IE 5318 - APPLIED LINEAR REGRESSION

SIMPLE LINEAR REGRESSION PROJECT REPORT

CAR RESALE VALUE

<u>TEAM MEMBERS</u>

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We did not provide or receive any help on this proposal and the proposal submitted is entirely our own work.

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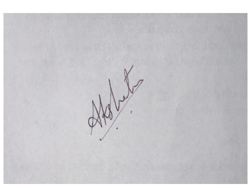
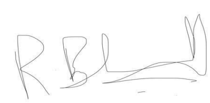
	V. V. Hirve	

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PROPOSAL

PROBLEM STATEMENT - Simple Linear Regression Analysis for predicting car resale prices in India.

PROJECT BACKGROUND - The dataset is obtained from https://www.kaggle.com/datasets/rahulmenon1758/car-resale-prices and it contains information of Car resale prices all over the cities from India in an unclean format, updated as of August 2023. We are focusing on four key predictor variables: kilometers driven, manufacture year, mileage, and engine capacity. Understanding how these factors influence resale prices will help both buyers and sellers make more informed decisions. The project seeks to provide insights into the used car market's dynamics, emphasize the significance of each predictor variable, and enhance market transparency and efficiency.

VARIABLES - The dataset under consideration includes several variables, with a focus on the following:
Manufacture Year (make year): The age of the car, as represented by the manufacture year, is a critical factor in determining its resale price. Newer cars tend to have higher resale values.
Mileage: Mileage not only accounts for the distance driven but also takes into consideration driving conditions and habits. Low mileage typically indicates a car that has been driven less.
Engine Capacity: Larger capacities are associated with more power, potentially increasing resale value, while smaller capacities can lead to better fuel economy, appealing to efficiency-conscious buyers.
Kilometers Driven: This variable quantifies a car's usage and potential wear and tear. It is crucial for assessing the car's overall condition and performance.

SIGNIFICANCE OF MODELING: Modeling this dataset is meaningful for several reasons:
Informed Decision-Making: A reliable predictive model empowers both buyers and sellers with data-driven insights. Buyers can assess the fairness of a price, and sellers can determine a competitive yet profitable asking price.
Financial Planning: Given the significant financial investment involved in buying a car, understanding how its value will change over time is crucial for personal finance planning.
Market Transparency: The model can offer insights into how different variables impact resale prices, thereby shedding light on market dynamics and consumer preferences. This contributes to greater market transparency and efficiency.
Economic Impact: The used car market plays a vital role in the Indian economy. Accurate pricing can facilitate smoother transactions, stimulate demand, and support economic growth.

PREDICTOR VARIABLE SELECTION: Make year holds a crucial role as a predictor variable for car resale prices in India. This significance is reinforced by the **strong linear relationship** we've observed from the dataset, making it the variable with the best linear fit when compared to mileage and engine capacity. Additionally, the strong depreciation effect makes newer cars more reliable and desirable, leading to higher resale prices. Consumer preference for updated safety features and technology in newer models further drives this trend. Additionally, market norms in the used car market are shaped by the prices of recent models, influencing the value of older cars.

