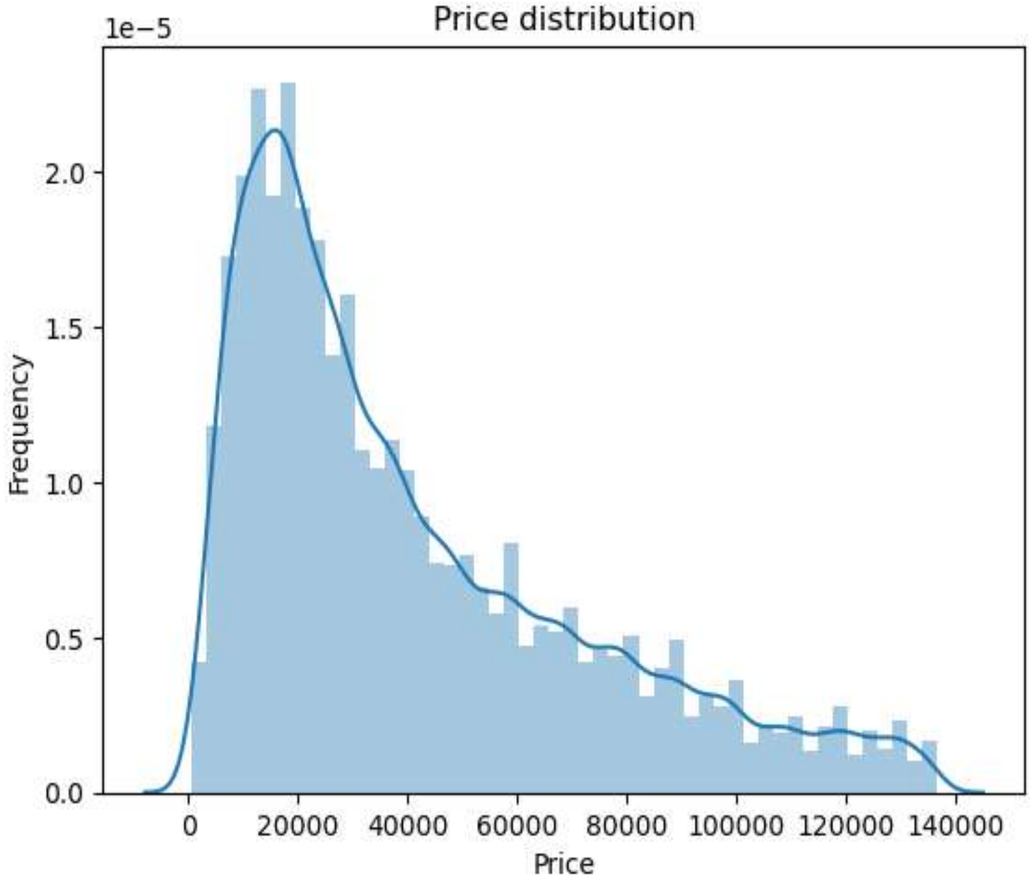
Car Sales AI-ML Case Study

Refer to the number of vehicles sold within a specific time period. The car sales could be used to analyze trends in the automotive industry, such as shifts in consumer preferences, changes in demand for specific types of vehicles, and the impact of economic factors on the industry.

