PORTFOLIO MANAGEMENT SYSTEM

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GROUP ID : 37

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MOTIVATION

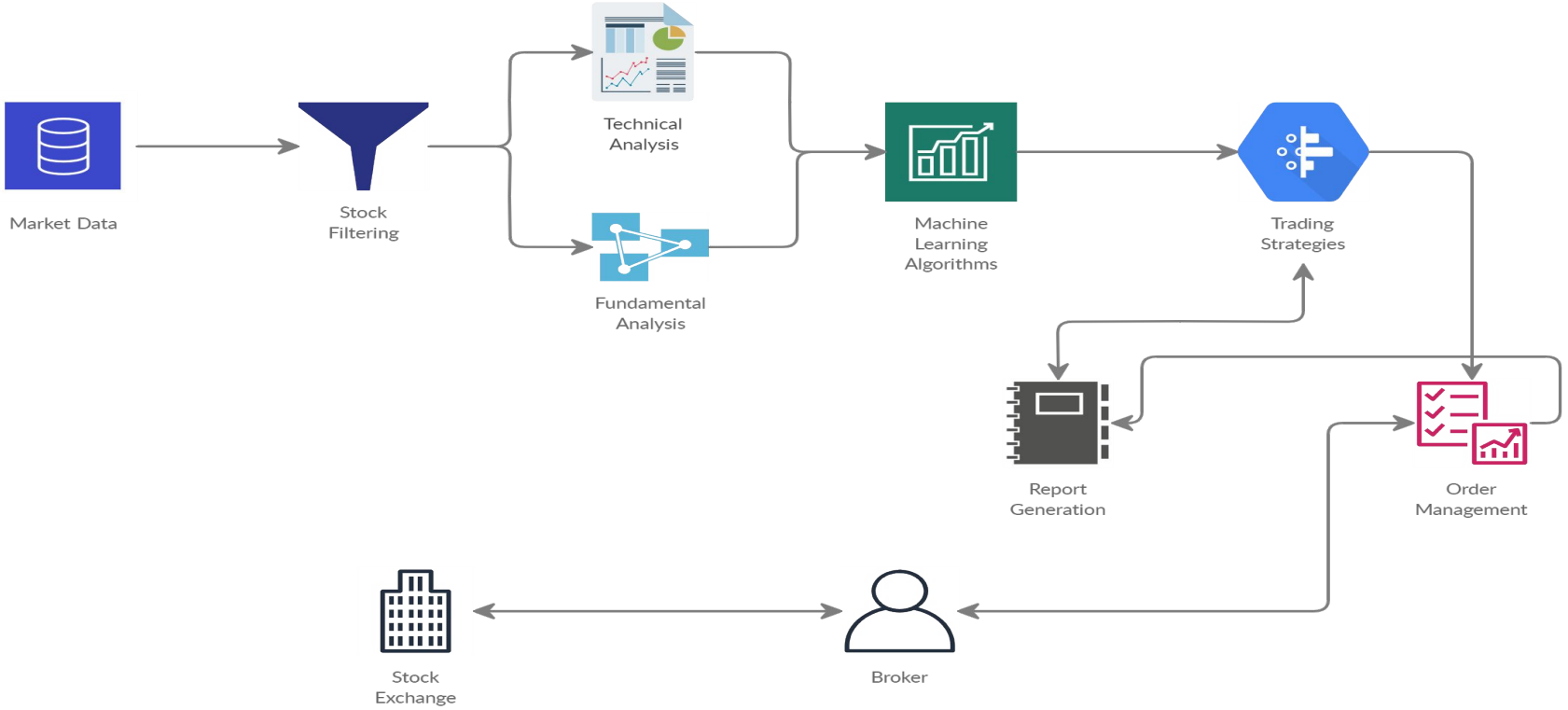
- In these unprecedented times many people have lost their wealth because of wrong investment decisions made, which are encouraged by human emotions.
- A strong system built on back-tested data would drive away human emotions and help people to make the right investment decision purely based on algorithms and statistics.
- Less than 1.5% of people in India invest in the stock markets and the majority lack knowledge in terms of the right stocks to invest and how to manage their portfolios efficiently.
- Our aim is to build a strong portfolio management system which would encourage more people to invest in the markets and make the right investment decisions.

