NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Recurrent Neuro-Fuzzy Parallel Embedded System (RNFPS) implemented with an automated trading strategy

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Goal of the project

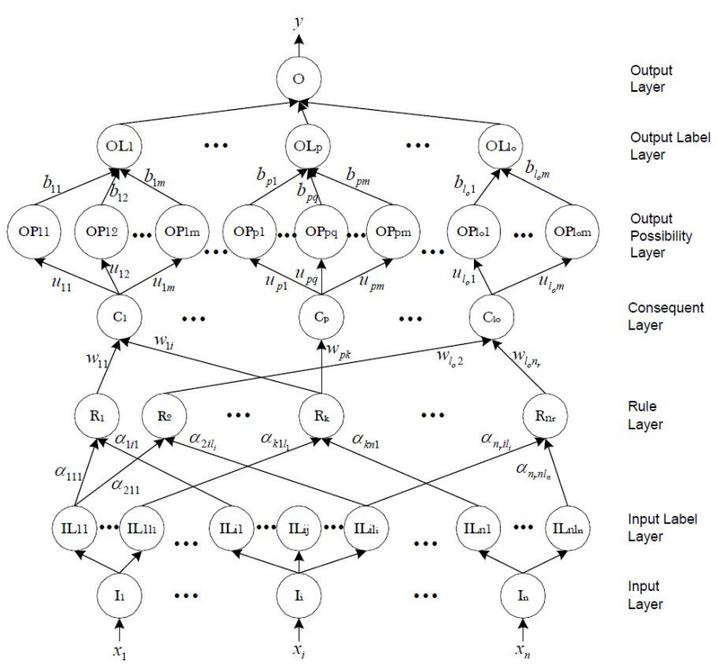
To implement a parallel embedded fuzzy neural network to predict the stock market's movement accurately and eventually understand the decision-making process behind the prediction. The model consists of an artificial neural network and a fuzzy system used with a genetic algorithm to optimize the trading strategy.

Motivation

1. To utilize the huge amount of data using neural network
2. To understand the black box behaviour of neural networks
3. To predict the future closing price of selected stocks

Fuzzy System

Modified Yager Fuzzy Neural Network (Modified Yager FNN)



Trading Strategy

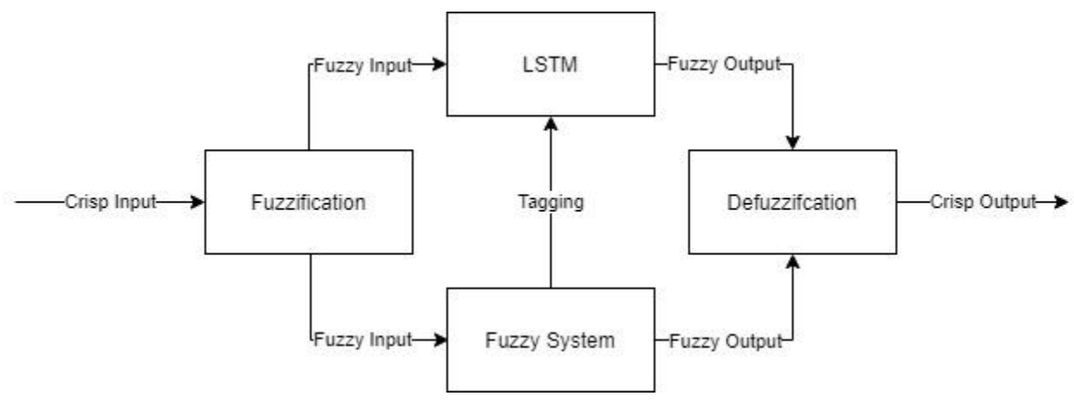
Genetic Algorithm

```
Def test(a,b):
    For i in range(date):
        If  currentClosePrice<predictedClosePrice[i+a] and buy conditions
met:
            Buy
        If  currentClosePrice>predictedClosePrice[i+b] and sell conditions
met:
            Sell
    Return -total assets
```

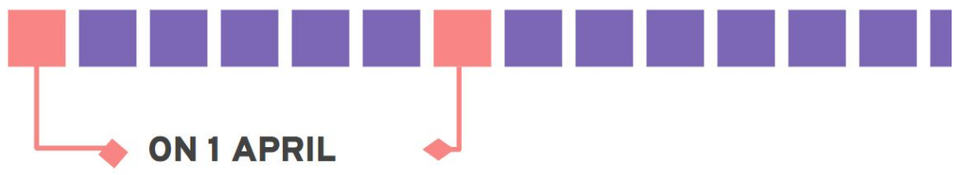
GA is utilized to calculate the best day to sell/buy when RNFPS detected a drop/increase in the near future

Steps for Recurrent Neuro-Fuzzy Parallel Embedded System (RNFPS)

1. Fuzzification
2. Train neural network (LSTM)
3. Tagging
4. Defuzzification



Look forward



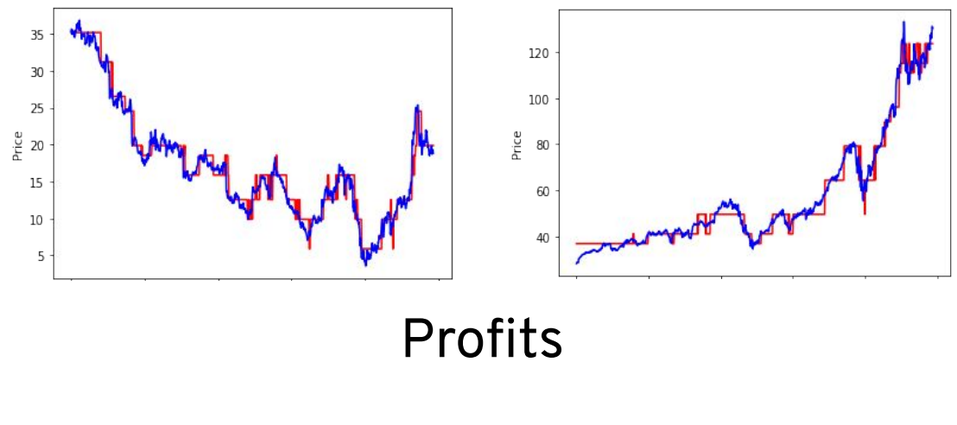
ON 1 APRIL

Input: open, high, low, volume of 1st April

Output: close price of april **7th April** (eg look forward = 5)

Results and Analysis

Accuracy



Profits

Type of stocks	Training / Testing data	Look forward			
		Low risk (no leverage used)			
		5	10	15	20
Bull	TSLA	477,796	386,114	872,191	476,486
	AAPL	221,824	207,109	247,989	339,999
Bear	BBBY	144,644	1,396,891	626,797	241,119
	BB	798,288	401,723	251,193	189,563
Index	NDAQ	221,278	165,703	208,379	204,885
	DJI	150,726	153,509	178,053	155,009