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Implementation the ARIMA Algorithm to Predict Used Car Auctions at the Balai Lelang Mobil Medan

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Abstract— The ARIMA model can analyze univariate data (describing data simply to find patterns within the data) that contains seasonal patterns and trends. The application of the ARIMA algorithm to automatically predict the auction prices of used cars at the Balai Lelang Mobil Medan, designing and building a web-based car auction price prediction application. Data collection for the research was conducted at the Balai Lelang Mobil Medan, and data processing was carried out at the University of Islam Sumatera Utara. The results of the research indicate that the Used Car Auction Price Prediction Application at the Balai Lelang Mobil Medan, utilizing the ARIMA algorithm, can be accessed by administrators and potential buyers, where potential buyers can predict used car auction prices based on the dataset entered by the administrator.

Keywords : ARIMA Algorithm, Forecasting, Price, Balai Lelang Mobil Medan

1. INTRODUCTION

The market for used cars has experienced significant growth, as a large number of consumers seek higher-quality, more economical alternatives while maintaining a level of quality that is competitive with new vehicle purchases[1]. An auction refers to the public sale of commodities characterized by systematic price escalation or de-escalation, conducted either in written or oral form, until the highest bid is reached, initiated by the official announcement of the auction event. The primary purpose of the auction process is to facilitate a mutually beneficial agreement between the parties involved, namely the seller and the buyer, beginning with the initiation of a transaction related to the offering of specific goods or services [2].

The Car Auction House is one of the divisions within the company responsible for conducting the auction process for used cars. Currently, many used car auction companies have implemented computerized systems, including online systems, for managing their used car auction data. However, these systems still lack features capable of predicting the auction prices for used cars. This information is undoubtedly valuable for auction participants, enabling them to determine the bid prices they should offer.

The ARIMA model can analyze univariate data (to describe data simply and identify patterns within it) that contains seasonal patterns or trends [3]. The forecasting results of the ARIMA method are more suitable for short-term use [4]. Based on this explanation, the author is interested in applying the ARIMA method to predict the auction prices of used cars..

Auction

An auction is a form of sale of goods conducted openly to the public with bidding prices that increase or decrease to reach the highest price, submitted either in writing or verbally, preceded by a notice of the auction or sale of goods. Legally, the definition of auction can be found in Article 1, point 17 of Law No. 19 of 1997 on Tax Collection by Means of a Writ of Execution, as amended by Law No. 19 of 2010, which states that an auction is any public sale conducted through oral bidding and/or through efforts to gather interested parties or potential buyers [5].

Forecasting

Forecasting is predicting one or more future events. Forecasting is an important issue that can cover many fields, including business and industry, government, economics, environmental science, medicine, social science, politics, and finance. In business, forecasting is an important factor that can influence decision-making..

2. ARIMA METHODE

Hanke states that the Box-Jenkins model, commonly known as the ARIMA model, is a combination of autoregressive (AR) and moving average (MA) models, which can represent both stationary and non-stationary time series. The general notation for the ARIMA model is: ARIMA(p,d,q) [7].

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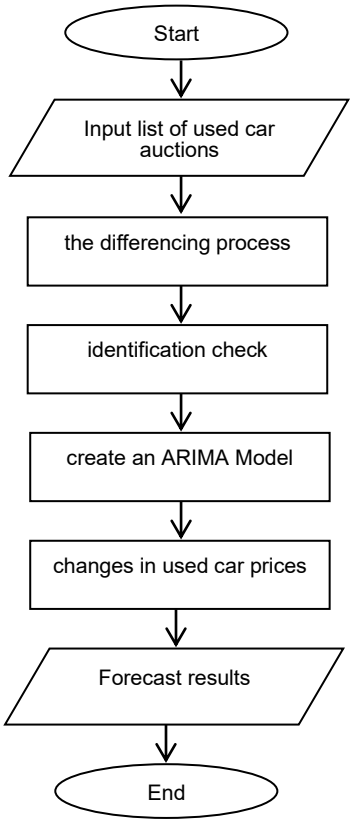

Figure 1. Flowchart of ARIMA Methode

The ARIMA method is one of the prediction methods. In the ARIMA method procedure, data stationarity in the mean can be determined by identifying the data plot and the shape of the ACF data. If the ACF shows a slow-declining pattern, it means the data is not yet stationary in the mean, so differencing is required to make the data stationary in the mean. Conversely, if the ACF shows a rapidly declining pattern, the data is already stationary in the mean.

