NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Hybrid Deep NN and Deep RL

For Algorithmic Finance

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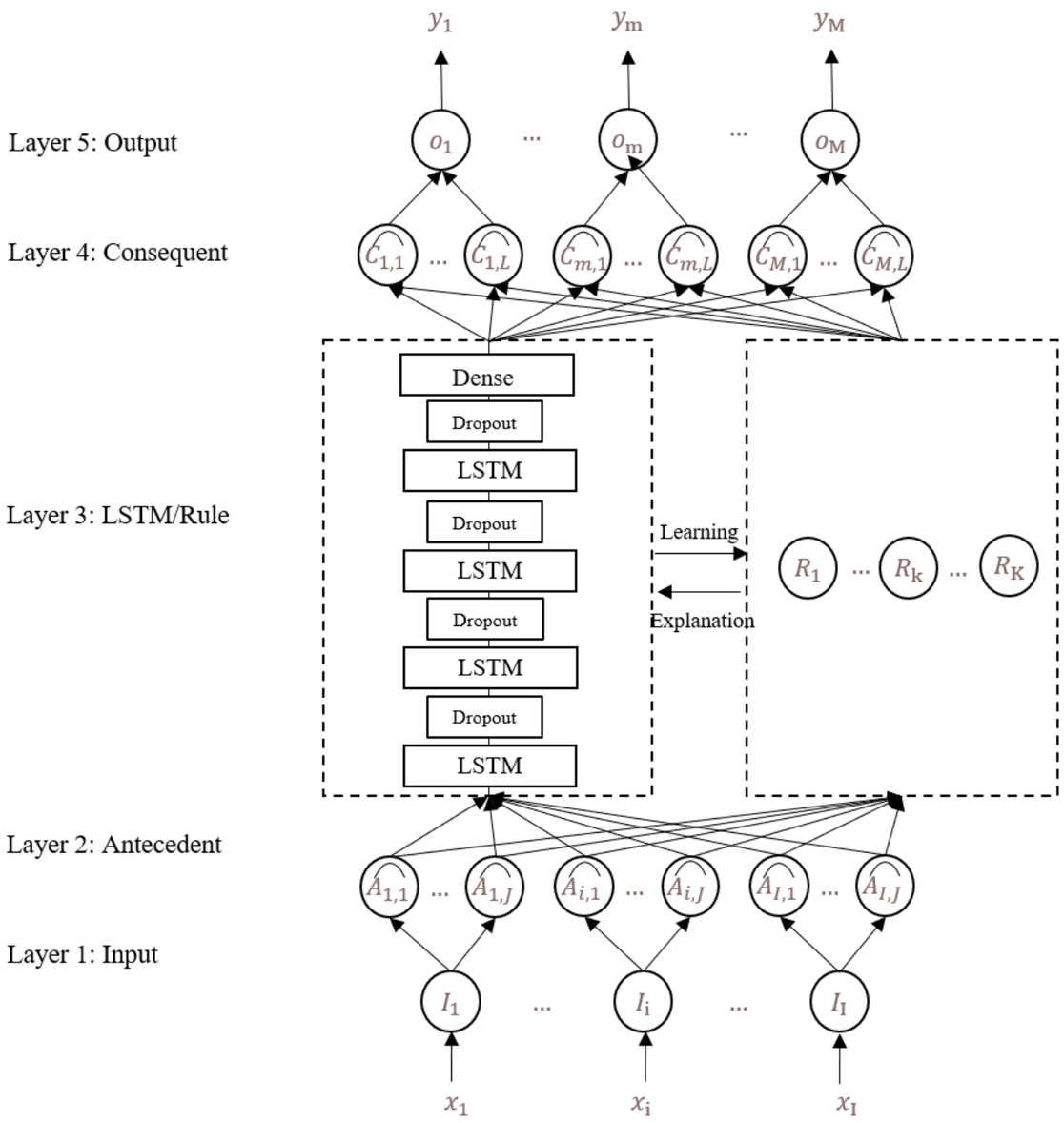
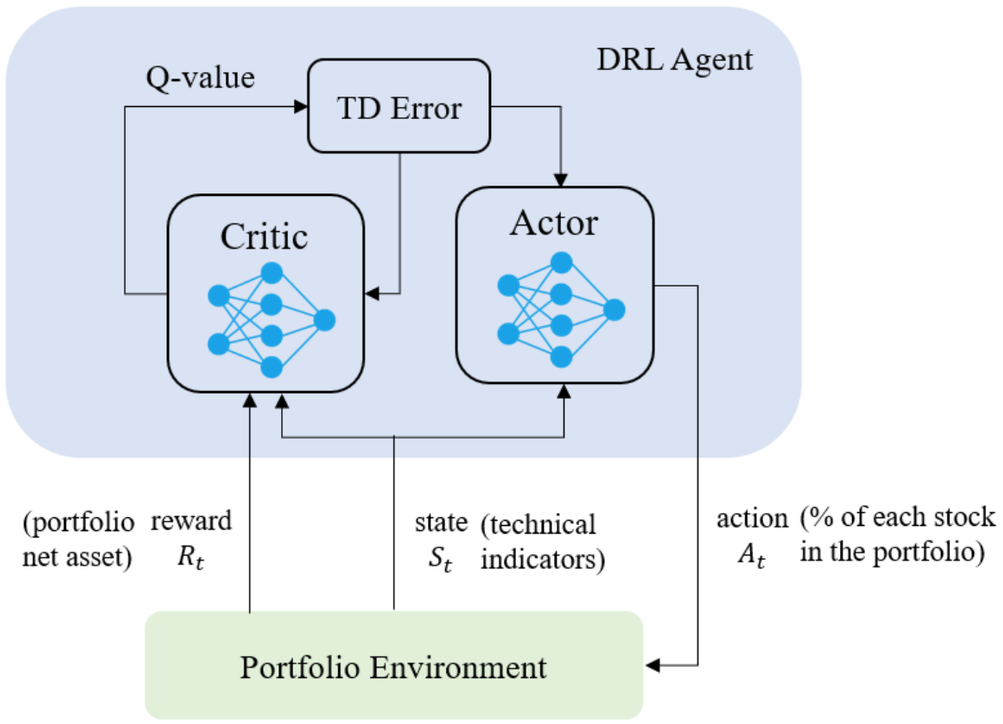
Project Objectives

