professionals in this industry. And can predict the market with 60-65 % accuracy for individual instruments, forecasting and maintaining a portfolio is another beast. It's a say in the market that it takes 5-10 years of industry experience to be called a Financial markets professional who has handled other investor's funds. If one searches what is the ratio for the population of people who do the above analysis for the Financial market with the overall population? The guesstimate will come out to be 0.1% to 0.5% or maybe it's even less. We may be wrong with this estimate but the point here is It's rare.

Once again, we do not intend to inflict fear in the hearts of folks who are not a part of the above particular fields discussed. So, one may ask two questions which first being, are there any disadvantages if one is to just start showing interest in the Financial markets? and have no idea at all. And second is if it is even worth showing interest. We will try to answer the second question first. The Financial market has the ability to influence and affect the livelihood of the people living in the economy it caters to. If Financial markets were living being, the favorite dialogue of that being would be "I am Inevitable". Do this activity, go to the nearest grocery store, and make a list of your favorite products. And check how many of them or their parent companies are listed on stock exchanges. While deciding the price of those products, One factor of how much demand/money is invested in the company is considered to produce, maintain, and improve that product on a large scale. This is the reason we believe that one should show some interest in stock markets. Back to the first question. The answer to that question is Yes. Most folks suffer losses when entering the market with no experience.

So, the next question in line is how to gain experience and avoid or minimize the disadvantages, losses, and risks! We would like to use an analogy from the past. If we consider the feudalism era. There was not much of a difference in terms of achieving/acquiring education. The ones who had privileges, means, and time to achieve the knowledge base required to fight wars were the kings and nobles. The population ratio would be similarly discussed above. This education not just included physical militia training, but tactics, warfare, governance, and so on. The common man at the time was provided with limited access. Still, wars were fought anyway by kings and common folks alike side by side for their kingdom. The question here is how common folks learned how to fight. The answer is this simple phrase.

The Best Way to learn how to fight Is In the battle itself.

This was the only option available to the common man when forced to fight for their land, for the king on a battlefield. This strategy is a double-edged sword. If a person with no experience goes all in toe to toe with an enemy having more experience is bound to lose their life on a battlefield. Instead of going all out on a battlefield. Common folks were assigned to small battalions and in that troop, some of the soldiers were experienced. The tasks were divided among the troops in most scenarios where common folk's main purpose in a battle was to survive, minimizing as much damage inflicted upon them by their enemies and simultaneously gaining experience that ensured survival and growth in the ranks of the army. It's the same concepts of survival, the same structures but in our case different systems at different times.

Now, we do not claim to be those experienced soldiers in those troops. We are self-proclaimed researcher-s still in uncharted territories/waters trying to figure out where we are. The only things we could provide you, are our findings in the form of opinions at a particular cost, and references to established proven or ongoing research by others, and publicly available resources that we feel are good enough to get started. There will be errors. Some things are bound to go wrong as we are discussing an evolutionary system where the sentiment of the Financial markets could change in real-time.

Now we are going to introduce 2 more modules. The first one is how one can leverage our products in the form of numerical and the second module is hypothesis testing. To develop and prove the truth fullness of an argument such that is it true and applies to a particular instrument of the stock markets.

MODULE 1:

Kelly Criterion

Kelly Criterion is a Mathematical formula simply referred to as Kelly named after its creator John L Kelly^[1] a researcher at Bell Labs, who introduced the concept in 1956 in a paper "A New Interpretation of Information Rate". The formula is used in gambling and investment management to find the optimal size of gambling bets, and investment i.e. bankroll to maximize long-term growth rate^[2]. In simple words, we are going to look at the aspect of position Sizing in Financial Markets, and Kelly's criterion happens to be one type. Please visit Risk Management in our guide section.

If someone wants to understand the workings of Financial markets then, for some Financial markets cannot be a one-time scenario where you go all in in the market, make some money, and be done with it. In that case, one is gambling, going all in strategy even in poker requires a lot of luck factor. And try to understand this, when someone goes all in, that means you want the other player to either fold or set them for a stand-off where either I win and everybody loses or the other way around or you are 100 % sure you are to win. There is a reason why there are terms called shares in stock markets. Where profits and losses are shared among each other. The module is going to answer some simple questions. For example -> How much to invest for n periods(trades)? N can be the combined moves of entry and exit for a Financial market in each period where position type can be long or short. This is partially what you call Position Sizing, a part of risk management.