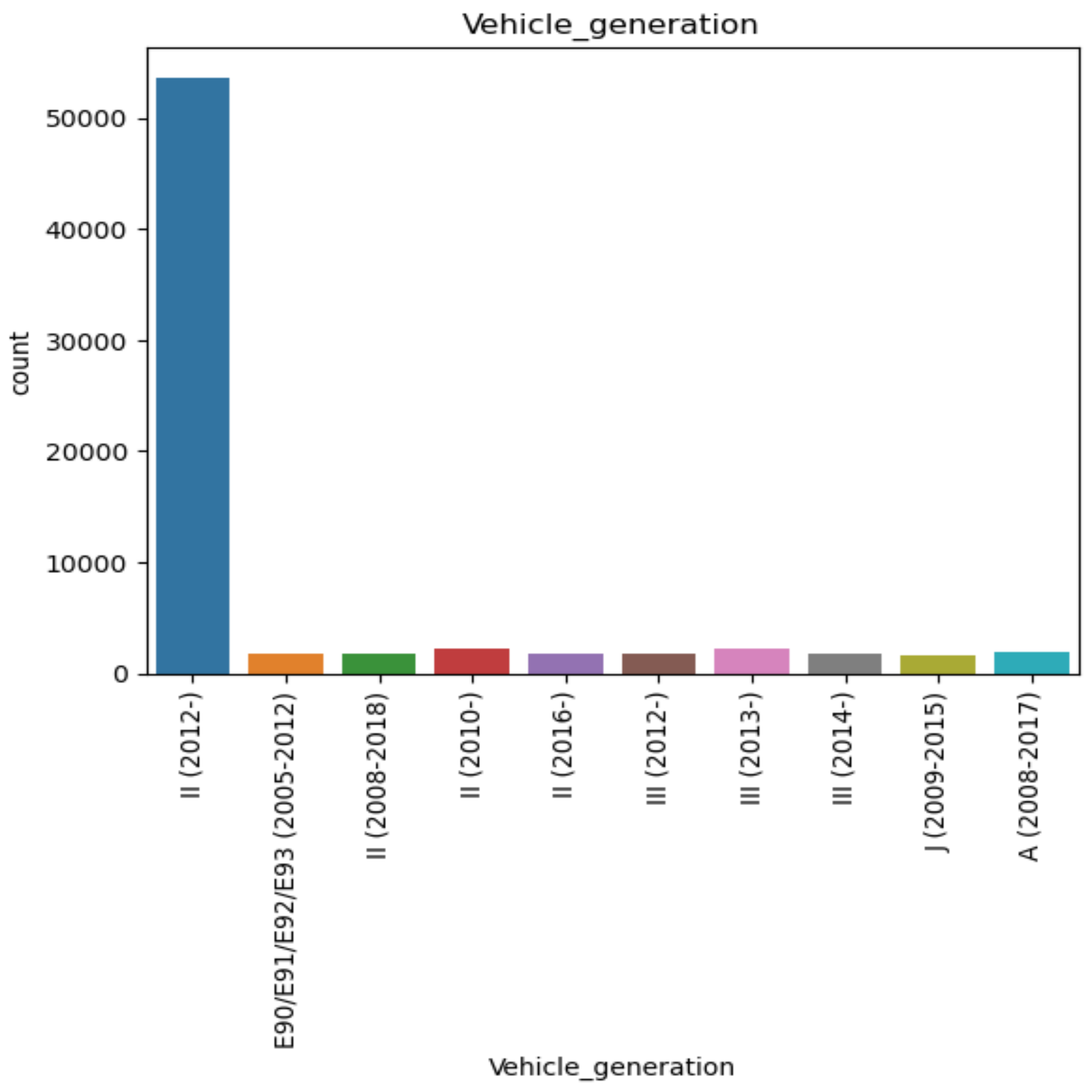
Businesses could use the data to inform their sales and marketing strategies, as well as to assess the performance of their competitors in the market. Additionally, policymakers and analysts could use the data to assess the health of the automotive industry and its impact on the broader economy.

