Accuvisor

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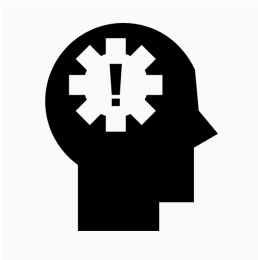
Prologue

The upper limit for being a GenZ is 26 years. At this age, most of us are figuring out what to do in terms of financial independence. Mostly, GenZ's are busy, and they also have good enough knowledge about financial instruments.

A significant problem that GenZ faces is the question "Where, when, how much should I invest?". The answer to this question varies from person to person, depending on their financial situation, goals, age, risk tolerance, and many other factors.

We will delve deeper into this problem. For that, I have divided this document into subsections: Problem, Target, Product solution, User Experience, Risks & Pitfalls, Success Metrics, and finally, Reference.

Problem



Over 7,400 companies were listed on the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) in India during 2020. With over 5,400 companies listed on the BSE. The NSE listed the remaining nearly two thousand companies.

For a GenZ, keeping track of every little detail (financial ratios, current prices, price changes, etc.) while investing in all these companies altogether is a nightmare. There is a need for some ***consulting*** for these young investors.

On the first look, personal human advisors seem like a good solution for this problem. It will be a person who has years of experience in this field and has constantly

provided excellent returns on invested capital and he/she will be dispensing advice to investors.

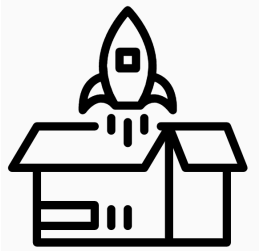
We have to consider that people aged 20-25 years have an average salary of 6.7 lakh Rupees (~2k respondents). With this salary, the monthly savings can be expected from 5 to 10 thousand Rupees. You get the issue here, right?? Personal human advisors will be very costly for someone with savings in the range of 5k-10k Rupees.

There is a need for an artificial intelligence system that can suggest stocks in real-time according to the user's needs and preferences. I have worked on many such technologies like fundamental analysis of stocks, sentiment analysis, predicting stock prices using LSTMs (Long Short Term Memory networks). I propose a product, ***"Accuvisor"*** (Accurate Advisor), with a collection of all these technologies to help users get the right stocks to buy/sell at the right time.

Target

1. Build an artificial intelligence system where GenZ investors can get accurate suggestions according to their preferences
2. The system should run and provide suggestions in real-time
3. Provide good analysed reasons about why they should follow the AI

Product Solution



I introduce to you ***"Accuvisor"***. This tool will recommend equities to GenZ based on their preferences (discussed later), real-time analysis, and a good reason for doing so.
All the pointers that ***"Accuvisor"*** will take into account are:

- ***Duration of Trade***
  - **Position Trading (buy and hold)**
    - Use of ***financial ratios***(P/E, Price-to-Book, Debt-to-Equity ratio) and company performance in ***financial statements*** with the current price.
  - **Intraday trading (buy and sell on the same day)**
    - Use of ***KPIs (Key Performance Indices)*** like CAGR, Volatility, Sharpe Ratio, Sortino Ratio, Maximum Drawdown, Calamar Ratio etc.
    - Use of ***indicators*** like ATR(Average True Range), Bollinger Bands, ADX(Average Directional Index), OBV (On Balance Volume), RSI(Relative Strength Index), Renko, Slope etc.
  - **Regular trade (buy today and sell optimally maximising profit)**

- *Risk Perception (High, Medium, Low)*
- *Specific return goals (a float number in percentage or price change)*
- *Capital size (Small-Cap, Mid-Cap, Large-Cap)*
- *Artificial Intelligence-based*

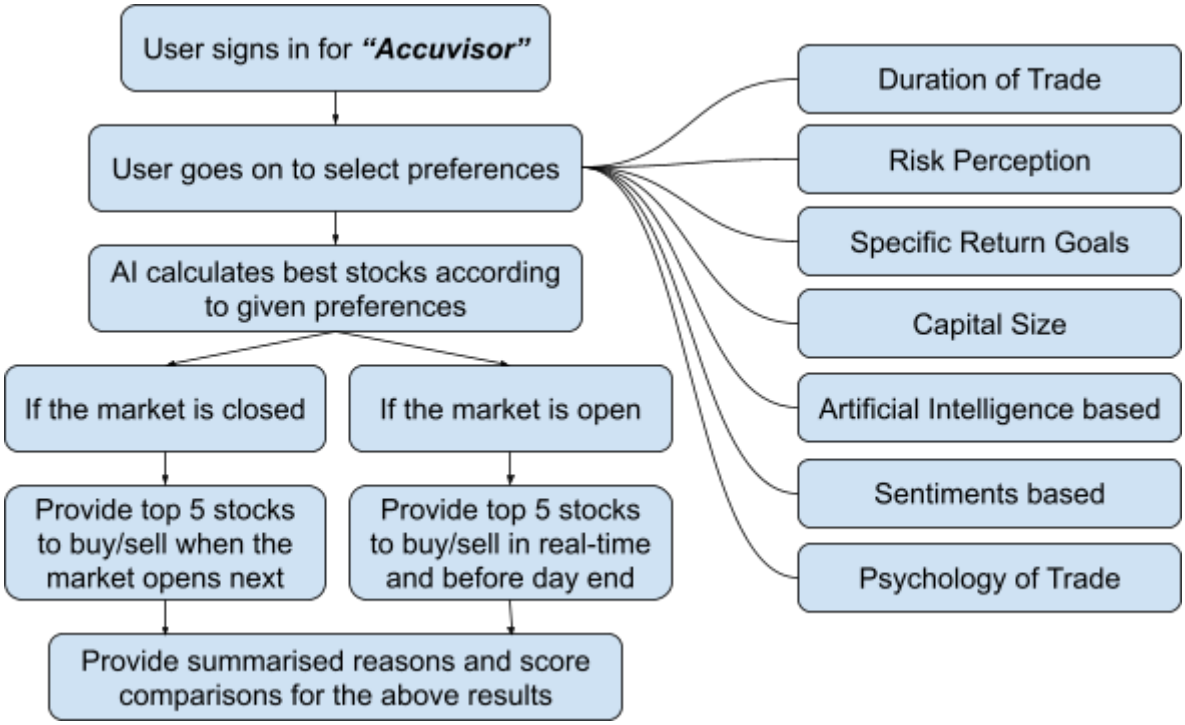
  Some of the recent researches in this field with their results are listed below:
  - **Stock market behaviour prediction using stacked LSTM networks**[1]
    - MSE(Mean Square Error) = 0.0022
  - **Forecasting stock prices with long-short term memory neural network based on attention mechanism**[2]
    - LSTM, MSE = 0.078
    - Weighted LSTM, MSE = 0.048
    - GRU (Gated Recurrent Unit), MSE = 0.045
    - Weighted LSTM with Attention mechanism, MSE = 0.038
  - **Stock Price Prediction Using Attention-based Multi-Input LSTM**[3]
    - MSE = 0.001
- *Sentiments based*