The formula is simple.

Note. There are two versions of the Kelly formula. One for gambling and one for investment. The difference in both formulas is because of the nature of loss. In gambling, it's the binary bet where the loss is -100%. But not in the case of the practical world of investment. So the formula for investment purposes is

$$Kelly \% = \frac{W}{A} - \frac{(1-W)}{B}$$

Where W is the Win probability. B is the profit of a win in the event of a win and A is the potential loss in the event of loss. The proof is quite difficult but with clear fundamentals of mathematics, it's easy large confusing part is why the worth of the portfolio is considered geometric. Remember, the investment type considered here is compounding which in nature is multiplicative, not additive. Whatever the profits are reinvested Capital. Kelly % is the portion of the investment to be used where the growth rate of the portfolio is maximized. Many versions of Kelly's formula have confused the hell out of the masses online. But for this version of the formula mentioned above, look in the advanced mathematics section of the reference provided. Edward O. Thorp provided a detailed discussion of the formula where in that section. They arrived at the same formula provided above. But with one additional condition. There is a limit to the number of successes when the total number of trails goes to infinity. That means the N number of trials should be very large.

To further improve your investment decisions, you can play with the above formula. When you have the Kelly %, simulate it on a computer programming language and see how the portfolio grows.

Python code generated using free AI online.

```
def kelly_criterion_simulation(win_probability, profit_percent, loss_percent, periods):
    bankroll = 1000 # Initial bankroll - Change as required
    kelly_percent = (win_probability / loss_percent) - ((1 - win_probability) / profit_percent)

for period in range(1, periods + 1):
    investment = kelly_percent * bankroll
    if investment > bankroll:
        investment = bankroll # Ensure not to invest more than the bankroll

outcome = "Win" if (period / periods) <= win_probability else "Loss"
    if outcome == "Win":
        bankroll += investment * profit_percent
    else:
        bankroll -= investment * loss_percent

print(f"Period {period}: {outcome}, Investment: {investment:.2f}, Bankroll: {bankroll:.2f}")

kelly_criterion_simulation(win_probability=0.65, profit_percent=0.20, loss_percent=0.10, periods=10)</pre>
```

To use the above module, you need to do a few things, you need to come up with a strategy of **where** and **when** to enter and exit concerning instruments of the Financial/stock market. Assume the percentage of win probability. After assuming, for being on the safe side subtract that win rate even more. Calculate the portion of the investment using the Kelly formula if you are repeating the process for N times. And to manage risk even further Use Stop Losses in case your investment decision turns out on the bad side. Moving on.

To get an idea of different possibilities to get a particular profit or loss? Combine the above Kelly model with Monte Carlo Simulation^[4]. We won't discuss Monte Carlo here. Please refer to the reference. It's straightforward. Code for Monte-Carlo-Kelly simulation. Python code generated by free AI is provided on the next page.

We also have developed a simple implementation in Python for better explanation. Please check it out. The below notebook is not a practical implementation but a theoretical one. The practical implementation of the entire G-BIA is explained in G-S-B.

https://colab.research.google.com/drive/17rLYSAnRHCFVsjroxzNWedvA68cO8Byl?usp=sharing
https://colab.research.google.com/drive/17rLYSAnRHCFVsjroxzNWedvA68cO8Byl?usp=sharing
https://colab.research.google.com/drive/17rLYSAnRHCFVsjroxzNWedvA68cO8Byl?usp=sharing
https://colab.research.google.com/drive/17rLYSAnRHCFVsjroxzNWedvA68cO8Byl?usp=sharing

```
import random
def kelly_criterion_simulation(win_probability, profit_percent, loss_percent, periods):
  bankroll = 1000 # Initial bankroll
  kelly_percent = (win_probability / loss_percent) - ((1 - win_probability) / profit_percent)
  for period in range(1, periods + 1):
    investment = kelly percent * bankroll
    if investment > bankroll:
      investment = bankroll # Ensure not to invest more than the bankroll
    outcome = "Win" if (period / periods) <= win_probability else "Loss"
    if outcome == "Win":
      bankroll += investment * profit_percent
    else:
      bankroll -= investment * loss_percent
  return bankroll
def monte_carlo_kelly_simulation(win_probability, profit_range, loss_range, periods,
num simulations):
  best_bankroll = 0
  best_profit_percent = 0
  best loss percent = 0
  for _ in range(num_simulations):
    profit_percent = random.uniform(*profit_range)
    loss percent = random.uniform(*loss range)
    bankroll = kelly_criterion_simulation(win_probability, profit_percent, loss_percent, periods)
    if bankroll > best_bankroll:
      best bankroll = bankroll
      best_profit_percent = profit_percent
      best_loss_percent = loss_percent
  print("Optimal Kelly Criterion Parameters:")
  print(f"Win Probability: {win_probability}")
  print(f"Best Profit Percentage: {best_profit_percent:.2f}")
  print(f"Best Loss Percentage: {best_loss_percent:.2f}")
  print(f"Best Bankroll: {best_bankroll:.2f}")
win_probability = 0.60
profit_range = (0.10, 0.30) # Range of profit percentages (from 10% to 30%)
loss range = (0.05, 0.20) # Range of loss percentages (from 5% to 20%)
periods = 10
num_simulations = 1000
monte_carlo_kelly_simulation(win_probability, profit_range, loss_range, periods, num_simulations)
```