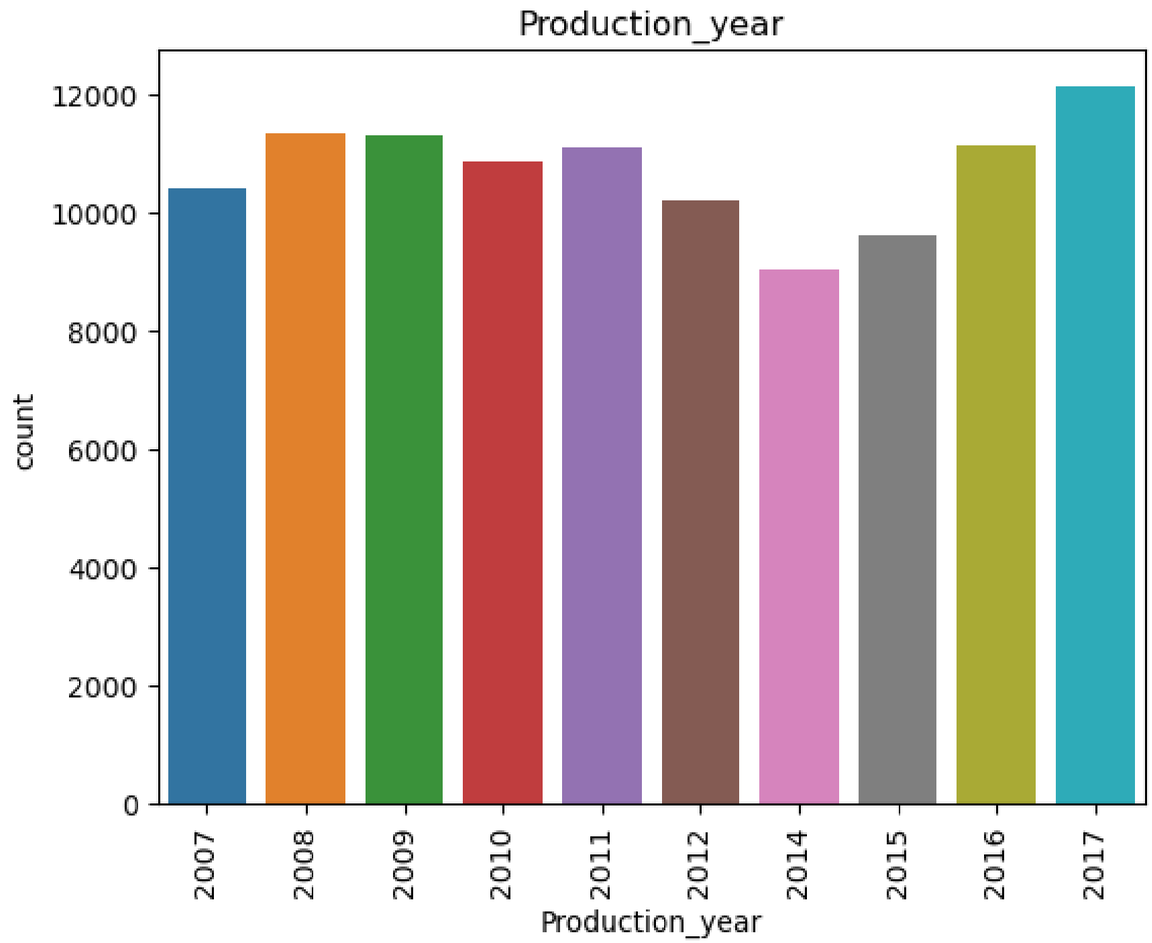
The main aim of the project is to predict the sale of cars and identify the features which determine the sale of a car.



- The most price distribution is from 0 to 40,000.
- This means that customers favour cars which have a price range below 40,000 USD

