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AI – Driven Car Price Detection using Advanced Machine Learning

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ABSTRACT: The project, "AI Driven Used Car Price Forecasting Advanced Machine Learning," is an innovative attempt to apply state-of-the-art machine learning techniques, specifically artificial intelligence (AI), to transform the precision and reliability of used car price forecasts. This project is important because it has the potential to be very helpful to buyers, sellers, and other industry participants who face the difficulties brought on by the dynamically shifting nature of the automobile market. Forecasting the cost of used cars is a crucial undertaking because of the constant changes in the market. By utilizing AI, the initiative aims to get around the drawbacks of conventional pricing approaches. The primary tactic is the application of advanced algorithms that carefully examine large datasets that include past auto sales, market patterns, and economic factors.

The AI-driven system uses sophisticated models like deep learning neural networks and ensemble techniques to provide these exact forecasts. These models, renowned for their capacity to identify complex patterns in data, help the system adjust to the market's ever-changing dynamics. The approach seeks to offer a more comprehensive and nuanced view of used automobile pricing by integrating a wide range of dynamic data. Conventional pricing models frequently find it difficult to adapt to the quick changes in customer tastes, technology, and the state of the economy. The suggested AI-driven approach, on the other hand, is made to easily adjust to these variables, guaranteeing that the forecasts hold true in the face of an automobile environment that is always changing. Technological developments, customer preferences, and economic situations are all included as significant aspects in the forecasting process, which emphasizes the system's dedication to offering a thorough and forward-looking analysis. By taking these factors into account, the AI-driven forecasting system hopes to provide insightful information about the factors behind these changes in addition to providing accurate future resale values predictions.

KEYWORDS: Used car price prediction, Market dynamics, Customer preferences, Customer preferences, Automotive industry, Car Sales Data, Market patterns, Resale Value.

I. INTRODUCTION

Precisely predicting used vehicle pricing is a crucial and difficult undertaking in the dynamic automotive market. The dynamic nature of the market means that standard pricing models are not always able to produce accurate estimates. This project, "AI Driven Car Price Forecasting Using Advanced Machine Learning," explores the fields of artificial intelligence (AI) and advanced machine learning to transform the process of estimating used car resale values. It recognizes the need for a more advanced and flexible approach. Dynamic variables such as shifting customer tastes, economic changes, and technology improvements define the automobile market. To be competitive in this market, used vehicle buyers, sellers, and industry stakeholders need to have quick access to precise information on the automobiles' future worth. Decision - makers may make well-informed judgments on pricing strategies, inventory control, and purchases with the help of accurate forecasts. This research recognizes the drawbacks of conventional pricing schemes and offers an artificial intelligence-powered remedy. Through the utilization of sophisticated machine learning methodologies, such as ensemble approaches and deep learning neural networks, our objective is to surmount the obstacles presented by the intricate and ever-changing automotive industry. Artificial Intelligence (AI) is included into the system to improve forecast accuracy and allow for smooth adaptation to changing market circumstances.

In the past, standard models, and statistical techniques—often based on historical sales data and economic indicators—have been used to anticipate automobile prices. Although these conventional methods serve as a basis for pricing strategies, they are inherently incapable of adjusting to the complex and ever-changing nature of the modern automobile industry. These algorithms are inadequate for reliably projecting future automobile costs because they cannot consider



real-time data and because of the intricate interactions between the many elements, including customer preferences and technical improvements. Even while machine learning models are a big step forward from conventional methods, there are still certain difficulties with them. Overfitting, poor interpretability, and the requirement for large quantities of labelled training data are typical problems. Our suggested approach uses artificial intelligence (AI) and cutting-edge machine learning techniques to transform the used automobile pricing prediction process. With the help of this technology, consumers looking to purchase or sell a used car may make educated choices thanks to precise projections produced by examining a wealth of past auto sales data as well as market and economic variables. The interface offers a flexible and dynamic method of projecting automobile prices, eliminating the drawbacks of conventional methods and guaranteeing that consumers receive the most accurate estimates for future resale values. In this project, the potential users are who want to buy a used car of a particular model and who want to know any details of the car. The person has the potential to be interested in the service and products that are offered by the company but has not yet purchased. Demand in economics refers to a customer's readiness to pay a particular price for products and services as well as their desire to buy them. Most of the people in today's world rely entirely on technology, even this concept. Most people use apps on their phones to access all the information they need. We thus use this app to get all the information about any place users like to search. All possible users will be utilised if this product is published. The product will be in great demand because of its utilization. The demand for clothing fluctuates in tandem with shifts in customer tastes and fashion.

