NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Fuzzy C-Means Long Short-Term Memory

with application in Exchange-Traded Funds

Student: Siek Ming Kang

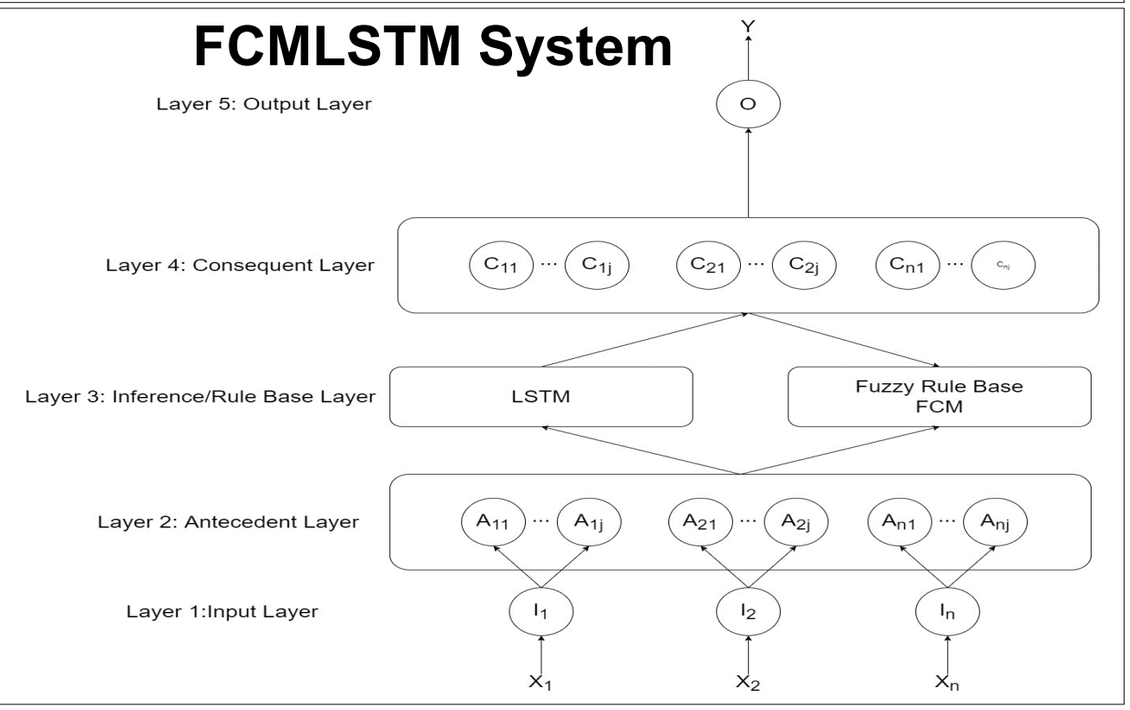
Supervisor: Prof Quek Hiok Chai

Project Objectives:

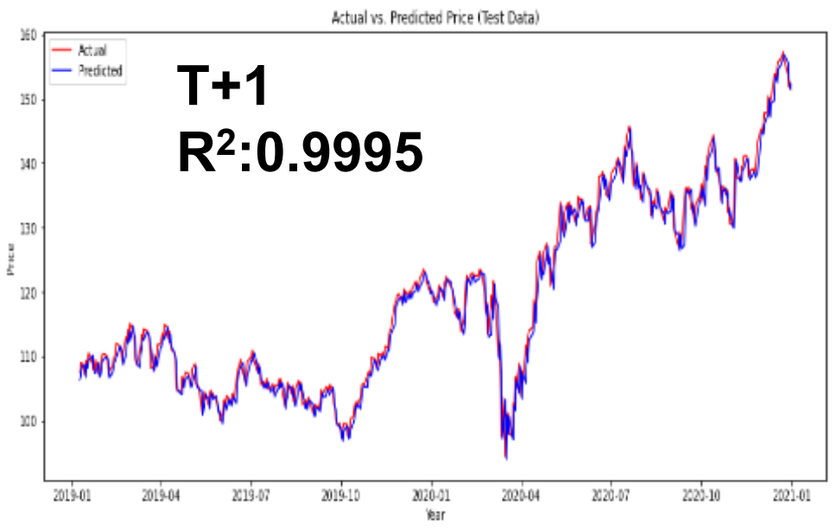
This project proposes a Fuzzy C-Means Long Short-Term Memory (FCMLSTM) system by incorporating the interpretability of fuzzy system and prediction performance of deep neural networks. The prediction by our system is utilised by a trend trading strategy to perform portfolio rebalancing containing exchange-traded funds (ETF).

Design & Implementation:

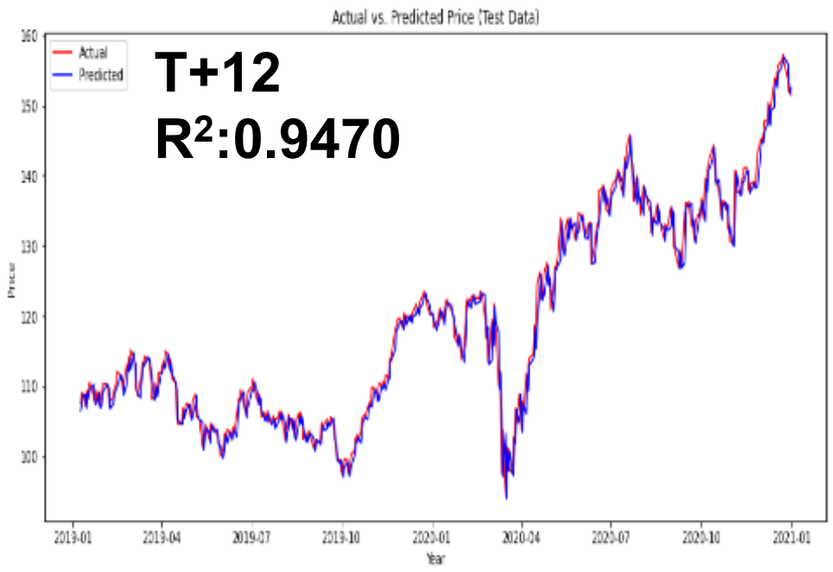
1) Fuzzy rule base generation by FCM
2) Fuzzification of crisp input to fuzzy input
3) Inference of fuzzy input to fuzzy output using FCM and LSTM
4) Defuzzification of fuzzy output to crisp output



ETF Price Prediction:



High correlation, Predicts trend



Predicts up to T+12

Portfolio Rebalancing:

Trading Strategy:

Predicted Moving Average Convergence Divergence Histogram with Genetic Algorithms (PMACDH-GA)

Rebalance portfolio based on PMACDH-GA buy/sell signals

PMACDH-GA strategy outperforms against buy & hold and MACDH

Strategy	ROI	AROI
PMACDH-GA	**135.46%**	**11.3%**
Buy & Hold	130.92%	11.03%
MACDH	99.58%	9.02%