To summarize Monte Carlo is trying different probabilities to find the best one or see different outcomes performance. A brute Force kind of approach. The above code is just an example. You can generate code that caters to your requirements using free AI available online. Try to solve this, Calculate the average profit-loss percentage in the above.

Some extra Notes. If you encounter a bad trade or a losing trade, it's essential to step back, relax, and re-enter the market only when you are confident in the conditions that could lead to profitable outcomes. It's strongly advised not to hastily jump back into the market in an attempt to recover losses from a previous bad trade. After thorough research into the experiences of various renowned investors worldwide, the analogy of investing in the stock market to an orchestra holds. In this comparison, investors are akin to musicians, and the stock market acts as the conductor determining the value of each instrument. The key point to emphasize is that similar to a musician in an orchestra, if an investor makes an error or misses a cue, the recommended approach is not to immediately resume activities where others currently are. Instead, the investor should subconsciously wait for the right moment, ensuring confidence and avoiding mistakes by having practiced that strategy extensively. This analogy underscores the importance of patience, preparation, and a well-practiced approach in navigating the complexities of the stock market. This was the learning available in the public domain.

Before proceeding. We would like to discuss the advanced version of techniques people use to invest in the stock market. These are fundamental and technical analyses. Fundamental analysis is commonly used for developing long-term investment strategies. This includes Financial statements, EPS, P/E ratio, Dividend yield, Growth prospects, Dividend yield, Industry and market analysis, Management Quality, external economic indicators, and competitive advantage. Pure logic and concepts of management at core levels are used to gauge a firm's health and future cash flows, profit margins, and so on. For technical analysis, It is used mostly for short to medium-term investment strategies to enter and exit the market. The basis of technical analysis is to assume that history tends to repeat itself to some extent. This technique mostly includes price charts, Trends, Support - resistance, moving averages, technical indicators, chart patterns, volume analysis, Fibonacci retracements, and so on. These techniques are mostly leveraged by intraday, swing traders to profit from small moments in the instrument of stock markets. The investment amounts used in the long term are huge compared to the short term. Folks use techniques that leverage concepts of both the above fields to gain competitive advantage. But, in the end, the stock market does not give a price to instruments that it maintains. The value, price, and demand are given by the investors themselves despite the firm suffering from debt or loss. Investors may believe that it will give profits in the future and sometimes they are true. However, we believe that instruments of the Financial/stock market get their value from how all investors think of it and what it has to offer now and in the future to the investors. Both of them go hand in hand in trying to achieve their true value in due course of time. To simplify, a firm provides certain profits and what investors think about those profits, dividends. If the demand is overpriced from the investor's side, there would be a price increase, but when the time comes when the returns do not match the expectation of the investors they will leave, resulting in achieving the true price of that instrument. And vice versa, when there is underestimated demand and returns are more than expected, investors are happy, and since it's the public domain, others want to get in on this. So true price is achieved in due course in time.

The next module is related to Hypothesis testing, it can be used easily by folks who want to try technical analysis. And can also be used for long-term strategy development for fundamental analysis. We have been online for research for quite some time, and the fields above are still in research, many folks claim some strategies that have worked for them and some offer courses, and professional advice, and many articles claim to make simple arguments. So while developing a strategy, we urge you to find

how true the underlying assumptions of that strategy are. One way to do it is by hypothesis testing and backtesting. Also, it helps an investor to test if their outlook of the stock markets is true in general. Financial Markets are evolutionary as some assumptions may be true in the past, but may not apply in the present and future. These techniques are some of the approaches to check the validity of these assumptions.