1. To implement a fuzzy deep neural network architecture and apply it to predict the stock market's movements accurately.

2. To implement a deep reinforcement learning architecture and apply it to optimise portfolio allocation, and test with different portfolio constraints.

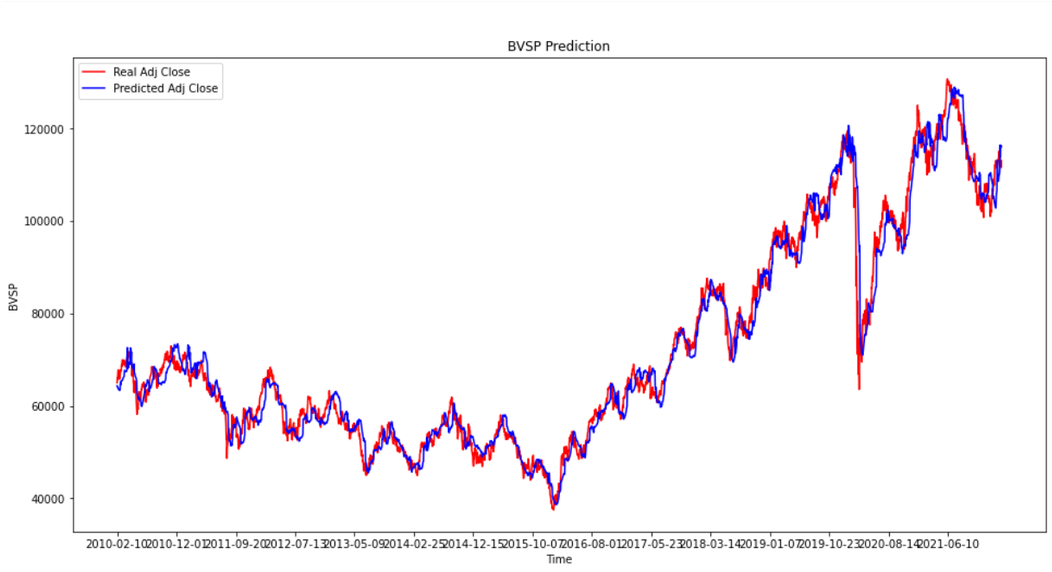
Design and Implementation



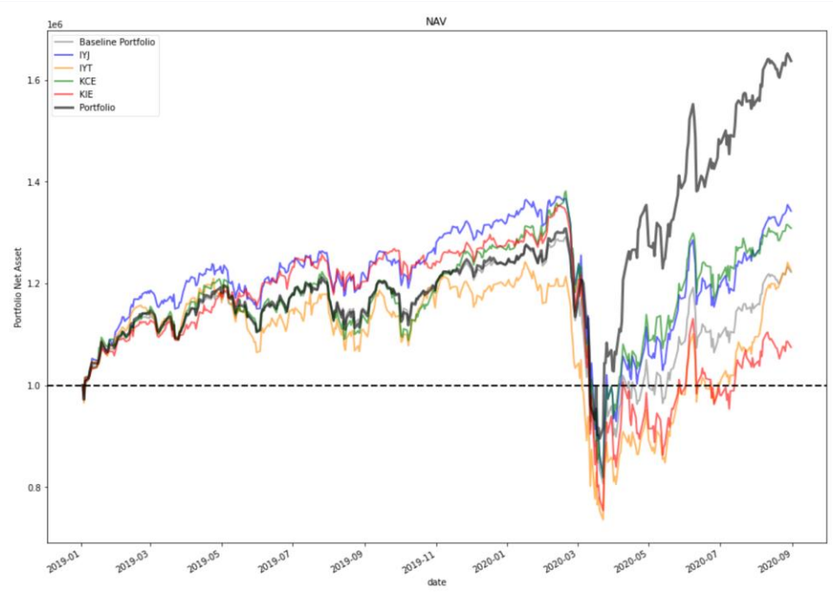


Portfolio allocation task is modelled as a Markov Decision Process (MDP) problem, using an Advantage Actor Critic (A2C) algorithm for as the agent.

Results and Analysis



R^2 values on all experiments achieved >0.98. Architecture was extended to predict 13 days' worth of lookahead values and maintained high R^2 results.



DRL architecture allowed for flexible testing with various portfolio constraints and integration with predicted stock prices using fuzzy NN, optimising portfolio performance