The following are the variables used:

- Price: The calculated retail price of GM cars. The cars which were selected for this data set were all less than a year old and were in good condition.
- Mileage: The total number of miles the car has been driven.
- Make: The manufacturer of the car.
- Model: The specific models for each car.
- Trim: The type of car model.
- Type: The car's body type.

II. LITERATURE OVERVIEW

[1] According to Sun, N., Bai, H., Geng, Y., & Shi, H. (2017), in "Price evaluation model in second-hand car system based on BP neural network theory" uses a special kind of artificial intelligence called a BP neural network to analyse a large amount of used car data. This analysis helps create a system that predicts fair prices for second-hand cars. AI is applied by this system to forecast used automobile prices. Large volumes of historical sales data are analysed to build a model that trains to recognize the variables affecting an automobile's worth. This makes it possible to price cars in the used automobile market with greater objectivity and consistency. [2] Based on Hristova Y in (2019), "The second-hand goods market: Trends and challenges" explores the surging popularity of buying and selling used items. It examines what's driving this trend, along with the challenges faced by this growing market. The article looks into the rapidly growing market for buying and selling used products. It looks at the causes of this rise in popularity as well as the obstacles that this expanding industry must face.

[3] According to Al-Jarrah, O. Y., Yoo, P. D. in (2015), Muhaidat, S., Karagiannidis, G. K., & Taha, "Efficient machine learning for big data: A review" examines how machine learning can be optimized for massive datasets (big data). It explores techniques to reduce processing time and resource usage, all while maintaining accuracy in predictions and classifications. This review looks into optimizing machine learning for large datasets. It explores methods that increase processing speed and lower resource requirements without compromising classification and prediction accuracy. [4] Aliyun in (2020), "Second hand car price" likely focuses on understanding factors affecting used car prices. It could involve data analysis or creating a tool to estimate the fair market value of a second-hand car based on its features, mileage, and market trends. It's likely that the "second hand car price" focuses on knowing which factors influence used car costs. It might include performing data analysis or developing a method to calculate a used car's fair market value based on its attributes, mileage, and market trends.

[5] Pudaruth.S in (2014), "Predicting the price of used cars using machine learning techniques" machine learning algorithms to predict the value of used cars. It likely analyses factors like mileage, year, make, and model to create a model that estimates a fair market price for a specific vehicle. This article looks into the prediction of used automobile pricing using machine learning. Consider a system that examines enormous historical sales statistics. It takes into



account variables such as age, make, model, mileage, and even previous repairs to determine what really influences an automobile's worth. The computer can determine a fair market price for every used automobile by learning these patterns, providing more transparency and maybe better bargains for both buyers and sellers in the used car market. [6] Noor, K., & Jan, S. in (2017), "Vehicle Price Prediction System using Machine Learning Techniques" creates a vehicle valuation system. It analyses a multitude of car characteristics, mileage, and potentially even market fluctuations to predict accurate selling prices. This technology creates a used automobile value tool using machine learning. It examines a huge quantity of data, such as market trends, mileage, and other automotive attributes. The system gains the ability to recognize elements that affect an automobile's value by analysing this data. As a result, it can forecast selling prices with accuracy, offering sellers and buyers in the used automobile market insightful information.