SCATTER PLOTS

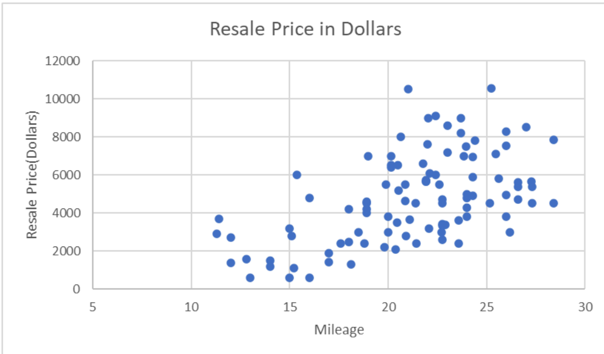

Figure 1: Scatter Plot Mileage VS. Resale Price

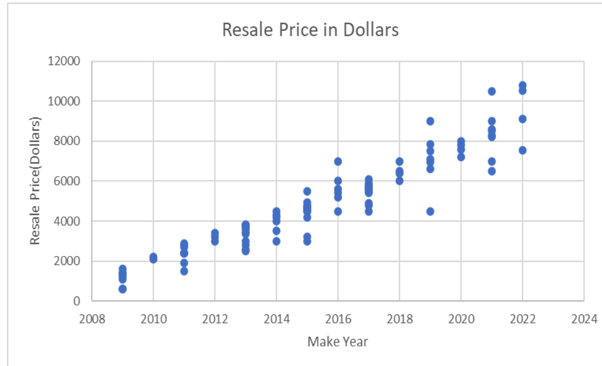

Figure 2: Scatter Plot Make year VS. Resale Price

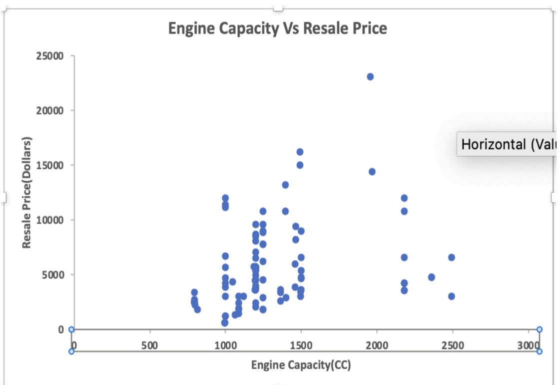

Figure 3: Engine Capacity VS. Resale Price

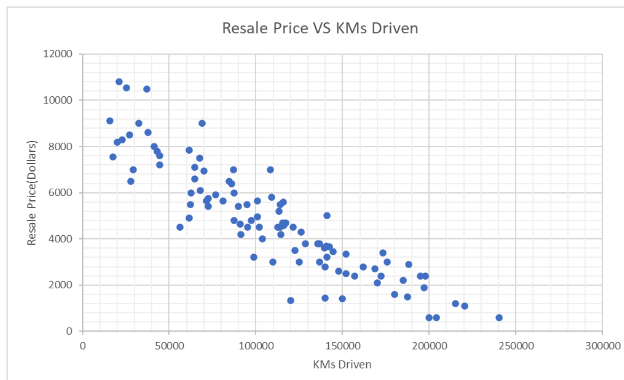

Figure 4: KMs Driven VS. Resale Price

In order to examine the relationship between response and predictor variables, scatter plots have been created using Excel.

Figure 1: Resale price and mileage have a somewhat linear but not ideal relationship. Attempting a regression line would exclude data points, resulting in more outliers compared to Figure 2.
Figure 2: Resale price and Make Year exhibit the best linear relationship. A proper regression line fits most data points, leaving only three outliers.
Figure 3: The relationship between resale price and the engine capacity is nonlinear, making it unsuitable for a regression line.
Figure 4: The relationship between resale price and the KMs Driven is perfectly linear. Making it stable to fit a regression line.

CONCLUSION

In summary, our project proposal lays the foundation for a predictive model designed to estimate car resale values in India for 2023. We aim to empower both car buyers and sellers through data-driven insights. By leveraging key predictor variables, including make year, mileage and engine capacity, we anticipate improving market transparency, supporting informed decision-making, and fostering economic growth within the Indian used car market.

REPORT

INTRODUCTION

In our in-depth analysis of car resale prices for the year 2023, we have chosen a vast dataset of 17,447 unique entries. From this extensive pool, we selected a representative sample of 100 observations, each consisting of attributes having information on used cars. The data is selected for a specific model of the car while the dataset has a variety of information for a wide range of models. Within this dataset, we identified the 3 most influential variables: make year (representing car age), mileage, and engine capacity, which have an impact on the valuation of pre-owned vehicles.

Of these variables, the "make year" particularly caught our attention, revealing a distinct linear pattern in relation to the car's resale price. We conducted an in-depth Simple Linear Regression Analysis, using the "make year" as our predictor variable and the "price" as our response variable. This approach will help us understand how a car's age directly influences its resale price.

Furthermore, to enhance the accessibility and relevance of our findings, we converted the resale prices from Indian Rupees to U.S. Dollars. Additionally, the technical aspects of our analysis like graphs were meticulously plotted using SAS, while calculations were conducted both manually and through Excel, ensuring accuracy and reliability.

