Team Name: Bruteforce
Problem Statement: Algorithmic Trading Strategies

Team Member Names:
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Idea Brief

- **Portfolio Management using Algorithmic Trading**
- We have used data(OHLCV) and feature engineered technical indicators like Bollinger Bands, RSI of the following cryptocurrencies and stocks individually over various years to train and test our models: *BTC/USDT, S&P500, DOW&JONES, ETH/USD, MRF* Ltd.

Approaches:

Reinforcement learning based-

- PPO & DDPG with LSTM, MLP
- DQN, DDQN
- Discrete, continuous action spaces include buy/sell signals along with quantity to be bought/ sold.
- Reward functions-
- Amount of profit with penalty on number of trades(To simulate the brokerage/transaction cost),
- Amount of profit divided by (volatility*drawdown), where RSI is used as a measure of volatility.

Classification based-

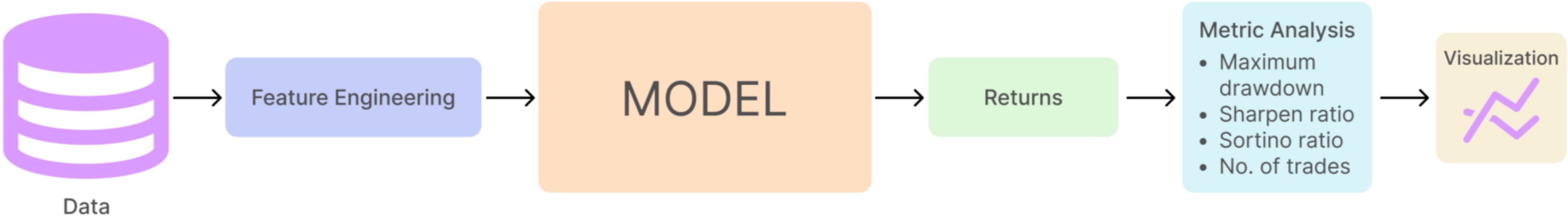
- Create label signals (buy or sell) for training.
- Trading Strategy: If SMA<LMA signal given is buy, else sell otherwise.
- Random Forest for signal prediction (0 or 1) using SMA, LMA, RSI,MACD, etc.
- XGBoost for signal prediction using various indicators.
- The model predicts the signal at each step for new data, the respective action is taken and portfolio metrics are updated.

We plan to use different cryptocurrencies and stocks together for maximizing portfolio with different amount of risk factor required.

Tech Stack Used

- Python
- pandas
- pandas_ta
- tensorflow,pytorch
- numpy
- pygame
- OpenAI Gym
- tensorboard
- stable_baselines
- Scikitlearn
- matplotlib

Architecture Design



What positive and unique solutions does your idea have?

- **Innovative Combination:** Our idea involves pioneering portfolio management through algorithmic trading, combining cryptocurrencies and stocks in a unique approach.

- **Risk-Based Allocation:** Tailoring investments to match individual risk preferences, we allocate funds between cryptocurrencies and stocks based on the client's risk capacity.

- **Unbiased Testing:** To ensure objectivity, our strategy and models undergo rigorous testing on various stocks and cryptocurrencies, preventing bias towards any specific asset.

- **RL-Based Techniques:** Leveraging Reinforcement Learning (RL), our system is committed to continuous learning and improvement, enabling it to adapt and evolve with market trends for long-term effectiveness.

