

ABSTRAK

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Judul: “PERBANDINGAN MODEL HIBRIDA SARIMA-NNAR DAN PROPHET DALAM ANALISIS DATA *TIME SERIES*”.

Model hibrida SARIMA-NNAR merupakan pendekatan yang dirancang untuk meningkatkan akurasi peramalan data *time series* yang mengandung pola musiman dan non-linear. SARIMA (*Seasonal Autoregressive Integrated Moving average*) dikenal efektif menangkap komponen linear dan pola musiman dalam data *time series*. Namun, keterbatasan model terletak pada ketidakmampuan menangani pola non-linear. NNAR (*Neural Network AutoRegressive*) mampu memodelkan pola non-linear dengan baik melalui struktur jaringan saraf tiruan. Penelitian ini membandingkan model hibrida SARIMA-NNAR dengan Prophet, yaitu model peramalan adaptif untuk menangani tren musiman. Model hibrida SARIMA-NNAR dan Prophet diterapkan pada data jumlah penumpang domestik pesawat di Bandara Soekarno Hatta yang memiliki karakteristik data musiman, tren, dan fluktuasi pola acak. Evaluasi model dilakukan berdasarkan metrik MAPE untuk mendapatkan tingkat akurasi peramalan yang sangat baik. Hasil evaluasi menunjukkan bahwa pendekatan hibrida ini memberikan performa yang unggul dibandingkan Prophet dengan nilai MAPE 7.39% sedangkan Prophet memperoleh MAPE 8.77%. Analisis sensitivitas terhadap gangguan acak (*white noise*) dilakukan model Hibrida SARIMA-NNAR dan Prophet. Hasil analisis sensitivitas menunjukkan bahwa Prophet lebih tahan terhadap fluktuasi acak dalam data dengan Penurunan MAPE 8.77% menjadi 7.24% sedangkan akurasi hibrida SARIMA-NNAR menurun secara signifikan dengan peningkatan MAPE 7.39% menjadi 13.26%.

Kata Kunci: SARIMA, NNAR, SARIMA-NNAR, Model Hibrida, *Time Series*, Prophet, Peramalan.

ABSTRACT

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Title: “COMPARISON OF SARIMA-NNAR AND PROPHET HYBRID MODEL IN TIME SERIES DATA ANALYSIS”.

The SARIMA-NNAR hybrid model is an approach designed to improve the forecasting accuracy of the time series data that contains seasonal and non-linear patterns. SARIMA (Seasonal Autoregressive Integrated Moving average) is known for its effectiveness in capturing linear components and seasonal trends in time series data, but it has limitations in modelling non-linear pattern. On the other hand, NNAR (Neural Network Autoregressive) effectively models non-linear patterns through the architecture of artificial neural networks. The SARIMA-NNAR hybrid model leverages the strengths of both methods to produce more accurate forecasting results. This study aims to compare the performance of the SARIMA-NNAR hybrid model with Prophet, an additive forecasting model designed to handle trend seasonality. Both models were applied to monthly data on domestic airline passenger counts at Soekarno-Hatta International Airport, which exhibits strong seasonal patterns, long-term trends, and moderate white noise fluctuations. Model performance was evaluated using the Mean Absolute Percentage Error (MAPE) metric to assess forecasting accuracy. The evaluation results indicate that the SARIMA-NNAR hybrid model outperformed Prophet, achieving a MAPE of 7.39%, while Prophet yielded a MAPE of 8.77%. Sensitivity analysis to random disturbances (white noise) was carried out on the SARIMA-NNAR and Prophet hybrid models. The results of the sensitivity analysis showed that Prophet was more robust to random fluctuations in the data with a decrease in MAPE of 8.77% to 7.24% while the accuracy of the SARIMA-NNAR hybrid decreased significantly with an increase in MAPE of 7.39% to 13.26%.

Keywords: SARIMA, NNAR, SARIMA-NNAR, Hybrid Model, Time Series, Prophet, Forecasting.