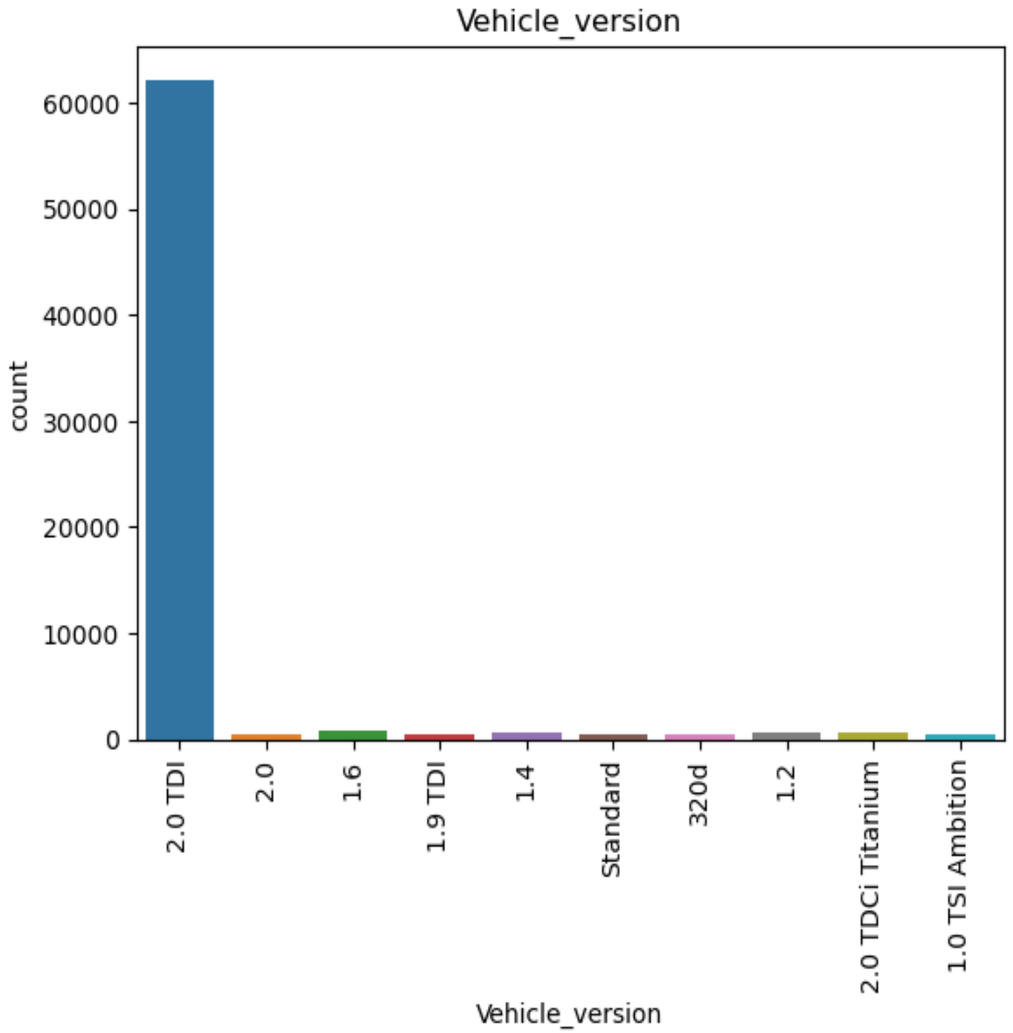
Features Responsible

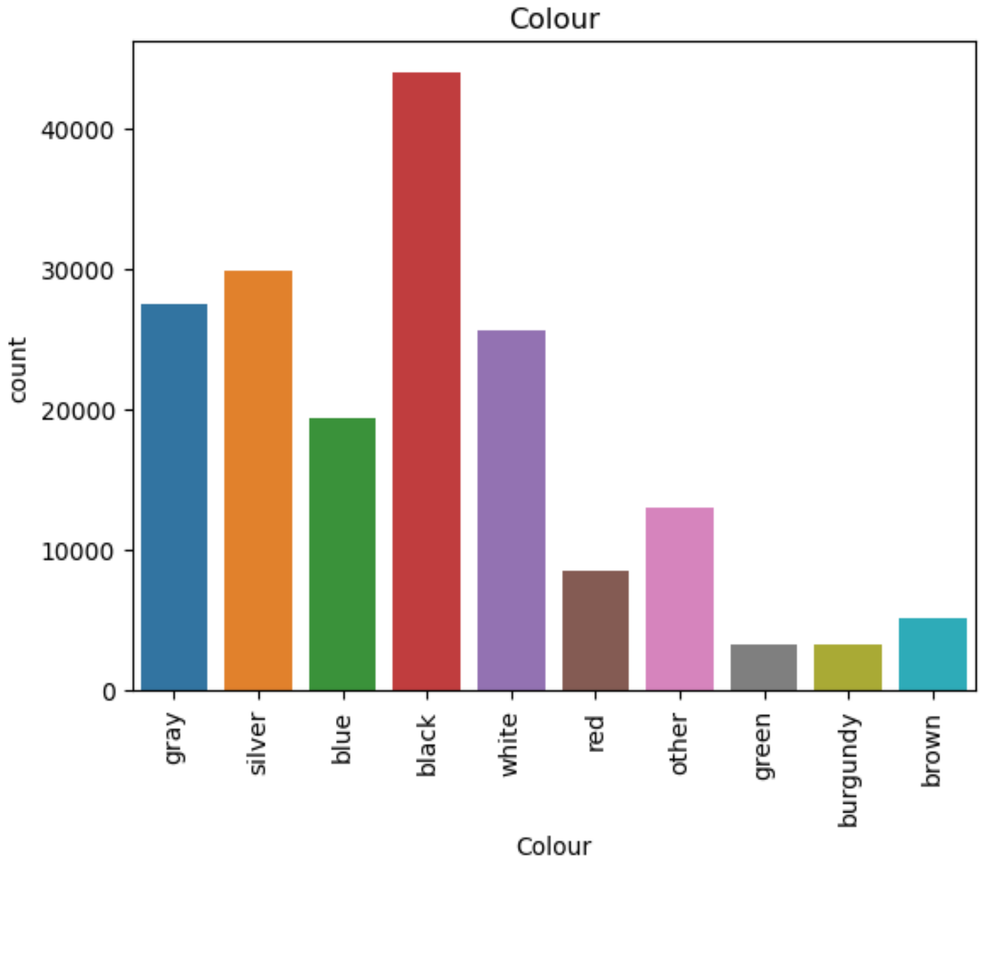




- **Vehicle Generation** : generation of vehicle in offer
- A generation is typically defined as a group of vehicles that share a common platform, design language, and technology. When a new generation of a vehicle is introduced, it often attracts a lot of attention from consumers, as it may have improved features, better performance, and a more modern design.

- **Production Year** : year of car production
- The production year of a car can impact car sales through factors such as newness, availability, price, and safety and technology features. Consumers may be more likely to purchase a car that feels new, has the latest features, is priced within their budget, and has advanced safety and technology features.





- **Vehicle Version** : version of vehicle in offer
- The version of a vehicle can impact car sales through factors such as features and options, price, brand perception, marketing and promotions, and competition. Automakers must carefully consider these factors when designing and marketing different versions of their vehicles to appeal to different segments of the market.

- **Colour** : car body color
- The color of a vehicle can impact car sales through factors such as personal preference, popularity, resale value, climate and geography, and brand perception. Automakers must carefully consider these factors when choosing which colors to offer for their vehicles to appeal to different segments of the market.

Auto-ML Methodology Results

Algorithms	Test Accuracy (25 percentile)	Test Accuracy (50 percentile)	Test Accuracy (75 percentile)	Test Accuracy (90 percentile)
Lasso	52.9	64.1	67.6	67.7
