Fuzzy Adaptive Learning Control Network with Policy and Another Adaptive Resonance Theory (FALCON-PAART)
for market climate prediction and analysis

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PROBLEM STATEMENT

To create an online machine learning model which can identify the current stock market environment, execute buy/sell actions and provide a graphic user interface for users to understand the model's decision. FALCON-PAART aims to solve the following problems:

1 Difficulty in Identifying Turning Point

2 Interpretability of AI model

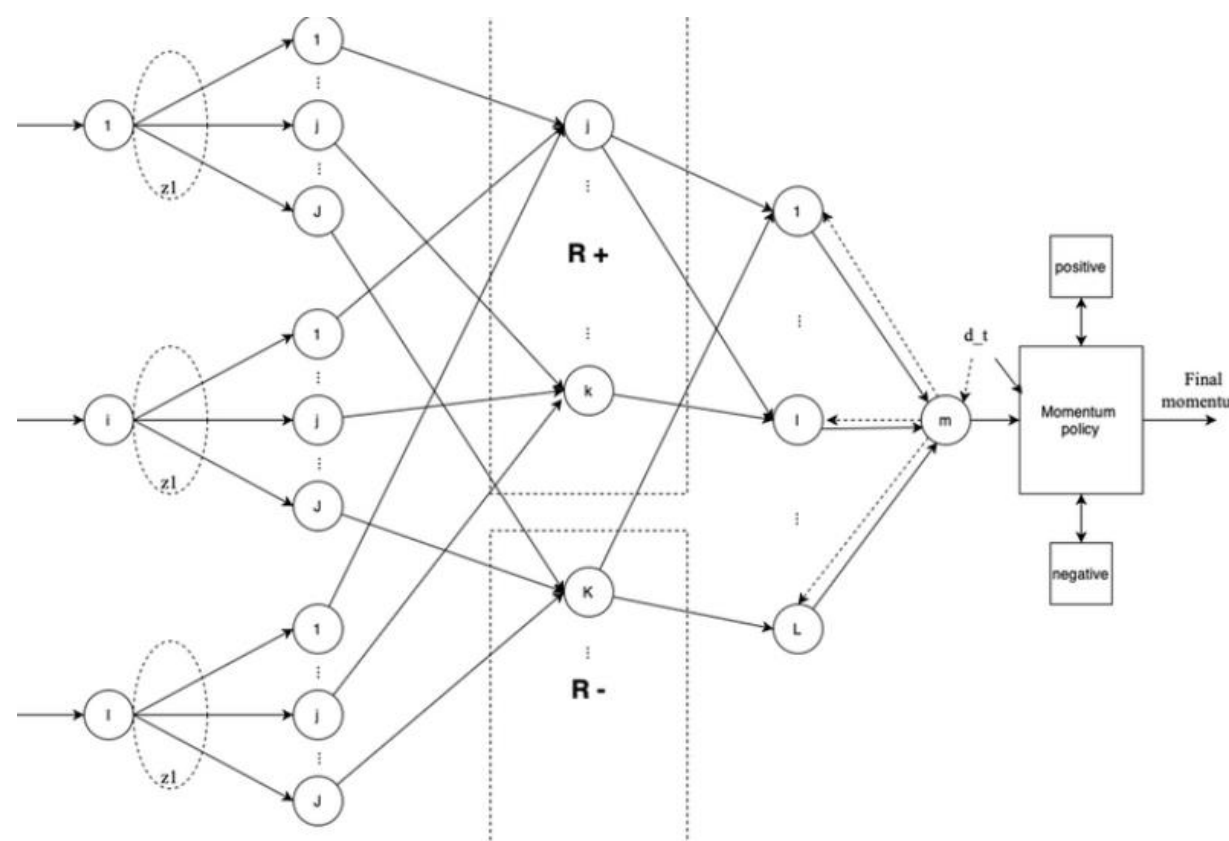**3** Difficulty in Dynamic Rebalancing of Portfolio

SOLUTION

FUZZY ART
Usage of adaptive resonance theory to build fuzzy clusters which handles the classification of inputs and outputs.