PROBLEM STATEMENT

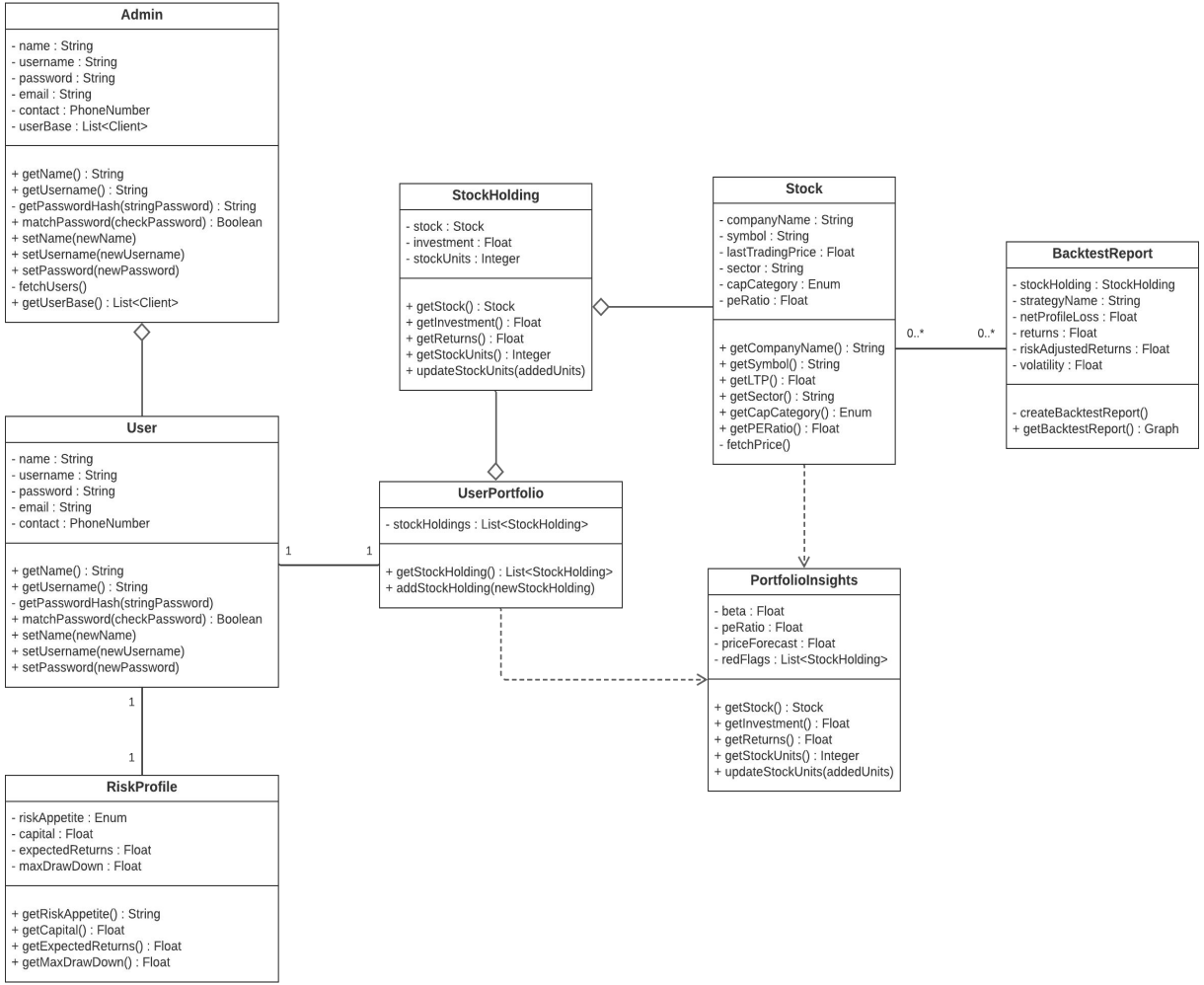
Design and create a portfolio management system which aims to :

- Maximize the alpha (returns) and minimize the risk.
- Implement various trading & investing strategies using technical & fundamental analysis.
- Optimize strategies using machine learning algorithms.
- Use Algorithmic Trading to remove the psychological & emotional bias faced during the investment process