SIMPLE LINEAR REGRESSION MODEL

We have established that the "make year" is the most suitable predictor for car resale price, we will now proceed to conduct a thorough Simple Linear Regression (SLR) analysis. This analysis involves SAS to perform a Simple Linear Regression on a dataset comprising 100 data points. In this regression, "Resale Price" (Y) will serve as the response variable, while "Make Year" (X) will be our predictor variable.

Model Form: $\boldsymbol{Y_i} = \beta_0 + \beta_1 \boldsymbol{X_i} + \in$

Where, i = 1, 2, 3, ……... n observations.

$\boldsymbol{X_i}$ - value of Make Year (independent variable) in the i^{th} trial.

$\boldsymbol{Y_i}$ - value of Resale Price (dependent variable) in the i^{th} trial.

β_0 - y - intercept

β_1 - slope of the fitted line

$\in$ is the error term.

n = 100

Fitted Model: $\hat{Y} = b_0 + b_1 X_i$ *and* Point estimators: b_0 *and* b_1

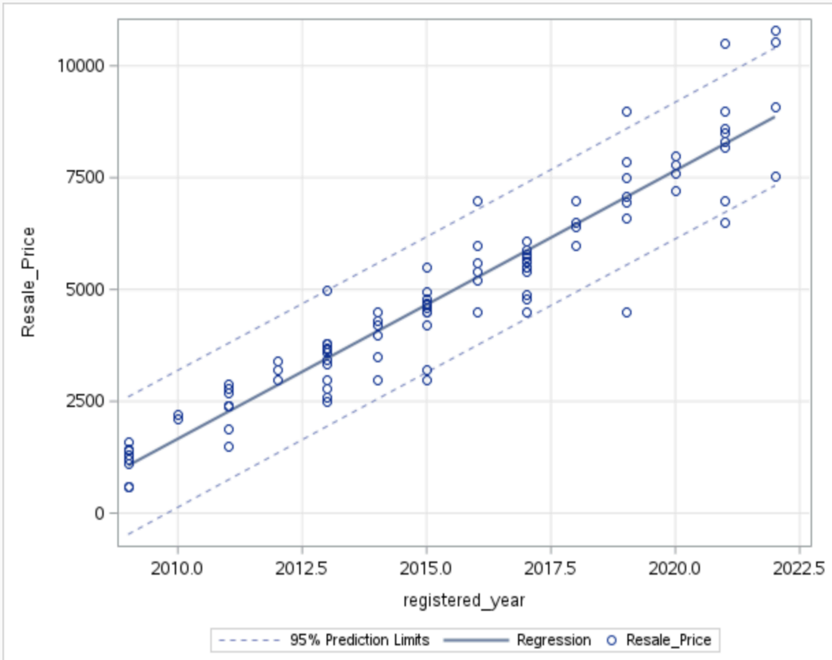

Figure 5: Fitted Regression Line (registered_year Vs. Resale_Price)

The REG Procedure
Model: MODEL1
Dependent Variable: Resale_Price Resale_Price

Number of Observations Read	100
Number of Observations Used	100

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	498474313	498474313	862.91	<.0001
Error	98	56611131	577665		
Corrected Total	99	555085444			

Root MSE	760.04250	R-Square	0.8980
Dependent Mean	4823.40000	Adj R-Sq	0.8970
Coeff Var	15.75740		

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	-1203876	41147	-29.26	<.0001
registered_year	registered_year	1	599.77066	20.41746	29.38	<.0001

Table 1: Analysis of Variance with Parameter Estimates

The aforementioned Table 1 represents the ANOVA Table where, the Degree of Freedom of the model is 1, the value of Regression Sum of Squares (SSR) is 498474313 and the value of Mean Square Regression (MSR) is 498474313,whereas the value of Error Sum of Squares (SSE) is 56611131and the value of Mean

Square Error(MSE) is 577665 having a Degree of Freedom (n-2) = 98. Moreover, the value of the Total Sum of Squares (SSTO) is 555085444 and its Degree of Freedom is (n-1) = 99.
Hence, the fitted line equation would be **Resale Price** = -1203876.416 + 599.71 * **Make Year**
The p-value is also less than .0001 and the estimated F value is 862.91. Since F value is >> 1 and the p-value is < α, this indicates that the model is statistically significant and there exists a linear relationship between the predictor and the response variable. The R^2 (coefficient of determination) value is 0.8980, indicating that the regression model fits the observed data by 89.80%. The parameter estimates table shows the estimate of intercept b_0 is -1203876.41 and estimate of slope of the line b_1 is 599.77.