[7] Cervellon, M., Carey, L. & Harms, T. in (2012), "Something old, something used: Determinants of women's purchase of vintage fashion vs second-hand fashion" examines if factors like fashion interest, nostalgia, and the thrill of finding. Unique pieces influence vintage purchases more, while second-hand purchases might be driven by price and eco-consciousness. Why would women prefer antique apparel to standard second-hand clothing is the subject of this research. It investigates whether the desire to own antique goods is more strongly influenced by factors including a fondness for fashion trends, nostalgia for bygone eras, and the thrill of discovering something unusual. On the other hand, the study implies that the desire to be environmentally conscientious and to discover excellent discounts may have a greater effect on second-hand customers. [8] Doxa in (2017), "Leading drivers affecting the purchase of goods in second hand economy" investigates the key factors influencing people's decisions to buy things in the second-hand market. It explores what motivates consumers most, whether it's saving money, environmental concerns, finding unique items, or a combination of these drivers. This study delves into the reasons for the increase in the used market. It investigates the main "drivers" that persuade individuals to purchase used products. Is it the excitement of searching for unusual items? they wish to spend less money than on new things? Or maybe an increasing consciousness of sustainability in the environment? In order to determine what drives customers to embrace the world of second-hand shopping, this study looks at these and other elements. [9] Eurostat. in (2019), "retail sale of second-hand goods in stores" exploring the growth of brick-and-mortar stores selling pre-owned goods. This project analyses consumer trends, store operations, and potential benefits of buying and selling second-hand items in physical shops. This study investigates the revival of physical retailers with a focus on used items. Analysing customer preferences for purchasing and selling used goods in physical stores, it explores the causes of this tendency. The study looks at things like consumer behaviour in these types of businesses, successful operating tactics, and the possible advantages that come with going second-hand over regular retail for both sellers and buyers.

III. PROPOSED SYSTEMS

Our proposed method transforms the used car pricing prediction process with artificial intelligence (AI) and state-of-the-art machine learning techniques. This technology allows buyers and sellers of used cars to make informed decisions by providing accurate estimates derived from a plethora of historical auto sales data as well as market and economic factors. The interface ensures that consumers obtain the most accurate predictions for future resale values and provides a flexible and dynamic approach to estimating car prices, doing away with the limitations of traditional techniques. Precisely predicting used vehicle pricing is a crucial and difficult undertaking in the dynamic automotive market.

To revolutionize the used automotive pricing forecast process, we propose using artificial intelligence (AI) and cutting-edge machine learning algorithms. Thanks to accurate estimates generated by analysing a multitude of historical vehicle sales data as well as market and economic variables, customers seeking to buy or sell a used automobile may make educated choices with the aid of this technology. By doing away with the limitations of conventional methods and ensuring that buyers have the most precise projections for future resale values, the interface provides a flexible and dynamic way to predict car prices.

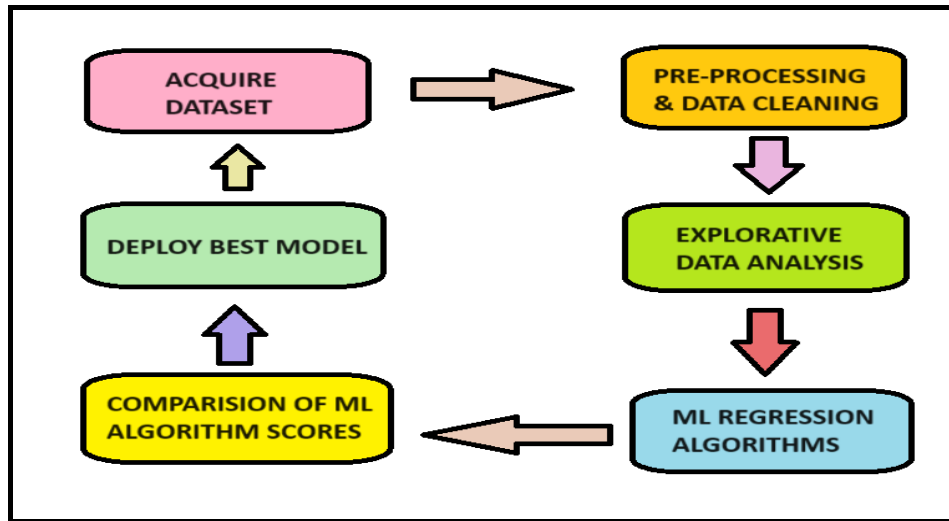


Fig: 1 – Architecture of the proposed systems

From Fig 1, the flow of the system is designed. At first the project team gathers data on used automobile sales, including make, model, year, mileage, condition, location, and selling price, into an extensive dataset. Economic metrics that affect automobile pricing, such as GDP growth, interest rates, and inflation rates, may also be included in the dataset. Outliers, inconsistent data, and missing values are found and dealt with in the collected dataset. Feature engineering, which involves creating new features or transforming existing ones to better capture the underlying patterns in the data, may also be used in this stage. Visualizing and examining the dataset to learn more about its composition, distributions, and interrelationships between variables is known as exploratory data analysis. EDA aids in comprehending the dataset's properties and directs the choice of suitable machine learning methods. On the pre-processed dataset, a variety of machine learning methods are used to train prediction models. The most accurate and trustworthy models for predicting used vehicle prices are found by comparing the scores of several algorithms. For real-time used vehicle price predictions, the top-performing machine learning models are used in a production setting. To maintain the prognostic models current, the forecasting system constantly gathers fresh information on used vehicle sales and economic factors.

