PORTFOLIO MANAGEMENT SYSTEM

MENTOR : Prof. Yogesh Handge

GROUP ID : 37

- BHUSHAN PAGARE
- MANAV PESHWANI
- NIPUN KHIVANSARA
- PURVESH JAIN

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

ABSTRACT

- In a world of fluctuating interest rates, changing gold prices & volatile financial markets, the aim of this project is to build an optimum portfolio for the users according to their risk appetite.
- The system's scope includes analysing client's preferable risk exposure, expected yearly returns and using this data to build a basket of securities and a variety of trading strategies based on technical analysis & machine learning techniques.
- Algorithmic Trading is used to automate trading strategies based on study of past historical data, technical indicators, machine learning algorithms & macroeconomic trends.
- This automation will help to eliminate human emotions from the investment process which will help in proper position sizing & risk management with strict stop losses and targets.
- The project aims to use Modern Portfolio Theory to maximize the alpha while reducing the risk.

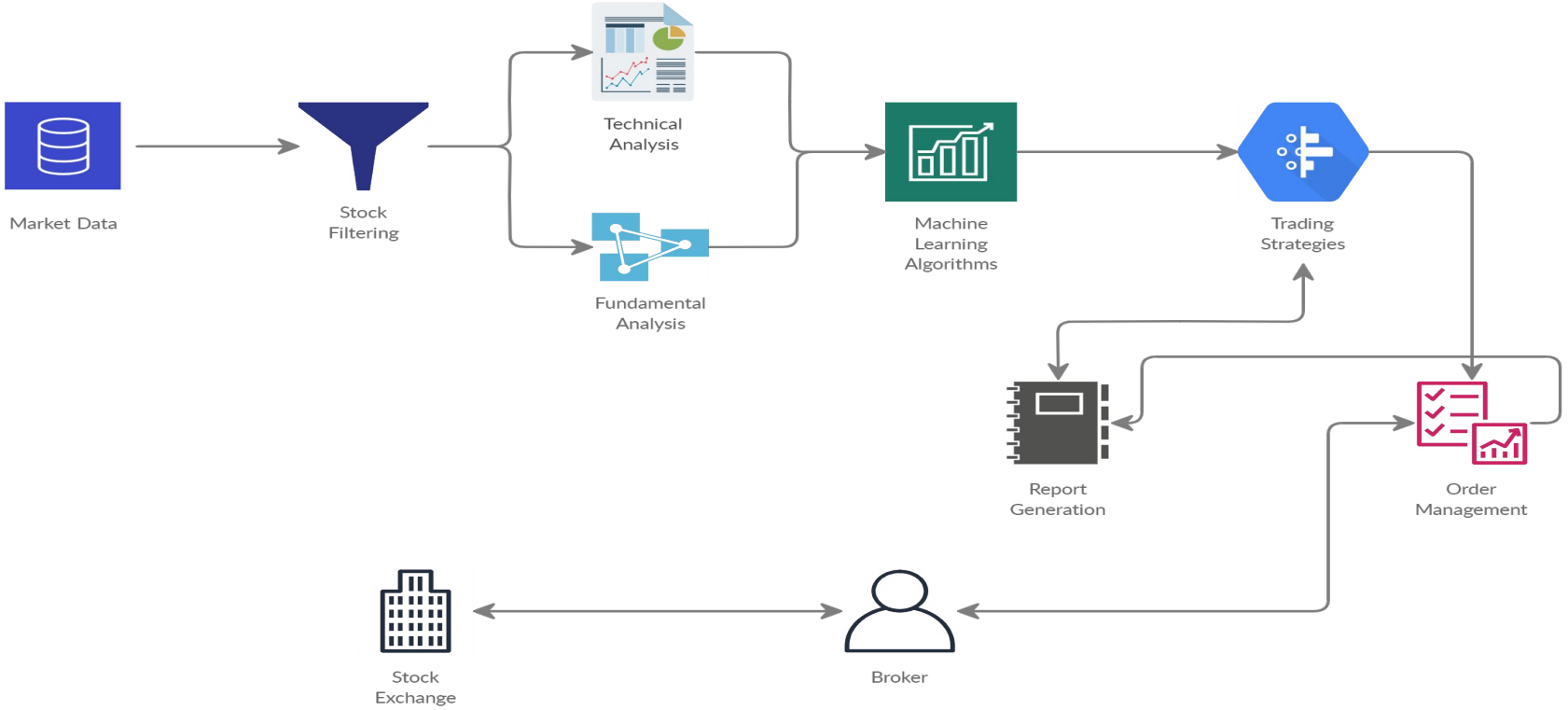
ACM KEYWORDS

- Portfolio Optimization
- Risk Management
- Asset Management
- Machine Learning
- Deep Learning
- Finance
- Algorithmic Trading
- Quantitative Finance