GitHub & Demo Video Links

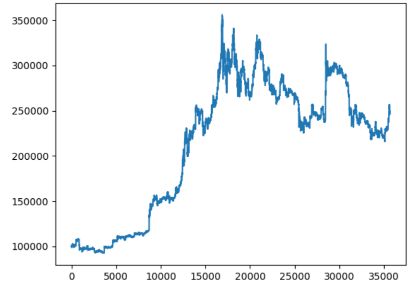
GitHub Repository Link	https://github.com/Kushal7551/Scale_91
Prototype Demo Video Link	Bruteforce submission

Future Scope

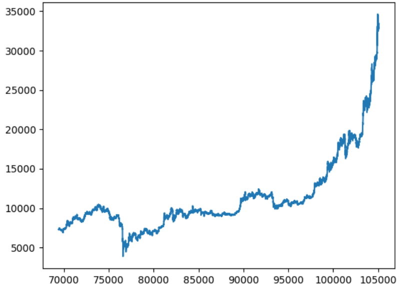
- **Automated Portfolio Management:** To include trading simultaneously across different instruments (currencies or stocks) to counter market volatility using RL-Based Techniques.

- **Different Actions:** Current Markets allow different options such as short (sell before buy) which can be included in our action space. Stock markets are also prone to splits which can be included as well.

SUMMARY

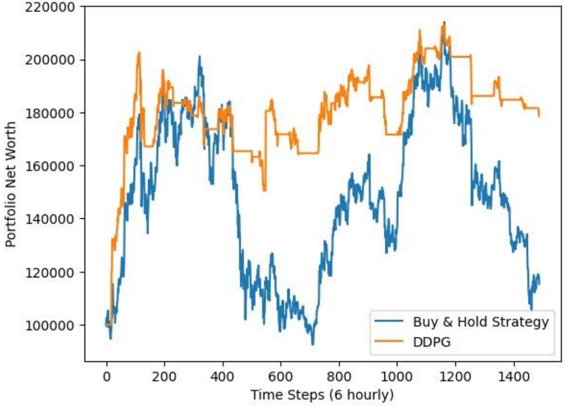


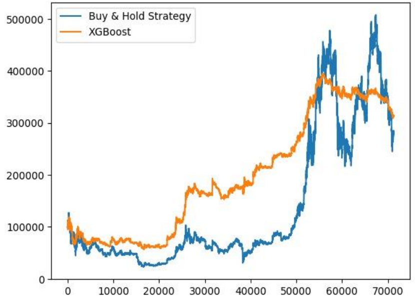
PPO Returns from March 2020 to Dec 2022 ~ 150%.(BTC/USD)



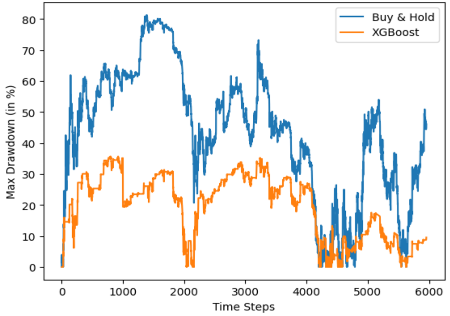
PPO Returns from Jan 2020 to Jan 2021 ~ 300%.(BTC/USD)

Returns from April 2020 to Sep 2022~ 100%.(Dow & Jones)



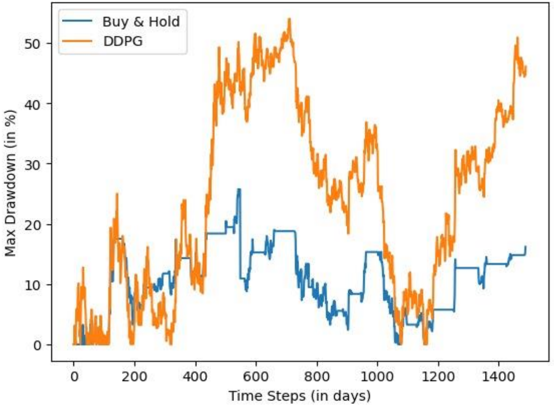


Comparision of XGBoost v/s Buy & Hold Strategy on BTC/USD from 2018 to 2022.



Comparision of maximum drawdown between XGBoost and Buy & Hold strategy on BTC/USD from 2018 to 2022

Comparision of Max-drawdowns from April 2020 to Sep 2022 (Dow & Jones)



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