Random Forest	89.8	91.7	92	91.9
XGBoost	89.4	91.7	92.2	92.2
MLP	23.2	32.3	54.8	49.2
RNN	74.2	82.9	69.8	83.9
Total Features	6	11	18	20
Avg. Accuracy	65.9	72.54	75.28	76.98

Based on our observation , XGBoost was the best performing algorithm with 92.2% accuracy in 90th percentile and 90th percentile is the best percentile with an average accuracy of 76.98%.

Conclusion

In conclusion, predicting car sales is a critical problem in the sales industry that can benefit from Auto-ML models. By leveraging historical sales data, market trends, and other relevant variables, Auto-ML models can accurately predict future car sales, allowing businesses to make informed decisions about inventory, production, and marketing. The dataset has 185655 records with 14 Categorical Features and 6 Numerical Features.

For regression, models were created with algorithms using Auto-ML techniques like Lasso, Recurrent Neural Network, Multilayer Perceptron, Random forest and XGBoost . With these models, performance measurement values were obtained for feature sets of 6, 11, 18 and 20. The Auto-ML algorithms were able to predict car sales with an average accuracy between 65% – 77% and helped to identify factors that determine the car sales. The major factors include Vehicle generation, Production year , Vehicle version and color of the vehicle. The Random forest with 92 % accuracy in 75th percentile where tree showed a threshold of car power>= 121 HP and production year > 2015 which will leads to cars with higher prices.

Overall, the application of Auto-ML in predicting car sales is a powerful tool that can help businesses in the sales industry to optimize their operations, improve profitability, and provide better customer service.