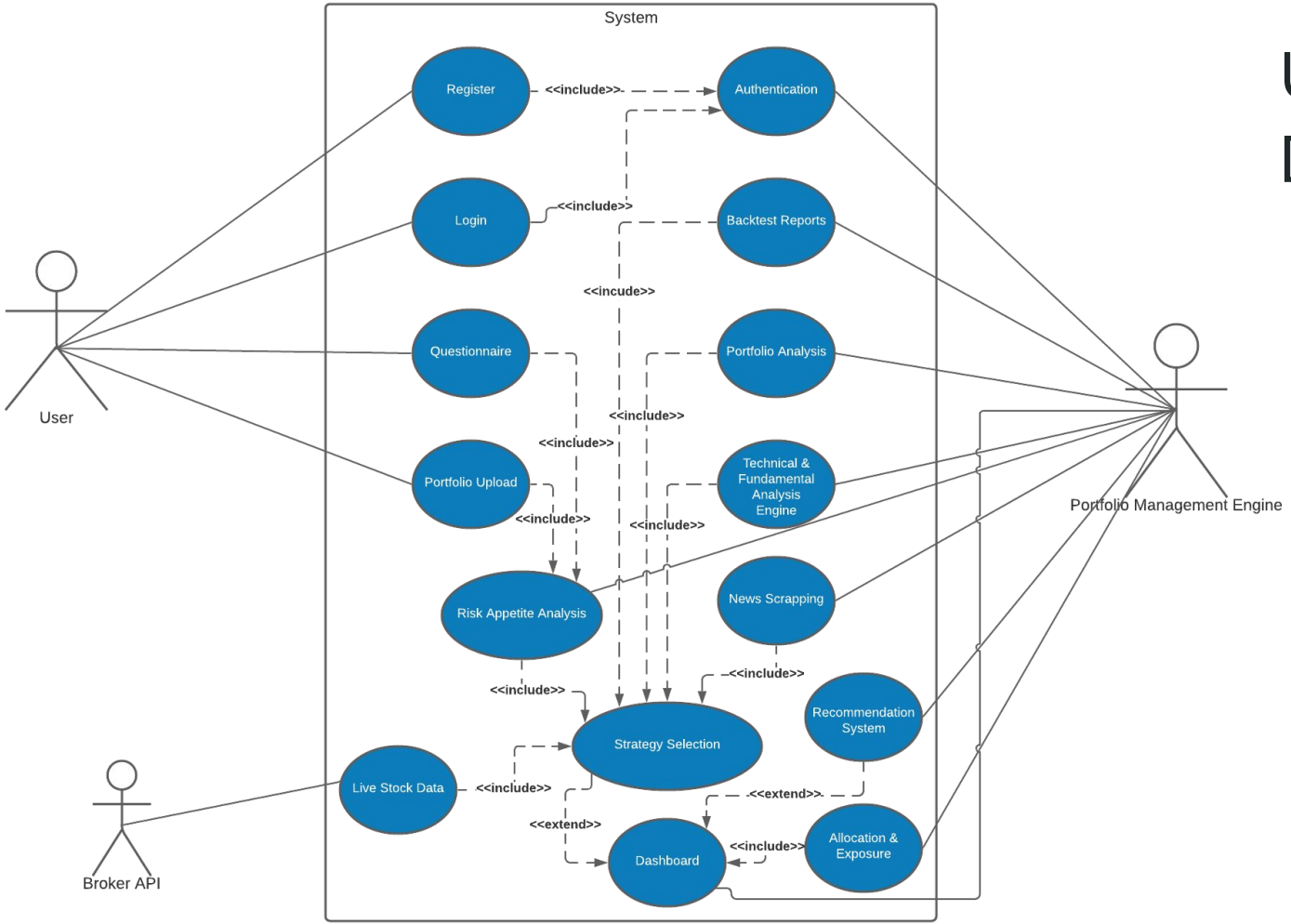
ARCHITECTURE DIAGRAM



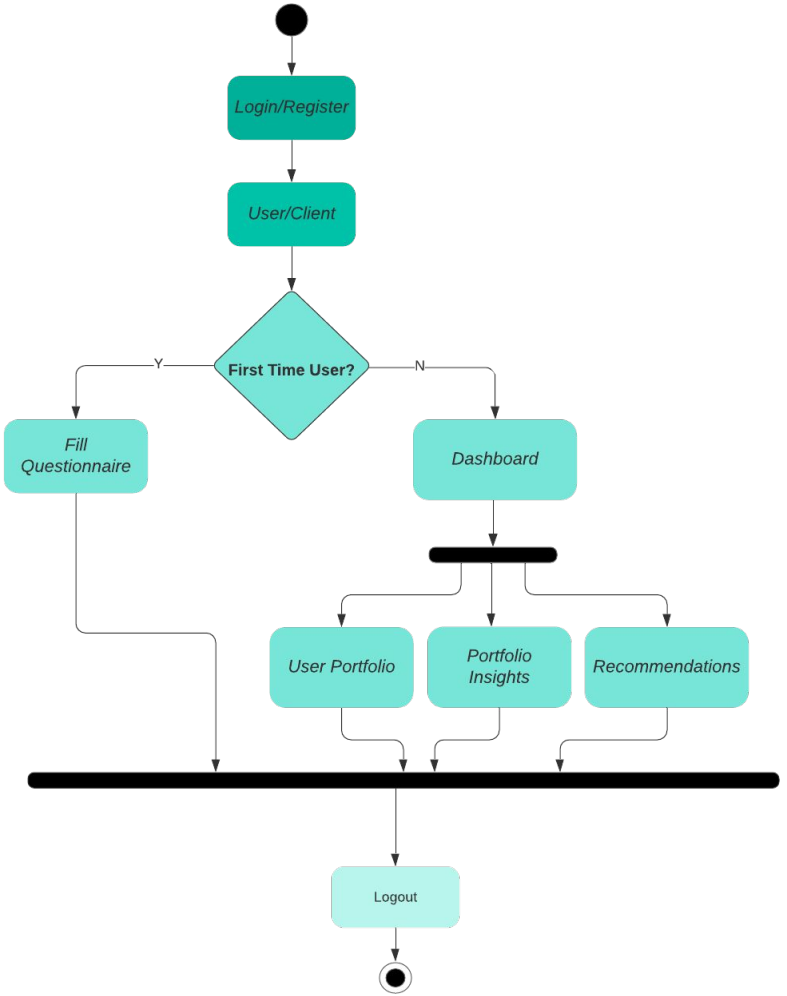
CLASS DIAGRAM



USE CASE DIAGRAM



ACTIVITY DIAGRAM



MATHEMATICAL MODEL

System = {Input, Output, Functions}

Input : {Client Risk Appetite, Market/Stock Data}

1. Client Risk Appetite: Dictionary of answers to set of fixed questions to identify risk appetite of client
2. Market/Stock Data: Stock prices data from BSE/NSE using an API

Output : {Strategy Reports, Market Orders, Portfolio analytics}

