

ABSTRAK

Nama : Nizar Zaki Anggandani

NIM : 1227010051

**Judul : PERAMALAN DATA *TIME SERIES* MENGGUNAKAN
MODEL *HYBRID* ARIMA-XGBOOST**

Peramalan data *time series* berperan penting dalam mendukung pengambilan keputusan, termasuk pada sektor transportasi udara. Namun, data *time series* umumnya mengandung pola linier dan nonlinier sehingga penggunaan model tunggal sering kali belum mampu merepresentasikan seluruh karakteristik data secara optimal. Oleh karena itu, penelitian ini bertujuan menerapkan model *hybrid* ARIMA-XGBoost pada data jumlah kedatangan penumpang pesawat internasional di Bandara Soekarno-Hatta. Model *hybrid* dibangun dengan menggunakan ARIMA untuk memodelkan komponen linier, sedangkan residual ARIMA digunakan sebagai masukan XGBoost untuk memodelkan komponen nonlinier yang masih tersisa. Kinerja model ARIMA, XGBoost, dan *hybrid* ARIMA-XGBoost dibandingkan pada horizon peramalan *1-step ahead*, *3-step ahead*, dan *5-step ahead*. Optimasi *hyperparameter* XGBoost dilakukan menggunakan *Grid Search 5-Fold Time Series Cross Validation*, sedangkan evaluasi model menggunakan RMSE, MAE, dan MAPE. Hasil penelitian menunjukkan bahwa horizon terbaik berbeda pada setiap model, yaitu ARIMA pada horizon *5-step ahead*, sedangkan XGBoost dan *hybrid* ARIMA-XGBoost pada horizon *1-step ahead*. Pada horizon terbaik model *hybrid*, diperoleh RMSE sebesar 69423.12, MAE sebesar 52075.29, dan MAPE sebesar 7.31%, yang lebih rendah dibandingkan model ARIMA dan XGBoost. Hasil tersebut menunjukkan bahwa pendekatan *hybrid* ARIMA-XGBoost memberikan kinerja peramalan terbaik pada data yang digunakan dalam penelitian ini.

Kata Kunci: Peramalan *Hybrid*, ARIMA–XGBoost, *Time Series*, Horizon Peramalan, Optimasi *Hyperparameter*

ABSTRACT

Name : Nizar Zaki Anggandani

NIM : 1227010051

Title : **TIME SERIES FORECASTING USING A HYBRID
ARIMA–XGBOOST MODEL**

Time series forecasting is an essential tool for supporting decision-making across various sectors, including air transportation. However, time series data generally exhibit both linear and nonlinear patterns, making a single forecasting model insufficient to fully capture their underlying characteristics. Therefore, this study aims to apply the hybrid ARIMA–XGBoost model to forecast the number of international passenger arrivals at Soekarno-Hatta International Airport. The hybrid model employs ARIMA to model the linear component, while the residuals generated by ARIMA are used as input for XGBoost to capture the remaining nonlinear patterns. The forecasting performance of ARIMA, XGBoost, and the hybrid ARIMA-XGBoost model is compared using 1-step ahead, 3-step ahead, and 5-step ahead forecasting horizons. XGBoost hyperparameters are optimized using Grid Search with 5-Fold Time Series Cross Validation, and model performance is evaluated using RMSE, MAE, and MAPE. The results indicate that the optimal forecasting horizon differs across models: ARIMA performs best at the 5-step ahead horizon, whereas XGBoost and the hybrid ARIMA-XGBoost model achieve their best performance at the 1-step ahead horizon. At this horizon, the hybrid model achieves an RMSE of 69423.12, an MAE of 52075.29, and a MAPE of 7.31%, outperforming both ARIMA and XGBoost. These findings demonstrate that the hybrid ARIMA-XGBoost model provides superior forecasting performance for the data used in this study.

Keywords: Hybrid Forecasting, ARIMA–XGBoost, Time Series, Forecasting Horizon, Hyperparameter Optimization