Module 2:

Back-testing and Hypothesis-testing

Python code for back testing :- Generated using Free AI GPT online


```
import numpy as np
import pandas as pd
import yfinance as yf
import talib # For calculating the RSI
import matplotlib.pyplot as plt
# Step 1: Load historical stock data for Apple (AAPL) from Yahoo Finance
stock_data = yf.download('AAPL', start='2020-01-01', end='2023-01-01')
# Step 2: Calculate the Moving Averages (MA) and Relative Strength Index (RSI)
def calculate_technical_indicators(data):
  data['MA_50'] = data['Close'].rolling(window=50).mean()
  data['MA_200'] = data['Close'].rolling(window=200).mean()
  data['RSI'] = talib.RSI(data['Close'], timeperiod=14)
calculate_technical_indicators(stock_data)
# Step 3: Define Trading Signals based on the MA and RSI conditions
def define signals(data):
  data['Signal'] = 0
  data.loc[(data['MA 50'] > data['MA 200']) & (data['RSI'] < 30), 'Signal'] = 1 # Buy signal
  data.loc[(data['MA_50'] < data['MA_200']) & (data['RSI'] > 70), 'Signal'] = -1 # Sell signal
define signals(stock data)
# Step 4: Implement a simple backtesting framework to simulate the strategy
def backtest_strategy(data, initial_balance=10000):
  balance = initial_balance
  position = 0
  for i in range(len(data)):
    if data['Signal'][i] == 1: # Buy signal
    shares_to_buy = balance / data['Close'][i]
      position += shares_to_buy
       balance -= shares_to_buy * data['Close'][i]
    elif data['Signal'][i] == -1 and position > 0: # Sell signal and holding position
       balance += position * data['Close'][i]
       position = 0
  # Sell remaining position at the end of the period
  balance += position * data['Close'][-1]
  return balance
final_balance = backtest_strategy(stock_data)
print(f"Final balance: ${final balance:.2f}")
# Step 5: Perform hypothesis testing to determine the profitability of the strategy
# Hypothesis: The strategy is profitable (Alternative hypothesis)
# Null hypothesis: The strategy is not profitable
# You can use any statistical test appropriate for your data to test the null hypothesis.
# For example, you could use the t-test or Wilcoxon signed-rank test to compare
# the final balance with the initial balance to check for statistical significance.
```

For demonstration purposes, we'll use a simple comparison

```
Initial_balance = 10000

if final_balance > initial_balance:
    print("The strategy is profitable.")

else:
    print("The strategy is not profitable.")

# Step 6: Visualize the strategy performance

plt.figure(figsize=(12, 6))

plt.plot(stock_data['Close'], label='Close Price', color='black')

plt.plot(stock_data['MA_50'], label='50-day MA', color='blue')

plt.plot(stock_data['MA_200'], label='200-day MA', color='red')

plt.scatter(stock_data.index[stock_data['Signal'] == 1], stock_data['Close'][stock_data['Signal'] == 1], marker='^', color='g', label='Buy Signal')

plt.scatter(stock_data.index[stock_data['Signal'] == -1], stock_data['Close'][stock_data['Signal'] == -1], marker='v', color='r', label='Sell Signal')

plt.leten()

plt.stite('Apple Stock Price with Moving Averages and Signals')

plt.show()
```

In the defined_signals function above, you can specify your strategy, whatever your style of investing specify the entry and exit signal of a targeted instrument of respective Financial markets, and test it if you are profitable or in loss, If you do not know how to code, many code generators will give you code that caters to your requirements. Be persistent while asking these generators, In most cases they are not accurate at first, ask them again if you find anything out of place or things you do not understand. It will give a detailed explanation of what a particular line or word of code means and correct itself. The reason for choosing Python is because Python feels like reading English, simple and beautiful. Efficient? Not on the microprocessor level, but okay in calculating investment strategies. You are free to use any. This approach is very basic when it comes to understanding the performance of a strategy that is been tested. A more complex version of how to practically develop a holistic strategy that may help you polish your style of investing can be found in the GSB document under our guide section.