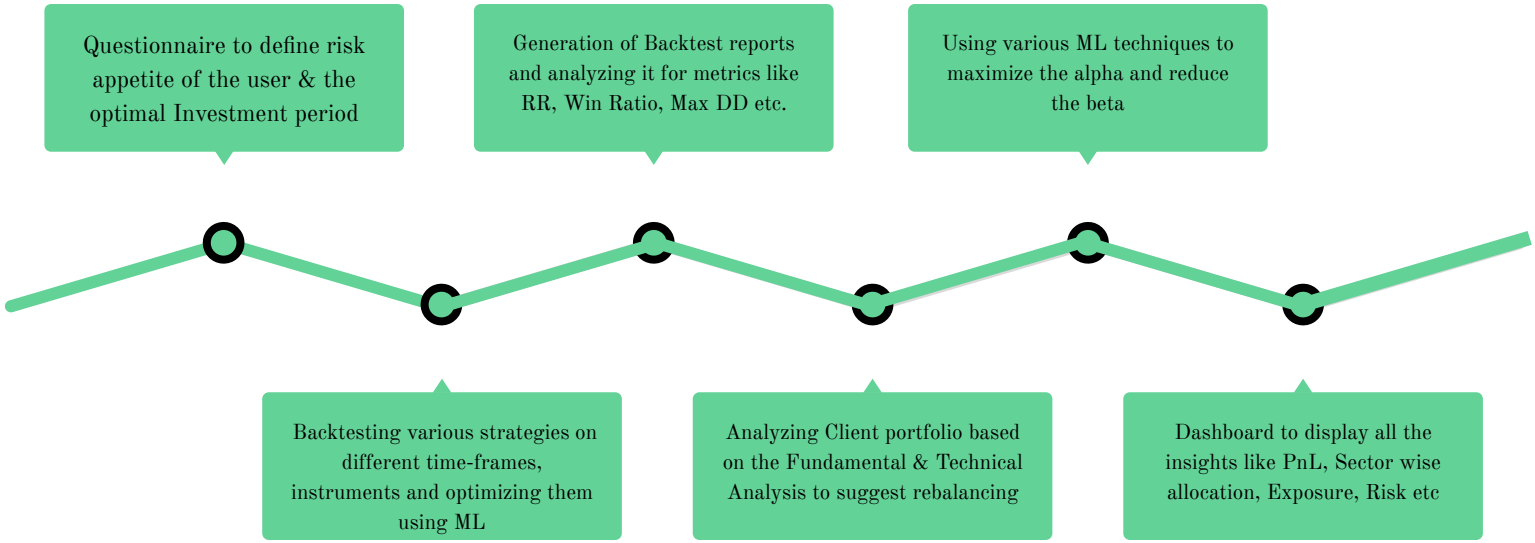
LITERATURE SURVEY

Method	Description
Stock Portfolio Selection using Data Mining Approach [1]	Logistic Regression & Neural Networks are used to select a stock portfolio using fundamental & technical parameters
Optimization of Investment Portfolio Management [2]	Pontryagin maximum principle and Markowitz portfolio theory is used to form a foundation of a portfolio as well as optimization of a given portfolio.
Algorithmic Trading for Trade Signal Generation[3]	Describes the algorithmic trading process & components like alpha,beta and transaction models.Trade signal generation & trade generation.
Data mining algorithm to analyse stock market data using lagged correlation [4]	Develops an algorithm for predicting the market direction more accurately when two stocks are strongly correlated to each other with a lag of K number of trading days.

ARCHITECTURE DIAGRAM



WORKFLOW


Questionnaire to define risk appetite of the user & the optimal Investment period
Generation of Backtest reports and analyzing it for metrics like RR, Win Ratio, Max DD etc.
Using various ML techniques to maximize the alpha and reduce the beta
Backtesting various strategies on different time-frames, instruments and optimizing them using ML
Analyzing Client portfolio based on the Fundamental & Technical Analysis to suggest rebalancing
Dashboard to display all the insights like PnL, Sector wise allocation, Exposure, Risk etc

TECH STACK

Front End:

1. HTML
2. CSS
3. Javascript & JQuery
4. Bootstrap
5. Django Templates

Back End:

1. Django
2. Python ML Libraries
   a. Keras
   b. Numpy
   c. Pandas
3. Finance Libraries
   a. Yahoo Finance
   b. Google Finance
   c. Backtrader
   d. TaLib

APIs

1. AliceBlue
2. Zerodha Streak
3. TradingView

REFERENCES

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3. G. Nuti, M. Mirghaemi, P. Treleaven and C. Yingsaeree, "Algorithmic Trading"
4. C. Fonseka and L. Liyanage, "A Data mining algorithm to analyse stock market data using lagged correlation"