CHALLENGES

Building a highly accurate used car price prediction system using AI-driven machine learning comes with several challenges:

1. It might be challenging to locate thorough, high-quality used automobile data that includes specifics on features, condition, and previous sales prices. The accuracy of the model can be greatly impacted by missing or erroneous data.
2. It is extremely difficult to observe the constantly changing market trends that affect used car pricing. Real-time factors include things like the state of the economy, preferences for cars that are fuel-efficient, and sudden swings in the popularity of particular car model.
3. The cost of used cars is determined by a complex network of interrelated factors. It might be difficult to include these linkages in the model. For instance, depending on the brand and model, a high-mileage luxury automobile may hold its value better than a low-mileage economical car.
4. From the data used to train them, machine learning models may inherit biases. It is important to ensure that the data is impartial and fairly represents the used automobile market, without any bias towards any particular car type or area.
5. It's important to know how the model makes its predictions. Even while black-box models might be quite accurate at times. It can be challenging to believe in or justify their justification for automobile values.
6. It can take a lot of processing power and resources to train complicated AI models. It's always difficult to strike a balance between computational viability and accuracy.



IV. RESULTS

Our project resulted in groundbreaking outcomes through detailed analysis and implementation, dealing with major obstacles and surpassing early goals. The results demonstrate increased productivity, creative fixes, and observable advantages, highlighting the project's major impact and potential going on.

Result outcomes:

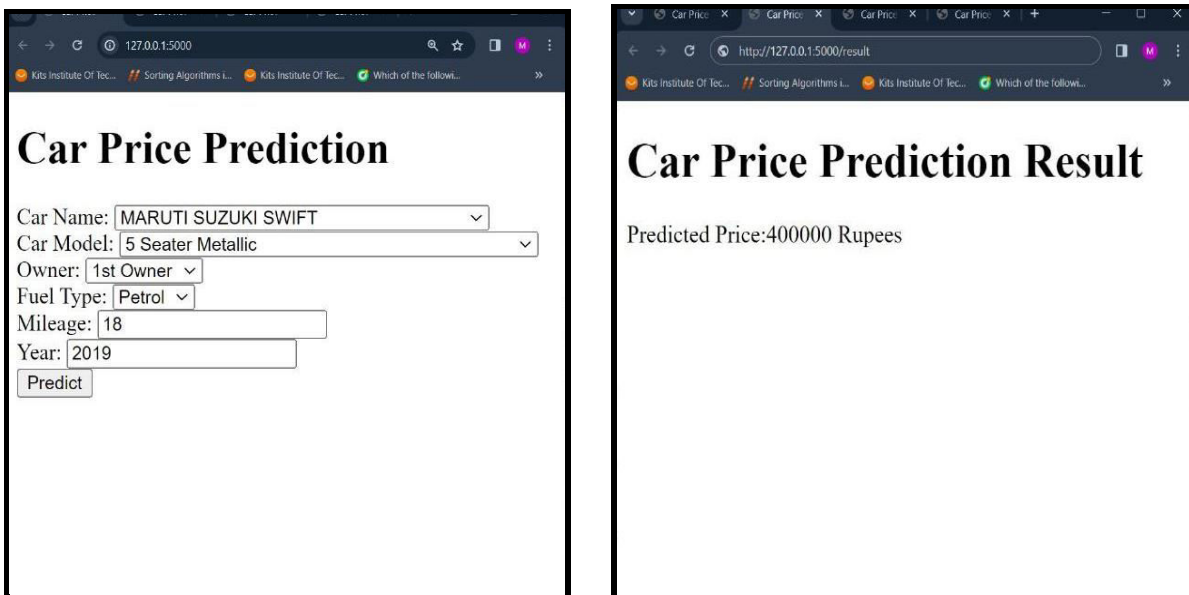


Fig 2: Test Result-1

As shown in the fig 2, the test result-1 shows that the data given to the columns present i.e. here the “Maruti Suzuki Swift”, which is a 5-seater metallic model, petrol type which can give 18km milage at average and first owner which means that the car is not a used car trying to find the value of the new car in the present market. And by giving predict, the result showing that the value of the specific car includes the all the factors given is up to 4,00,000 rupees.