1. Strategy Reports: Verdict of strategies (long-term, medium-term, short-term), and Backtested reports of strategy performance on past data
2. Market Orders: The order of placing the buy/sell bids
3. Portfolio analytics: {alpha score, beta score, red flags, expected returns, sector-wise allocation}

MATHEMATICAL MODEL (contd.)

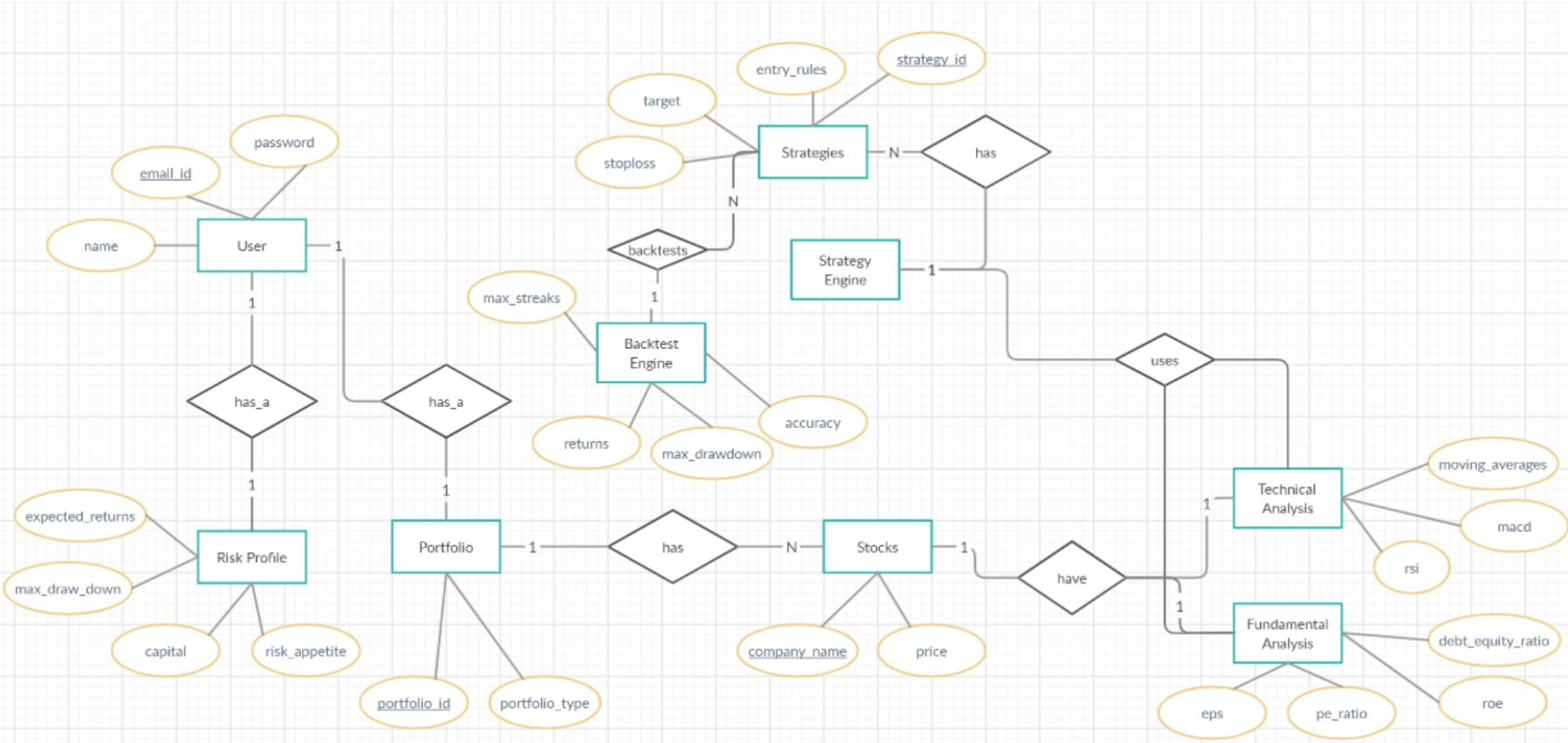
Functions : { f1 , f2 , f3 , f4 , f5 , f6 }
f1 : Define Entry Rules
f2 : Define Exit Rules
f3 : Define Strategy Logic
f4 : Buy Order
f5 : Sell Order
f6 : Portfolio Rebalance