MOMENTUM POLICY
The momentum policy serves as memory for the previous states of market and translates the interaction of bull and bear prediction into market expectations.
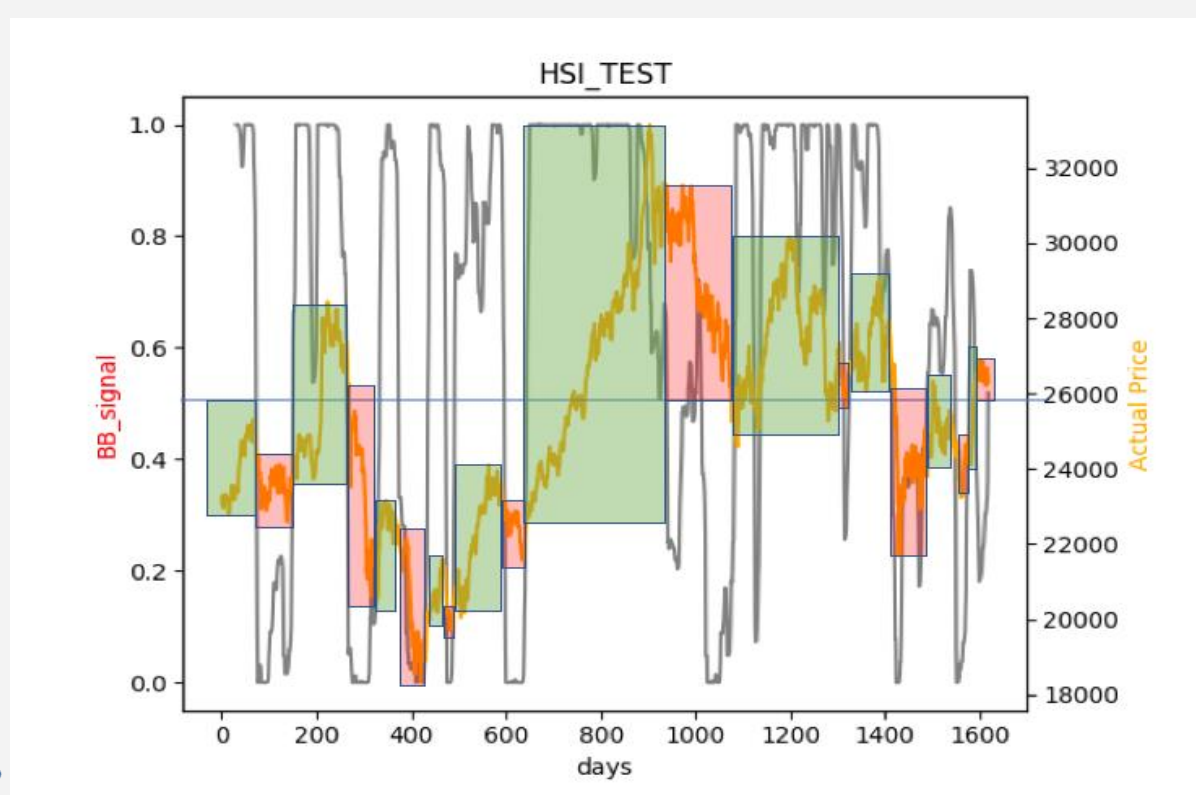
POSITIVE/NEGATIVE LEARNING
The usage of positive and negative rules governs the different knowledge base which is triggered at different market environments.

GRAPHIC USER INTERFACE
GUI serves to gain trust from its user by explaining how the model makes decisions at each point in time through the breakdown and explanation of the rules and clusters.

RESULTS

FALCON-PAART is able to effectively identify most rises and drops especially the more significant ones.

Trading Time Period : 6 years (~1658 days) (20%)		Strategy	Technical Analysis		AI/ML
		Buy & Hold	MACD	RSI	FALCON-PAART
Indexes	DJI	79.49%	58.32%	0	71.89%
	FTSE	-4.61%	-15.25%	9.78%	23.19%
	GSPC	91.62%	38.31%	0	59.18%
	HSI	13.16%	8.24%	0	99.05%
	IXIC	202.50%	66.04%	50.07%	166.81%
	N225	81.22%	28.60%	47.72%	103.07%
	STI	-13.21%	18.79%	0.81%	30.61%

Trading Time Period : 3 years (~796 days) (20%)					
ETF	VGK	5.95%	12.79%	0	5.82%
	VWO	22.70%	1.45%	0	40.39%
	VAW	19.44%	3.15%	0	38.36%
	GLD	35.95%	5.49%	0	33.06%
	VFH	14.14%	8.41%	21.26%	37.93%
	VHT	48.57%	13.65%	0	48.57%

In terms of individual stock trading, FALCON-PAART is able to consistently win or perform as well as other techniques and strategies in both indexes and ETFs.

		Average Buy-and-hold	Average MACD	Average FALCON-PAART	Portfolio Rebalancing
Portfolio	VGK,VWO, VAW,GLD, VFH,VHT	24.46%	7.49%	34.02%	**88.20%**

Using simple portfolio rebalancing strategy of equal distribution, FALCON-PAART is able to yield much better performance as compared to averaging performances of different techniques.