NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
School of Computer Science and Engineering
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Transformer Fuzzy Deep Neural Network (TFDNN)

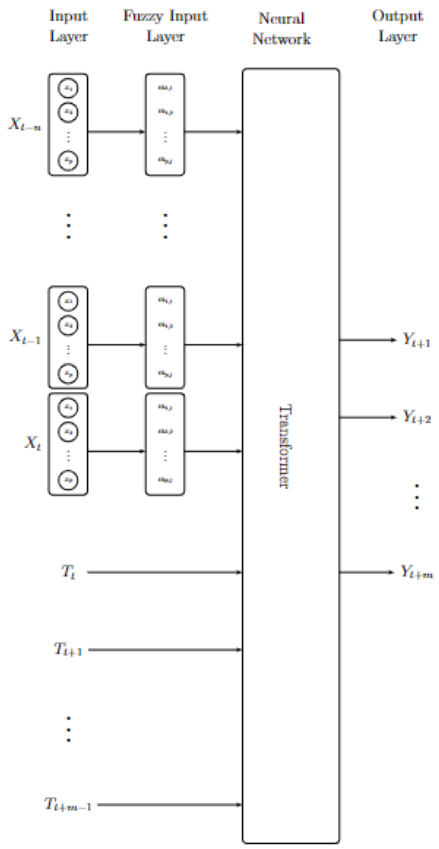
Attention-Based Security Price Prediction

Project Objectives:

The aim of this project is to investigate the potential of combining Transformer - based sequence - to - sequence modeling with fuzzy logic techniques to capture subtleties beyond rigid numerical values. The proposed model will leverage the attention mechanism of the Transformer to discern patterns in price movements, while also integrating fuzzy logic to extract degrees of truth from input data. Subsequently, a trading strategy will be employed to assess the effectiveness of utilizing information derived from the predicted prices.

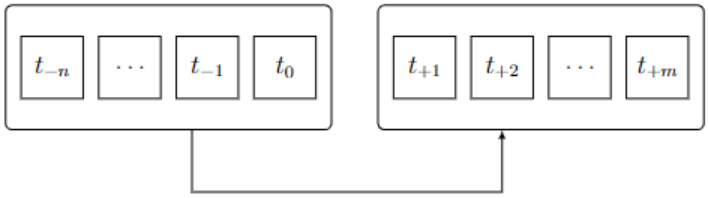
Architecture

- 4 - Layer: Input, fuzzification, deep neural network (DNN) and output
- Neural network layer utilizes Transformer architecture

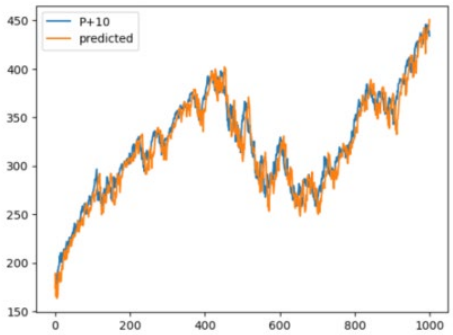


Sequence to Sequence Approach

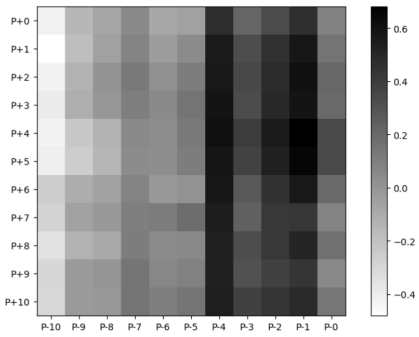
Use one model to predict future sequence utilizing past sequence



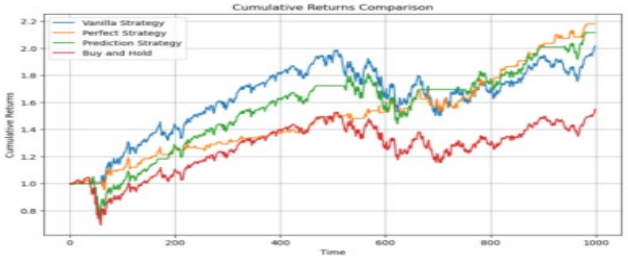
TFDNN Prediction Result



Feature Selection Based on Transformer Attention Weight



Trading Results



Performance

Index	Vanilla	Perfect	Predicted	Buy & Hold (Benchmark)
SPY	101.7%	124.6%	111.2%	55.0%
QQQ	165.3%	336.9%	170.2%	157.6%
IWM	42.1%	203.3%	124.9%	25.2%
EWJ	35.3%	39.9%	31.2%	12.3%