

Evolving Deep Fuzzy Ensemble Network for Portfolio Management

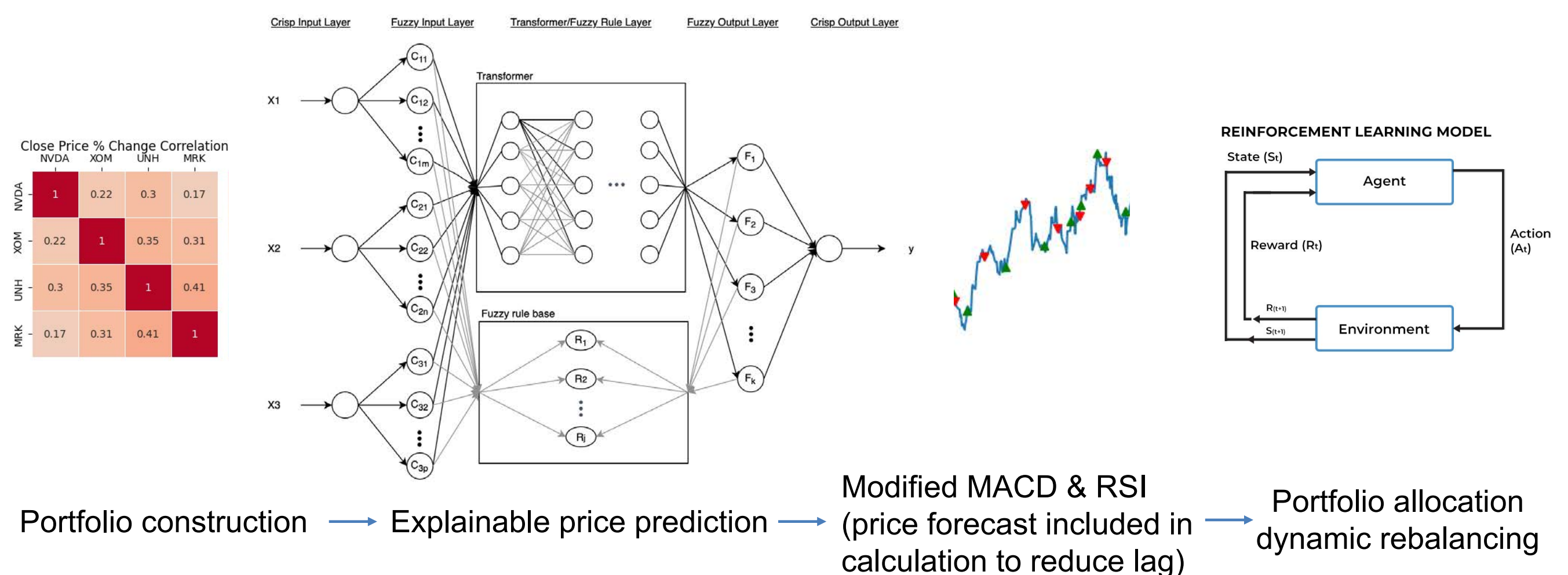
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Project Objectives

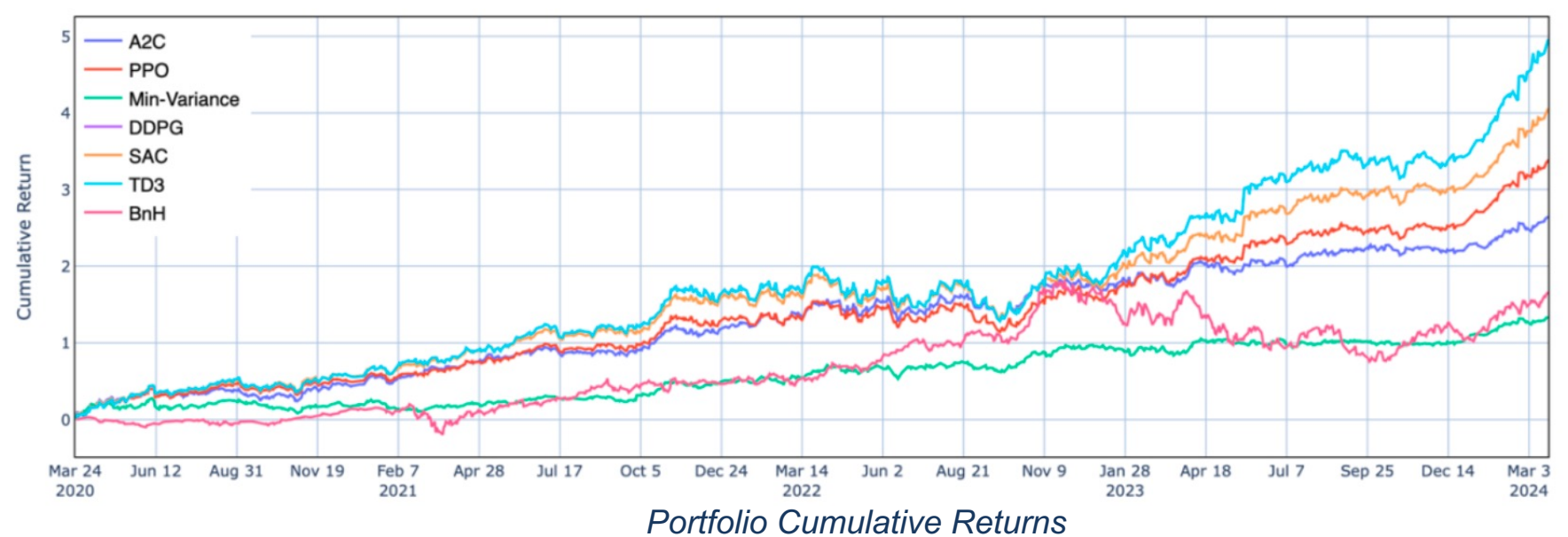
This project aims to design a robust portfolio management system using evolving fuzzy Ensemble Transformer, modified technical indicators and Reinforced Learning. The ensemble of transformer models will predict future stock prices, and explain how predictions are made in the form of if-then logic. Next, price forecasts are used to calculate modified technical signals that identifies trend reversal points. Reinforcement Learning optimizes the returns and compensates for delays in trend reversal prediction. The system is applied to a carefully constructed portfolio for both allocation and dynamic rebalancing, and its performance is benchmarked against other popular trading strategies. The system is expected to generate target returns and remain robust in changing market conditions.

Methodology



Experiment Results & Benchmark

Various Deep Reinforcement Learning (DRL) algorithms are tested on a portfolio of 5-yrs period, using modified MACD & RSI. They are benchmarked against Min-Variance allocation and Buy-and-Hold (BnH). TD3 is the best DRL based solution.



Portfolio Management Performance in Different Market Conditions

	Bull Market Period		Volatile Market Period	
	Best DRL Strategy	Buy and Hold	Best DRL Strategy	Buy and Hold
Total Return %	396.80 (-25.2%)	530.20	22.46 (-9.7%)	24.86
Average Annual Return %	44.72 (26.4%)	35.37	5.20 (14.3%)	4.55
Sharpe Ratio	1.85	1.32	0.32	0.30

In both bull and volatile market conditions, DRL based strategy outperforms BnH in average annual return and generates a total return that is comparable to BnH. The returns are primarily limited by market condition. DRL-based portfolio management is robust in volatile markets and continue to generate considerable profits.