Backtesting can be done for long-term and short-term where indicators are used. For fundamental analysis, you need to use logical reasoning to test the different conditions that were there back then and consider the present condition of the instrument which is a tedious process. It may include manually entering the exit-entry signal for backtesting.

One can also check if the strategy applies to different types of instruments. For different intervals, different start and end times, gain all sorts of insights like what's the sentiment of the market for different timeframes are and so on.

For Hypothesis testing: Python code generated using Free AI online.


```
Import yfinance as yf
import pandas as pd
import matplotlib.pyplot as plt
# Function to implement the RSI indicator
def calculate rsi(data, window=14):
  delta = data['Close'].diff()
  gain = delta.mask(delta < 0, 0)
  loss = -delta.mask(delta > 0, 0)
  avg_gain = gain.rolling(window=window).mean()
  avg_loss = loss.rolling(window=window).mean()
  rs = avg_gain / avg_loss
  rsi = 100 - (100 / (1 + rs))
# Function to identify overbought and oversold conditions using RSI
defidentify\_overbought\_oversold(data, rsi\_window=14, overbought\_threshold=70, oversold\_threshold=30):
  data['RSI'] = calculate_rsi(data, window=rsi_window)
  data['Signal'] = 0
```

```
data.loc(data('RSI') > overbought threshold. 'Signal') = -1 # Mark as oversold
  data.loc(data('RSI') < oversold threshold. 'Sianal') = 1 # Mark as overbought
  return data
# Retrieving historical data for Apple Inc. (AAPL)
symbol = 'AAPL'
data = yf.download(symbol, start='2020-01-01', end='2023-01-01')
# Identifying overbought and oversold conditions using RSI
data = identify_overbought_oversold(data)
# Calculate actual price movements after overbought and oversold conditions
data['Price_Movement'] = data['Close'].pct_change() * data['Signal'].shift(1)
# Separate price movements for overbought and oversold conditions
overbought_moves = data[data['Signal'] == -1]['Price_Movement']
oversold_moves = data[data['Signal'] == 1]['Price_Movement']
# Perform a t-test to compare mean price movements for overbought and oversold conditions
t_stat, p_value = stats.ttest_ind(overbought_moves, oversold_moves, equal_var=False)
# Define the significance level (alpha)
alpha = 0.05
# Interpret the p-value
if p value < alpha.
  print("Reject the null hypothesis (H0). The RSI indicator effectively identifies overbought and oversold conditions for AAPL.")
else:
  print("Fail to reject the null hypothesis (H0). The RSI indicator does not effectively identify overbought and oversold conditions for AAPL.")
```


The hypothesis is mentioned in the print statements. You can use a hypothesis-testing approach in almost any field including fundamental and technical analysis. If you ask the Free AI GPT models for hypothesis in both fields. Try to query the top 50 hypotheses for each type, you will be surprised and curious at the same time.

Thank you so much for reading so long document.

If you are starting fresh in investing. Try to answer this question first. What is a Financial/Stock market? A place for buyers and sellers to meet and trade ownership of the instruments in the form of placing buy and sell orders. And the price of that Instrument is the outcome of a Concept called Supply and Demand. In the world of Investing, The whole game is to understand and collect a list of variables that cause the change in the SUPPLY and DEMAND and to be specific in what direction for that Instrument. That's it. That list is endless. As Financial/Stock markets are forever Evolving.

Our product DayBreak & MidDay updates and outputs results for different instruments of different stock markets daily. The most fascinating thing about Financial Markets is one can never know what will be correlated to what entity at a particular time which may affect the end state of some or every instrument in those markets.

This document is the most simple basic communication to explain some of the concepts of Investing in all the documents under our guide section. The main intent of the document is to explain the concept of position sizing and Monte Carlo simulation which is explained in the Colab Notebook link provided on one of the above pages which is named Position Sizing. If missed, we humbly request you to have a read.

References:

- 1] https://en.wikipedia.org/wiki/John Larry Kelly Jr.
- 2] https://en.wikipedia.org/wiki/Kelly_criterion
- 3] https://blogs.cfainstitute.org/investor/2018/06/14/the-kelly-criterion-you-dont-know-the-half-of-it/
- 4] https://www.investopedia.com/terms/m/montecarlosimulation.asp
- 6] https://www.investopedia.com/terms/b/backtesting.asp
- 7] https://www.investopedia.com/terms/l/limitorder.asp

Hope this helps.

Thank you

Be Careful

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