In ARIMA estimation, if the parameters are significant, the process proceeds to determine whether the residuals are White Noise; if not, the process returns to ARIMA estimation. Once both processes are completed, the system proceeds directly to the best model selection stage, followed by traffic data forecasting, and the process is complete. The output of the ARIMA method is the data forecast results.

3. RESULT AND DISCUSSION

Implementation

This application is a system that aims to make it easier for prospective buyers to find out the predicted prices of used cars provided by used car auction houses. The display of the website implementing the ARIMA algorithm to predict used car auctions at the Balai Lelang Mobil is divided into two parts, namely the admin section and the buyer section.

Home page for administrators

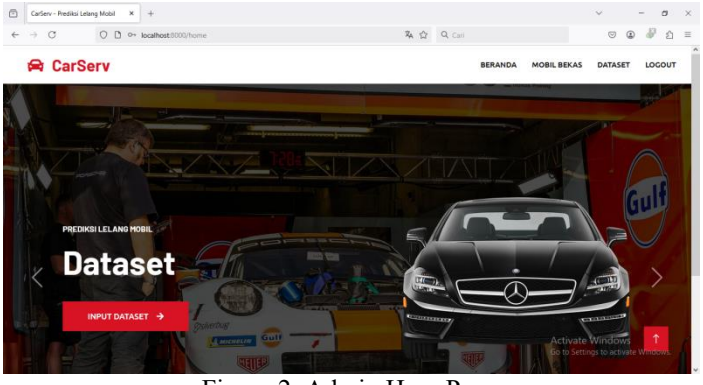

Figure 2. Admin Hom Page

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Used Car Data Input Page

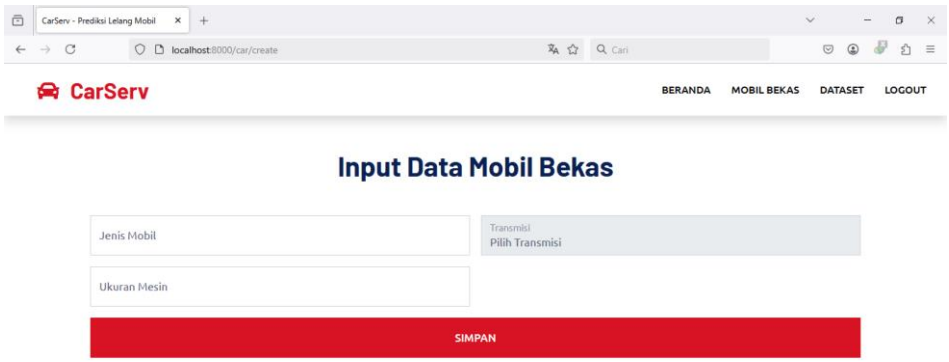

Figure 3. Used Car Data Input Page

Used Car Listing Page
If the admin wants to display a list of used cars that have been registered in the database, they can click on the Used Cars menu, and the system will display the Used Cars List page, as shown in the following image