  Some of the recent researches in this field with their results are listed below:
  - **DP-LSTM: Differential Privacy-inspired LSTM for Stock Prediction Using Financial News**[4]
    - Accuracy = 0.996
  - **A Robust Predictive Model for Stock Price Prediction Using Deep Learning and Natural Language Processing**[5]
    - MAPE(Mean Absolute Percentage Error) = 5.37
- *Psychology of trade*
  - **Speculator:** a person who invests in ventures in the hope of profit
  - **Hedger:** a person who invests to protect from the risk involved in price movements
  - **Arbitrageur:** a person who invests to profit from market inefficiencies

User Experience

Let's understand this product with an example. Shyam is a GenZ, and he can save Rs. 5000 per month. He signs up for ***"Accuvisor"*** and then fills in his preferences as described in the previous section. Each choice, when hovered, will explain the meaning of it. After choosing his preference, the AI will show him five stocks to buy and sell (if he already has some equity) based on whether the market is open or closed. If the market is closed, the AI will give

results for when the market will open next. Else, the results will be real-time and before the day ends.



Risks & Pitfalls

1. AIs are rapidly improving

With new studies every day, we need to keep our AI updated so that users can gain more profits. Some examples suggest that while using outdated AIs, one can incur huge losses.

2. Slippage can occur

Any difference between the price you wanted to trade at and the price you end up trading is called ***slippage***. There will always be some differences while recommending and buying/selling equity.

3. It might be confusing for beginners

Many GenZs are just beginners with the knowledge of how financial markets work. Since ***"Accuvisor"*** considers a lot of factors on which our prediction depends, a beginner might get overwhelmed. A user-friendly platform and some financial guidance will help these users.

4. Small target population

Only 9% of the population is between 20-25 years of age. Out of these, people who are interested in investing and have basic trading knowledge are scarce.

Success Metrics

1. **Easy Initiation metrics**
   a. % first-time users initiating & opting our product
   b. % users completing the registration
   c. % increase in # people buying and selling using AI

2. **Daily Interaction**
   a. % increase in user engagement in daily updates
   b. Avg. no. of times each user opens a portfolio
   c. Frequency of buying and selling stocks per user
   d. Avg. no. of AI invocation per investment made
   e. % using AI when the market is open/close

3. **Risk Metrics**
   a. % users incurring losses after following AI
   b. Total losses due to slippage
   c. profit generated by AI to calculate efficiency

4. **Company level metrics**
   a. % increase in new users
   b. % users quitting after incurring losses using AI
   c. % increase in the total amount of stocks purchased
   d. % increase in revenue

Reference

- https://www.averagesalarysurvey.com/india
- https://www.statista.com/statistics/731969/india-number-of-companies-listed-in-nse-and-bse/
- [1] Ojo, S.O., Owolawi, P.A., Mphahlele, M. and Adisa, J.A., 2019, November. Stock market behaviour prediction using stacked LSTM networks. In *2019 International Multidisciplinary Information Technology and Engineering Conference (IMITEC)* (pp. 1-5). IEEE.
- [2] Qiu, J., Wang, B. and Zhou, C., 2020. Forecasting stock prices with long-short term memory neural network based on attention mechanism. PloS one, 15(1), p.e0227222.
- [3] Li, H., Shen, Y. and Zhu, Y., 2018, November. Stock price prediction using attention-based multi-input LSTM. In Asian conference on machine learning (pp. 454-469). PMLR.
- [4] Li, X., Li, Y., Yang, H., Yang, L. and Liu, X.Y., 2019. DP-LSTM: Differential privacy-inspired LSTM for stock prediction using financial news. arXiv preprint arXiv:1912.10806.
- [5] Mehtab, S. and Sen, J., 2019. A robust predictive model for stock price prediction using deep learning and natural language processing. Available at SSRN 3502624.