INFERENCES OF PARAMETERS

A) SLOPE

Confidence Interval for the Slope:
H_0: $\beta_1 = 0$
H_1: $\beta_1 \neq 0$
Using a significance level of 0.05, a confidence interval (CI) for the slope (β_1) is as follows.
n = 100; α = 0.05
For a 95% Confidence interval:

$b_1 \pm t\,(1-\alpha/2\,,\ n-2)\, s\{b_1\}$
b_1= 599.771 ...From Parameter Estimates Table

$t\,(1-\alpha/2\,, n-2)$
= t (1-0.05 /2, 100-2)
= t(0.975, 98)
= 1.661
$s\{b_1\} = \sqrt{}\text{MSE}/ \sum(X_I - \bar{X})^2$

From the figure 5,
MSE = 577664.6; Mean $(\bar{x})$ = 2015.27
$\sum(xi - \bar{x})2$= 1385.71 …refer Appendix

$s\{b1\} = \sqrt{}$ (577664.6/1385.71)= 20.417

So, for 95% Confidence interval,
599.771 ± 1.661*(20.417)
CI for b_1= (565.888, 633.683)
Conclusion: We are 95% confident that the slope lies between 565.888 and 633.683. With a 95% level of confidence, we reject the null hypothesis as the confidence interval does not contain 0.
Hence, we conclude that there is a linear relationship between Make Year and Resale Value.

B) INTERCEPT

Confidence Interval for y-intercept

H_0: $\beta_0 = 0$

H_1: $\beta_0 \neq 0$

Using a significance level of 0.05, a confidence interval (CI) for the y-intercept (β_0) is as follows.

n = 100; α = 0.05

For a 95% Confidence interval:

$b_0 \pm t\,(1-\alpha/2\,,\; n-2)\; s\{b_0\}$

b_0= -1203876.416

$t\,(1-\alpha/2\,, n-2)$= t (1-0.05 /2, 100-2)= t(0.975, 98) = 1.661

$s\{b_0\} = \sqrt{\text{MSE}[\,(1/n) + (\bar{X}^2 / \sum(X_I - \bar{X})^2)]}$

MSE = 577664.6 , $\bar{X}$ = 2015.27 , $(\bar{X})^2$ = 4061313.173

$\sum(X_I - \bar{X})^2$ = 1385.71

$s\{b_0\}$ = 41146.76

For 95% Confidence interval

-1203876.41 ± 1.661(41146.76)

CI for $\beta 0$ = (-1272221.17, -1135531.64)

Conclusion: Based on the confidence interval, we reject the null hypothesis and conclude that the y-intercept is significant with 95% confidence.

<u>INFERENCES OF THE REGRESSION LINE</u>

For our fitted model, we would like to make inferences using predictor variable Make Year (X_h) as **2018** at a significance level α =0.05 (95% confidence). The value can be chosen randomly between datasets to get the confidence interval for that particular data point.

Confidence Interval for Mean Response

For 95% Confidence Interval

$\hat{y}_h \pm t\,(1-2\;\;, n-2)\; s\{\hat{y}_h\}$

$\hat{y}_h = b_0 + b_1(x_h)$

$\hat{y}_h$=-1203876.416 + 599.771(2018)

$\hat{y}_h$= 6461.46

$t\,(1-\alpha/2\,, n-2)$ = t (1-0.05/ 2, 100 − 2) = t(0.975, 98)= 1.661

$s\{\hat{y}_h\} = \sqrt{MSE[\,(1/n) + (x_h - \bar{x})^2/\sum(x_i - \bar{x})^2]}$

$s\{\hat{y}_h\} = \sqrt{577664.6[(1/100)+(2018-2015.27)^2/(1385.71)]}$

$s\{\hat{y}_h\}$ = 94.25

Here,

$\hat{y}_h$(Resale Price)= 6461.46

$s\{\hat{y}_h\}$ - standard error of the point estimator

x_h - value of the predictor variable, Make Year (x_h =2018)
$\bar{x}$ - mean of the Make Year ($\bar{x}$= 2015.27)
MSE - mean standard error for the Make Year provided by SAS (MSE= 577664.6)
S_x - standard deviation of Weight provided by SAS (S_x=3.74127)
s{pred}- prediction error [to be used for prediction interval]

