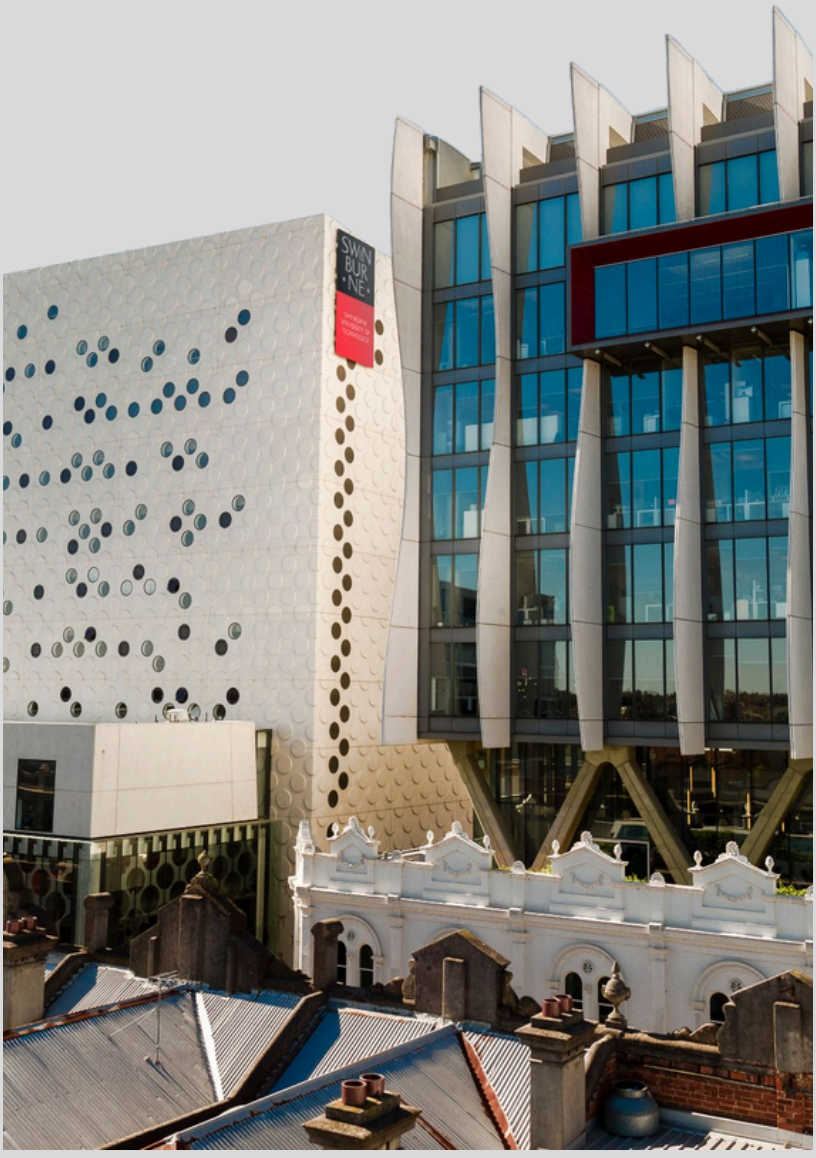
Swinburne University of Technology

TASK B.6.1 REPORT

COS30018
Intelligent Systems



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Task B.6 (Part 1)

This report analyzes the v0.6_codebase_stock_prediction.ipynb notebook to demonstrate that it successfully fulfills the primary requirement of "Task B.6 - Machine Learning 3," which is to develop a basic ensemble model combining a classical statistical model (ARIMA) with an existing Deep Learning (DL) model.

1. Development of Required Individual Models

The first step in creating an ensemble is to have multiple, distinct models. The assignment specifically required at least an ARIMA model and an existing DL model. The notebook successfully implements both.

a. Implementation of ARIMA Model:

Fulfillment: This requirement is fully met in Cell 11, titled "Train ARIMA Model".

Details: The code correctly imports the ARIMA class from the statsmodels.tsa.arima.model library. It then configures, trains (fitted_arima = arima_model.fit()), and evaluates a standard ARIMA model on the 'Close' price time series. The trained model is also saved for future use, demonstrating a complete implementation workflow.

b. Implementation of Existing DL Model (LSTM):

Fulfillment: This is shown in Cell 7, "Train LSTM Model".

Details: The notebook reuses the flexible build_model function from previous tasks to construct and train an LSTM network. This provides the necessary Deep Learning component for the ensemble.

2. Development of the Basic Ensemble Model

The core of Task 1 was to combine the predictions from the two different model types into a single, improved prediction.

Requirement Fulfillment: This is explicitly and clearly demonstrated in Cell 13, "Ensemble Modeling".

Combining Predictions: The code first loads the predictions from both the ARIMA model and the various DL models. It then creates the required basic ensemble:

Create ensembles

ensemble_arima_lstm = (aligned_arima_preds + aligned_lstm_preds) / 2.0

Weighted Average: This line of code directly implements a weighted average, giving equal 50% weight to the ARIMA predictions and 50% to the LSTM predictions, thereby combining them into a single ensemble forecast.

Evaluation: The performance of this new ensemble model is then immediately evaluated using Mean Absolute Error (MAE), allowing for direct comparison against the individual models.

Conclusion

The v0.6_codebase_stock_prediction.ipynb notebook successfully fulfills all criteria for Task 1 of the assignment. It demonstrates the implementation of both the required ARIMA and LSTM models and, most importantly, creates a functional ensemble by combining their predictions through a weighted average.

This provides a solid foundation for the more advanced ensemble experiments required in the subsequent tasks.