

# G H RAISONI INSTITUTE OF ENGINEERING & TECHNOLOGY, NAGPUR

# DEPARTMENT OF ARTIFICIAL INTELLIGENCE

"Stock Price Prediction using Reinforcement Learning"

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**Abstract:** In an era marked by the increasing complexity and volatility of financial markets, the quest for effective and adaptive trading strategies is of paramount significance. This project dives into the domain of stock trading using reinforcement learning, with a primary focus on the development and evaluation of a Q learning based trading agent. The agent is trained to make buy and sell decisions by learning from historical stock price data. The study explores the practical implementation of this agent and assesses its ability to optimize trading strategies for long term profitability. Through rigorous evaluation, the thesis offers insights into the agent's performance and its capacity to adapt to dynamic market conditions. It further investigates parameter tuning, transaction cost management, and otherreal world complexities that affect algorithmic trading strategies.

The research outcomes present a foundation for the practical application of reinforcement learning in stock trading. The Q learning agent's performance is showcased through visual representations of stock price charts, providing a clear illustration of its actions and effectiveness. This thesis not only contributes to the growing body of knowledge on algorithmic trading but also underscores the potential of reinforcement learning as a valuable financial gains.

#### **Introduction:**

In the dynamic and competitive landscape of modern financial markets, the quest for effective trading strategies has never been more pressing. This model embarks on a comprehensive exploration of stock trading empowered by reinforcement learning, with a particular focus on the development and evaluation of a Q learning based trading agent.

The model sets the stage by recognizing the pivotal role of informed trading decisions in today's financial ecosystem, acknowledging the challenges that characterize stock trading. It underscores the need for strategies that can autonomously adapt to market fluctuations, optimize trading performance, and offer a degree of resilience in the face of uncertainty.

At the heart of this research is the development of a Q learning agent, representing a key component of algorithmic trading. This agent is meticulously trained to make buy and sell decisions based on historical stock price data, learning from past experiences and striving for long term profitability.

The study's scope extends to critical aspects of algorithmic trading, including parameter tuning, transaction cost management, and the pragmatic handling of real world complexities that inevitably impact trading decisions. These components are dissected to ensure the trading agent is not just theoretically sound but practically viable.

### **Design:**

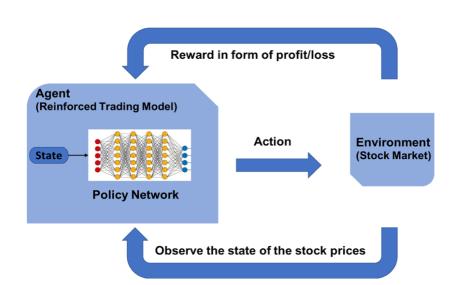


Fig 1:- Design of Stock Trading using Reinforcement Learning

#### **Implementation:**

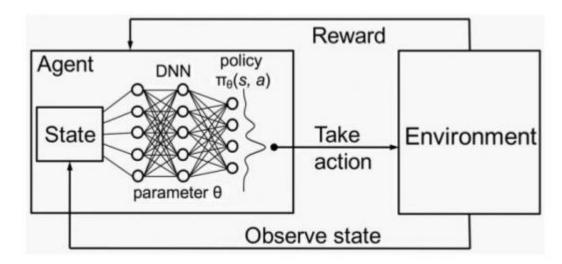


Fig 2. Working of Reinforcement Algorithm

Fig 2:- Implementation of Stock Trading using Reinforcement Learning

#### **Result:**

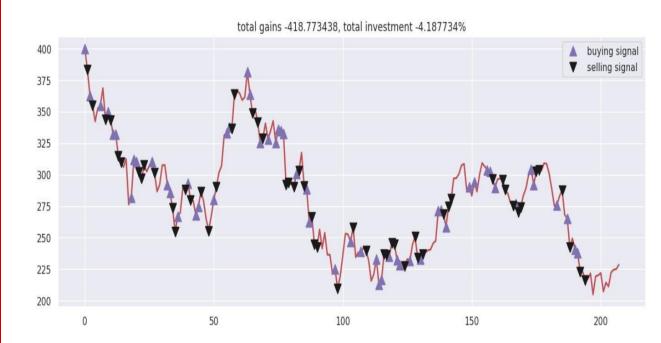


Fig 3:- Stock Trading Using Reinforcement Learning

### **Conclusion and Future scope:**

- In conclusion, the project thesis on stock price prediction using reinforcement learning with a Q- agent has provided valuable insights into the application of cutting-edge technology in the financial domain. Throughout this research, we have explored the potential of reinforcement learning, specifically the Q-learning algorithm, in forecasting stock prices.
- The future scope of stock price prediction using reinforcement learning lies in enhancing portfolio optimization and risk management. Advanced RL algorithms can offer more adaptive, dynamic trading strategies, improving returns while managing risks in volatile markets. This area is expected to see increased development and integration into financial services and investment practices.

#### **References:**

- 1) Hidden Markov Models for Stock Market Prediction, Luigi Catello, Ludovica Ruggiero, Lucia Schiavone, and Mario Valentino.
- 2) Predicting Financial Market Trends using Time Series Analysis and Natural Language Processing.
- 3) Stock Market Sentiment Classification and Backtesting via Fine-tuned BERT Jiashu Lou.

## Program Outcome (PO's) and Program Specific Outcome (PSO's)

		FUS   F								PS	SO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	3	3	2	3	2	2	3	2	3	2	2	3	3	2

1 - Low; 2 - Medium; 3 - High

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Name & Sign of Student	Name & Sign of Guide				
Mohd Fayyaz					
Kaustubh Yewale					
Jaykumar Thakre					
Anuj Wadi					
Devesh Ambade					
Aryan Meshram					