Time-Series Forecasting Model Evaluation in South African Transport Maintenance Depots Systems,

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Abstract

This study examines South African transport maintenance depots systems within a time-series forecasting framework to evaluate risk reduction methodologies. A comparative study using ARIMA (AutoRegressive Integrated Moving Average) model was conducted. The choice was made based on its robustness in handling time-series data. The analysis revealed a significant reduction in forecast errors when employing an ARIMA(1,1,0) configuration compared to the standard ARIMA(0,1,0), indicating improved accuracy and reliability of risk assessment models. ARIMA(1,1,0) was identified as superior for forecasting maintenance costs in South African transport depots, with forecast errors reduced by approximately 20%. These findings suggest a shift towards using ARIMA(1,1,0) for future risk assessments and cost predictions in the sector. The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *South Africa, Geographic Information Systems (GIS), Monte Carlo Simulation, Random Forests, Time Series Analysis, Forecasting Models, Data Mining*

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