Helper Functions: { f1, f2, f3 }
f1 : Collect Client Data using questionnaire
f2 : Collect Market Data using API
f3 : Backtest defined strategy logic on past data

Success case: return percentage >= promised returns, no red flags, stable portfolio

Failure case: return percentage < promised returns, failure in predicting the right stocks.

ER DIAGRAM


password
email_id
name
User
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1
has_a
1
expected_returns
max_draw_down
Risk Profile
capital
risk_appetite
has_a
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portfolio_type
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has
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Stocks
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price
entry_rules
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target
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Backtest Engine
returns
max_drawdown
accuracy
Strategy Engine
1
uses
1
Technical Analysis
moving_averages
macd
rsi
1
have
1
Fundamental Analysis
debt_equity_ratio
roe
eps
pe_ratio

USER REQUIREMENTS

- Minimum RAM 2 GB
- 320 GB Storage Space.
- Intel i3 Processor.
- Internet Connectivity with Ports configured.

•This application can be accessed by user through a machine having any web browser with bootstrap. Angular support and flash to get video content. The client devices must preferably have browsers like IE9 or above, Mozilla Firefox (version 60.02 quantum) or Opera 54.0 or chrome (version 68.0.3) or safari installed in their OS and must have enabled flash content to get videos output. Specified versions are preferred to get Bootstrap 3.0 output.

FEASIBILITY STUDY

- Different machine learning models have various types and amounts of trainable parameters and might employ different mathematical ideas. Moreover, there are various meta-parameters that one can tweak to control the training algorithm, resulting in different rates of correct recognition.
- There are at least the following unique risks in AI projects: lack of a suitable machine learning method, poor data quality, and short term planning.
- We shall study these one by one and explain the challenges and uncertainties in our project.

SCOPE

- All users have their own profiles in Portfolio-management system.
- Clients can create new account, log-in to their existing accounts which will give them the authority to use the services provided by the system.
- If a client wishes to create a new account then a questionnaire needs to be answered which will help the system understand the risk appetite of the customer.
- A new client might upload his/her existing portfolio for simple portfolio analysis like expected returns and red flags.
- Depending on the risk appetite, the system will create a list of stocks which are to be traded for a particular day/month/year.
- These strategies used are back tested thoroughly and only then are they allowed to predict a list of stocks which will give positive returns.
- The long term investor gets stocks which are only based on fundamental analysis.
- The mid term and short term investors get stocks which are predicted using technical analysis and minimum fundamental checks.
- LSTM, GRU, Random Forest algorithms are used to predict the future trend of the market.

REFERENCES

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