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FORECASTING OF PASSENGER TRAFFIC FLOW USING SMOOTHING METHODS AND ARIMA MODELS

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Introduction. In modern world, where rapid changes and instability are the norm, accurate forecasts become key to successful management of business, finance, and other industries [1]. Accurate and reliable forecasts of passenger demand allow companies to plan their decisions effectively, including flight schedules, traffic volumes, resource utilization and profitability optimization. Comparing the effectiveness of different methods allows you to identify the advantages and disadvantages of each of them, contributing to the further development and improvement of predictive models.

The study of the effectiveness of forecasting methods in the context of the company "Amadeus IT Group" can contribute to the improvement of technological solutions and increase the level of customer service in the air transportation industry. Investigating the effectiveness of smoothing methods and ARIMA models will identify their strengths and weaknesses and make appropriate improvements to obtain more accurate forecasts.

Research results.

Automatic ARIMA model (Auto ARIMA) is a powerful tool for forecasting time series. It allows to determine automatically the optimal parameters of the ARIMA model based on statistical methods The Auto ARIMA algorithm is based on finding the optimal ARIMA model by sorting through various combinations of model parameters and using criteria such as AIC (Akaike Criterion) and BIC (Bayesian Information Criterion) [2]. These criteria penalize the complexity of the model, taking into account the quality of the data fit and the number of model parameters. Models with smaller AIC or BIC values are considered better in terms of generalization and prediction. In time series analysis, the correct model should yield the highest log-likelihood and require the lowest AIC. AIC and BIC models depend on the log-likelihood, or rather, AIC and BIC use the log-likelihood. This implicitly means that the log-likelihood is high, so this method iterates through the model with different orders and specifications and returns the lowest.

Using AIC and BIC to compare ARIMA models, we calculate the AIC and BIC values for each model variant and choose the one with the lowest value. This means that the model that has the best balance between data fit and model complexity was selected.

Smoothing averages are one of the key tools in time series analysis. They are used to smooth out noise and detect trend and seasonal changes in the series. The basic idea is that each value of the smoothing average is calculated by averaging a certain number of previous values of the series.

The role of smoothing averages in revealing trend and seasonal changes in time series is that they smooth out the noise and fluctuations that may be present in the series and allow the underlying changes such as trends and seasonal fluctuations must be identified more clearly. This enables analysts and researchers to observe general trends and patterns in time series more easily. They also can be used to predict future values of a series based on past observations.

Conclusions.

During the study, a detailed analysis and comparison of the effectiveness of smoothing methods and ARIMA models in forecasting the passenger traffic of the company "Amadeus" was made. Various smoothing methods have been studied, including simple exponential smoothing (SES) and the Holt and Holt-Winters linear trend model. The ARIMA model was also investigated, taking into account autocorrelation and seasonality.

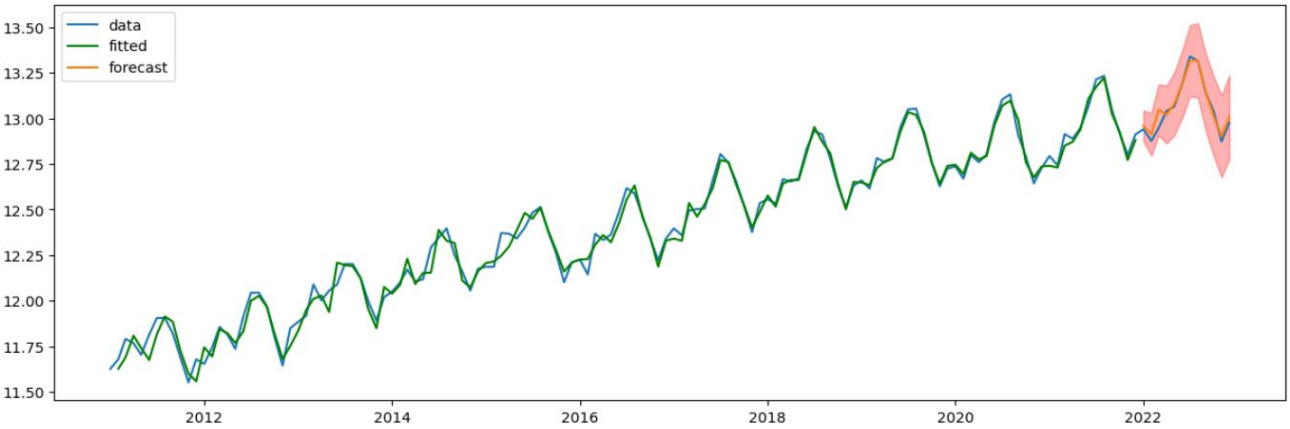

Fig.1. ARIMA(12, 1, 2) model for logarithmic values

Based on the research of the time series of passenger traffic of the airline "Amadeus", it was established that the ARIMA(12, 1, 0) model for prologarithmic values showed the best efficiency (Fig. 1) in forecasting. It is able to take into account both the trend and seasonality in the time series. The Holt-Winters model with trend multiplication and added seasonality was the next most effective.

References.

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