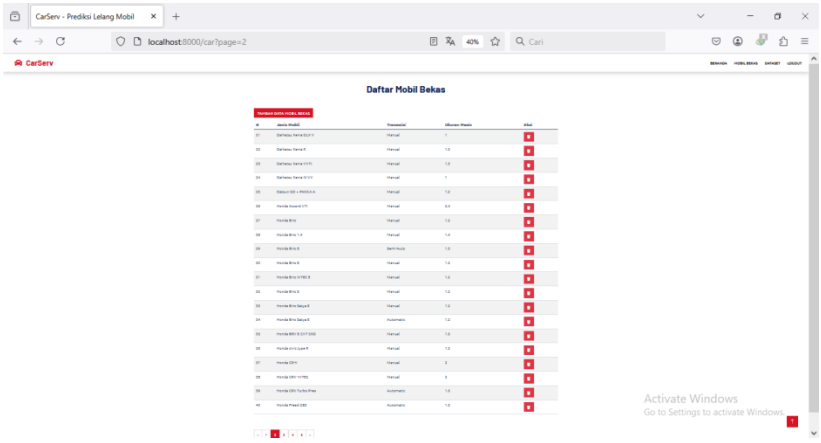

Figure 4. Used Car Listing Page

Dataset Input Page

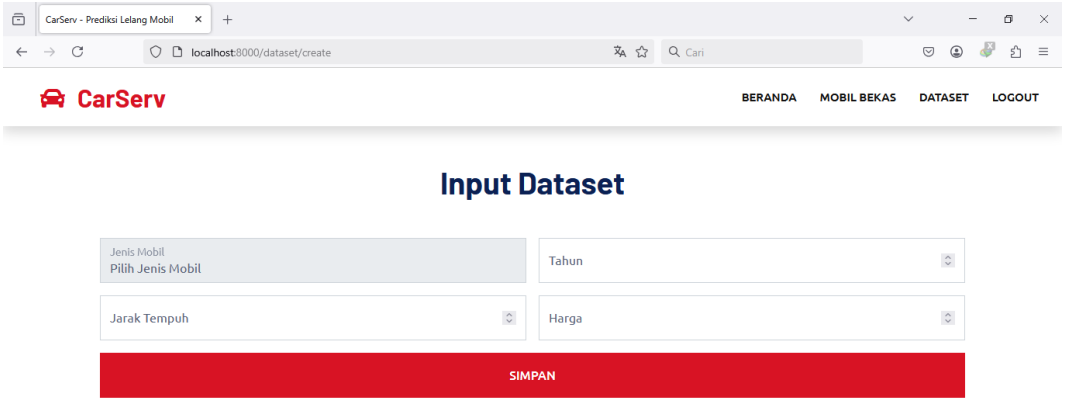

Figure 5. Dataset Input Page

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Dataset Listing Page
If admin wants to display a list of datasets stored in the database, they can click on the Dataset menu, and the system will display the dataset list page, as shown in the following image:

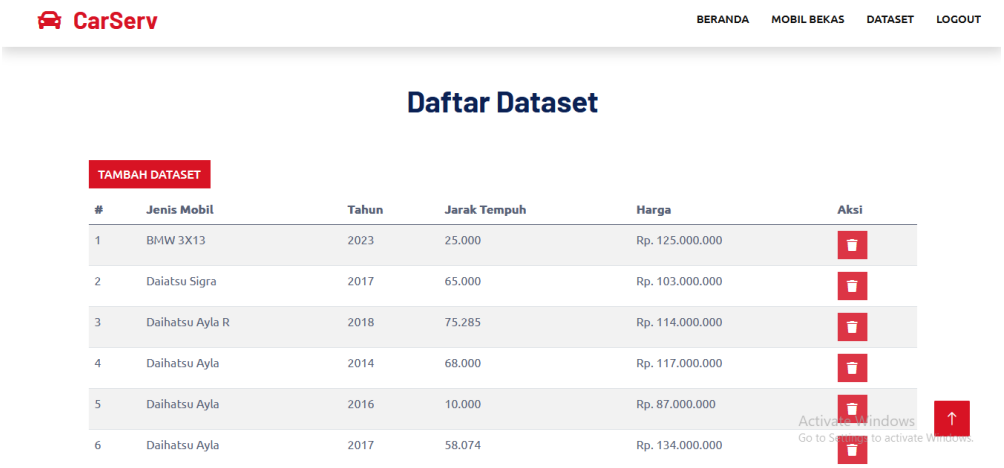

Figure 6. Dataset Listing Page

Website display for prospective buyers

User Registration Page

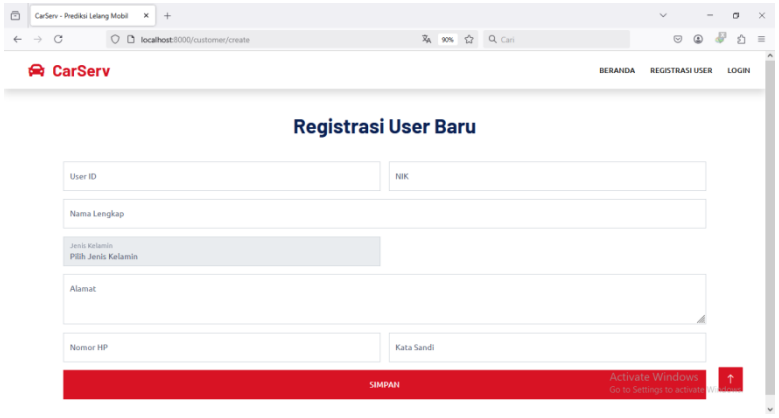

Figure 7. User Registration Page

User Home Page
Users must enter valid user data and click the save button to save the user data to the database. Once users are registered in the system, they can log in to the system.
If the login process is successful, the system will display the User Home page as shown in the following image:

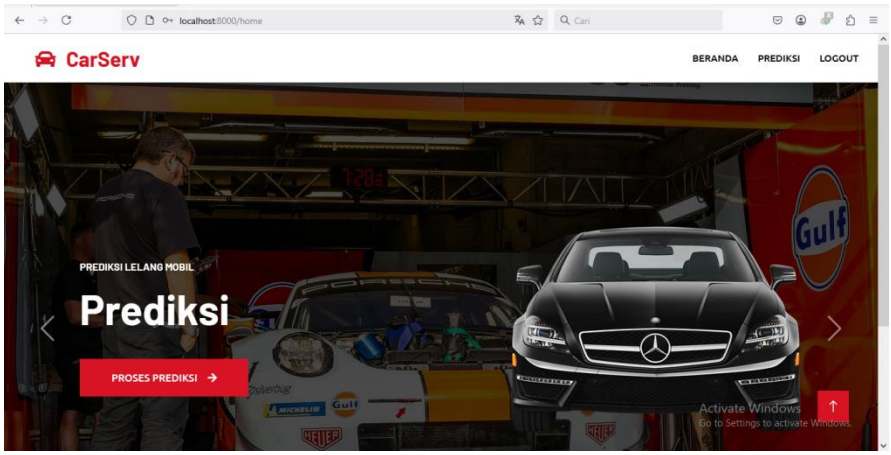

Figure 8. User Home Page

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Prediction List Page

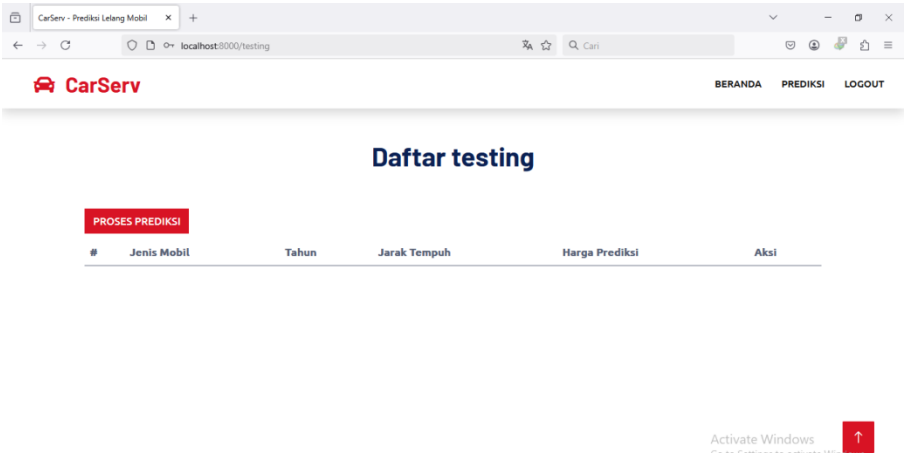

Figure 9. Prediction List Page

Prediction Page

To perform the prediction process, users can click the Prediction Process button, and the system will display the Prediction page as shown in the following image:

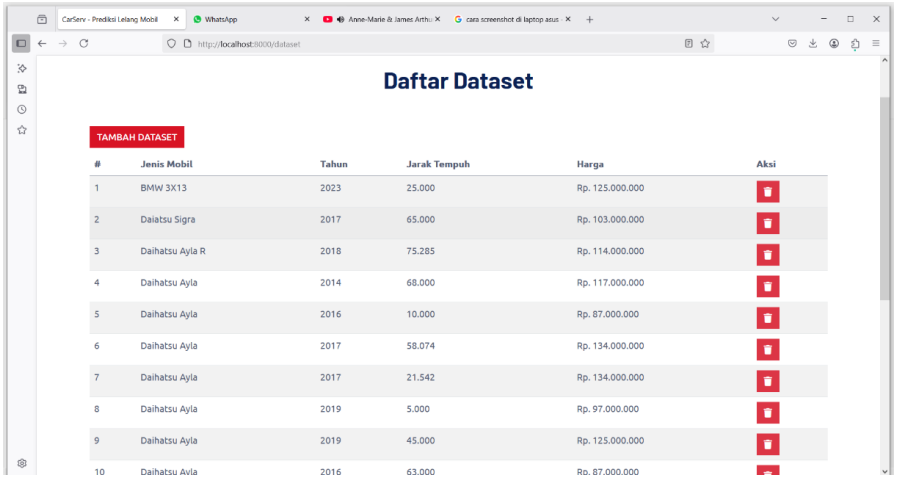

Figure 10. Prediction Page

4. CONCLUSION

The website implementing the ARIMA algorithm to predict used car auctions at the Balai Lelang Mobil Medan can be accessed by administrators and prospective buyers, where prospective buyers can predict the auction price of the used car they want. The ARIMA algorithm can be used to predict auction prices for the types of used cars entered by potential buyers. The author's suggestion is that the website could be further developed by adding features to perform other processes, such as managing auction data.

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