

Assignment: Stock Trading and Automated Trading Readiness

Section 1: Theoretical Knowledge

Stock Market Basics

It would be very recommended that you start trading with minimum capital or paper trading at the very least, and explore by buying or selling stocks and on the way explore everything there is. Try to make profit (you may make loss, but it's okay with minimum capital). With real money, however less, you will feel the heat and the urge to find out how to make money out of it. So it is highly highly recommended that you start trading. Meanwhile try to find the answers to the questions like:

1. Explain what a stock is and how is it traded?
2. Describe the difference between a market order and a limit order.
3. What is the significance of the bid-ask spread?
4. What does the price of a stock really mean? Who is determining the price? Is there a direct link between the company working and its stock price?
5. What does a symbol mean in the market?
6. What are dividends?

For resources u can read Zerodha modules , or refer to investopedia.

Technical Analysis

You need not assume that any of the sections after stock market basics is actually important. But as you trade, you will realize that you will move towards thinking along these lines naturally. So the terms are nothing new, you need to realize that this may be intuitive. So try to reason out why people are doing what they are doing.

Define the following terms and explain their importance: **Moving Averages, RSI, MACD, Bollinger Bands.**

How can the technical indicators be used to make trading decisions?

Resource : As of now, you can do the above tasks by reading zerodha modules, but as we will progress further you have to know more about the indicators etc. For that there is a good book named:

“Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications”

The above book is not required for you to read right now. Now focus on building an intuitive understanding.

Risk Management

Humans tend to be risk averse. We do not want to lose a big percent of our money in one day right? Even if a strategy is profitable, big losses are gut wrenching. Thus risk management seems to be quite important if you think about it.

1. What is a drawdown?
2. Explain the concept of risk management in trading.
3. What is a stop-loss order, and how is it used?
4. Describe the importance of position sizing in trading.

Algorithmic Trading

1. What is algorithmic trading, and how does it differ from manual trading?
2. Discuss the benefits and risks associated with algorithmic trading.
3. Explain the concept of backtesting and its importance in algorithmic trading.

Resource : Book by **Ernest P Chan** (uploaded on the github)

Section 2: Practical Tasks

Data Analysis

The work is never always glamorous. Data fetching does have a lot of non-glamorous work. So you need to be ready to be bored haha. In this task you need to use google, and look for good data sources. Free data sources are hard to find and will have some drawbacks. Now you need to find one of these data sources, research on how to download the data (like CSV files, or API). If you need any resources, do message me I'll help you out regarding APIs. Otherwise, google is your best friend. Thus, perform the following procedure:

1. Download historical stock price data for a company of your choice using an API (e.g., Alpha Vantage, Yahoo Finance).
2. Perform basic data cleaning and preprocessing on the downloaded data.
3. Calculate the 20-day and 50-day moving averages and plot them along with the stock price.

Technical Indicators Implementation

1. Implement a function to calculate the Relative Strength Index (RSI).
2. Implement a function to calculate the Moving Average Convergence Divergence (MACD).

3. Create a combined plot showing the stock price, RSI, and MACD for the selected stock.

Backtesting a Simple Strategy

1. Implement a simple moving average crossover strategy (e.g., buy when the 20-day MA crosses above the 50-day MA and sell when it crosses below).
2. Backtest this strategy on historical data and calculate the strategy's performance metrics (e.g., total return, Sharpe ratio).
3. Plot the equity curve of the strategy over time.

Mean reversion is simple, yet very effective. I want you to reason out what mean reversion is and where it would work the best. Also, you need to understand, what's the point of backtesting? What does your brain think would be the optimal way to test out any strategy?

Section 3: Coding Exercise

Automated Trading Bot

Write a Python script to simulate an automated trading bot using the moving average crossover strategy. Since task2 covers this aspect, do not get overwhelmed. You can try out there as well or do the following tasks. It's okay, everything will alright :)

The bot should:

1. Fetch real-time stock price data.
2. Calculate the necessary technical indicators.
3. Execute buy or sell orders based on the strategy.
4. Maintain a trading log of executed trades and their outcomes.

You will find the template code in the folder as 'template.py'. Check out the code.

Section 4: Reflection and Reporting

Report Writing

Write a detailed report summarizing the steps you took in this assignment. The report need not be very formal, it just needs to convey what you have understood.

Discuss the results of your backtesting and any insights you gained. A good discussion will be vital to your growth. Reflect on the challenges you faced and how you overcame them.

Discussions between the mentees is the aim. Please don't be boring, speak up in the next meeting :)

Submission Requirements

1. Submit your answers to the theoretical questions in a document.
2. Include all code and plots for the practical tasks and coding exercise.
3. Submit your report as a PDF.

Evaluation Criteria

1. Accuracy and completeness of theoretical answers.
2. Correctness and efficiency of the implemented functions.
3. Quality and clarity of data visualizations.
4. Performance of the backtested strategy.
5. Depth of analysis and reflection in the report.

Haha feels so sophisticated reading the criteria. This is just a general guideline, main takeaway should be, is it passable if I want to realize the dream in real life? It need not be perfect, but you should be able to build upon this in the future. Thus everything should be performed based on whatever you understand, copying blindly won't help. Make use of already present abstractions, but do understand them.

Note : Whatever terms you find new in the above document, do GOOGLE IT. This assignment is aimed to cover basic concepts and code writing that will be used in our project. So please do the assignment properly. Make a note of whatever you learn, document it or add to your github if you prefer. Hopefully this is too intimidating and you give up soon :D

"The stock market is never obvious. It is designed to fool most of the people, most of the time."
— Jesse Livermore