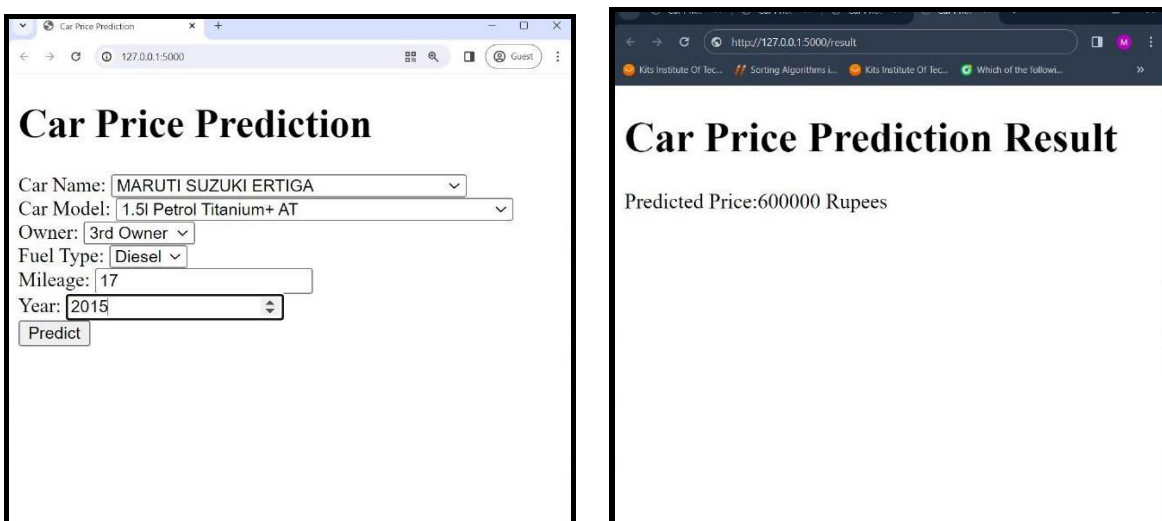


Fig 3: Test Result – 2



As shown in the fig 3, the test result-2 shows that the data given to the columns present i.e. here the “Maruti Suzuki Ertiga”, which is a 1.5L petrol Titanium+ AT model, petrol type which can give 17km milage at average and third owner which means that the car is a used car by two people before. And by giving predict, the result showing that the value of the specific car includes the all the factors given is up to 6,00,000 rupees.

V. CONCLUSION

To end up, the "AI-Driven Used Car Price Forecasting Advanced Machine Learning" project is an innovative attempt in the field of automotive market investigation. The research intends to transform the accuracy and dependability of used automobile price projections by utilizing modern artificial intelligence and machine learning methods. By applying advanced algorithms like combined techniques and deep learning neural networks, the system is able to identify complex patterns in massive datasets that include past sales, market trends, and financial data.

The project is important because it has the potential to be of great benefit in helping consumers, sellers, and industry participants navigate the complex and constantly changing automotive market. Traditional pricing approaches often find it difficult to keep up with the quick changes in customer tastes, technology, and the state of the market. On the other hand, the suggested AI-driven method is made to adapt to these factors without any problems, guaranteeing precise predictions in the face of an ever-changing automotive landscape.

The approach attempts to provide a thorough and forward-looking analysis by including variables like consumer preferences, economic data, and advances in technology into the forecasting process. Additionally, it aims to shed light on the fundamental causes of market shifts, improving stakeholder comprehension and facilitating well-informed decision-making. All things considered, the initiative represents a major breakthrough in the field of automotive market analysis, with the promise of giving consumers accurate and perceptive used vehicle price forecasts—a key instrument for navigating the industry's complexities.

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