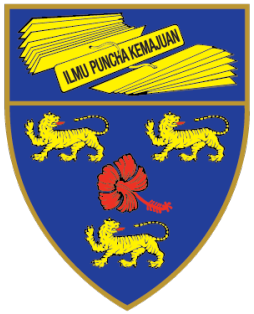

UNIVERSITI MALAYA

Forecasting with Hybrid Numerical Integration and Deep Learning

Group CSBS1

Supervisor: Dr. Suzan J. Obaiys

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Introduction

- Fields applying forecasting: Healthcare, Weather, Traffic.
- Challenges in forecasting.
- Limitations of traditional models (ARIMA, SARIMA, Statistical Methods).
- Contribution of numerical integration to forecasting.

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Problem Statement

The study addresses the accuracy and efficiency of forecasting time-series data using hybrid numerical integration and deep learning models.

Objectives

- Develop and evaluate LSTM models with numerical integration.
- Use metrics like MSE, MSLE, R^2, IA, MAPE, and sMAPE.
- Leverage time-series datasets for enhanced forecasting.

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Methodology Overview

- Dataset collection (e.g., NYC taxi passengers).
- Numerical integration methods: Trapezoidal Rule, Monte Carlo.
- Preprocessing: Trend extraction, seasonality analysis, Normalize/standardize data, dataset splitting.
- Deep learning model: LSTM.
- Hybrid model design.
- Performance metrics.

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Results and Discussion

- Comparative analysis: Numerical Integration, Deep Learning, Hybrid models.
- Visualization: Bar charts, line plots, confidence intervals.
- Discussion of hybrid model performance.

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Conclusion

- Hybrid models improve forecasting accuracy.
- Trade-offs: Computational cost vs. accuracy.

Future Work

- Explore real-time forecasting applications.
- Apply to larger datasets.
- Investigate anomaly detection.

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Bibliography