$s\{\hat{y}_h\} = \sqrt{577664.6[(1/98) + ((2018 - 2015.27)^2 /(3.704)^2*(99))]}$
For 95% Confidence interval
$\hat{y}_h \pm t (1 - \alpha/2 ,\ n - 2)\ s\{\hat{y}_h\}$
6461.46 ± 1.661(94.25)
(6304.91, 6618.00)
Conclusion: From the analysis performed above, we are 95% confident that the Resale Price for the Car with manufacturing year 2018 will lie between 6304.91 and 6618.00.

Prediction Interval for New Response
For a 95% PI:
Resale Price(x_h) = 2025
$\hat{y}_h = b_0 + b_1(x_h)$
$\hat{y}_h$ = -1203876.416 + 599.771 (2025)
$\hat{y}_h$ = 10659.9
$t (1 - \alpha/2, n - 2)$= t (1 - 0.05/2, 100 − 2)= t(0.975,98)= 1.661
$s\{\hat{y}_h\} = \sqrt{577664.6[(1/98) + ((2025 - 2015.27)^2 /(3.704)^2*(99))]}$
$s\{\hat{y}_h\} = \sqrt{577664.6[(0.102) + (94.6729 /1358.24)]}$
$s\{\hat{y}_h\}$ = 314.939
s{pred} = $\sqrt{s\{\hat{y}h\}^2 + MSE}$
s{pred} = $\sqrt{(314.939)^2 + 577664.6}$
s{pred} = 822.71
$\hat{y}_h \pm t (1 - \alpha/2, n - 2)$ s{pred}
= 10659.9 ± 1.661(769.9)
= (9381.1, 11938.7)
Conclusion: From the analysis performed above, we are 95% confident that the mean Resale Price for year 2025 will lie between 9381.1 and 11938.7

<u>CONFIDENCE BANDS</u>
To compute the confidence band for the regression line, confidence intervals at various values of x should be computed first. Limits for confidence intervals are calculated using Excel. The basic calculation for calculating confidence interval is shown below.
Manufacturing Year (x_h) = 2018 ; α = 0.05
W^2 = 2F(1-α; 2, n-2)
W^2 = 2F(1-0.05; 2, 100-2)
W^2 = 2(3.091) ...Value using F-Table
By taking square root on both the sides we get,
W= 2.486
$\hat{y}_h$= 6461.46

$s\{\hat{y}_h\} = 94.25$
Therefore, the confidence Limit is,
$\hat{y}_h \pm Ws\{\hat{y}_h\}$
$= 6461.46 \pm 2.486 * (94.25)$
$= (6227.15, 6695.76)$
These confidence limits are calculated at various values of x i.e. Manufacturing Year and a plot is generated which is the confidence band for the entire regression line. Refer table below.

X_h	Regression Line ($\hat{y}=b_0+b_1x$)	$s\{\hat{y}_h\}$	Lower Band $\hat{y}_h - w*s\{\hat{y}_h\}$	Upper Band $\hat{y}_h + w*s\{\hat{y}_h\}$
2009	1062.84	148.88	$ 692.72	$ 1,432.95
2010	1662.61	131.74	$ 1,335.11	$ 1,990.10
2011	2262.38	115.66	$ 1,974.85	$ 2,549.91
2012	2862.15	101.16	$ 2,610.66	$ 3,113.64
2013	3461.92	89.02	$ 3,240.61	$ 3,683.23
2014	4061.69	80.31	$ 3,862.05	$ 4,261.33
2015	4661.46	76.20	$ 4,472.02	$ 4,850.90
2016	5261.23	77.45	$ 5,068.69	$ 5,453.78
2017	5861.00	83.81	$ 5,652.65	$ 6,069.36
2018	6460.77	94.25	$ 6,226.46	$ 6,695.09
2019	7060.54	107.59	$ 6,793.06	$ 7,328.02
2020	7660.32	122.90	$ 7,354.80	$ 7,965.83
2021	8260.09	139.51	$ 7,913.26	$ 8,606.91
2022	8859.86	157.03	$ 8,469.48	$ 9,250.23

Table 2: Confidence Band Intervals

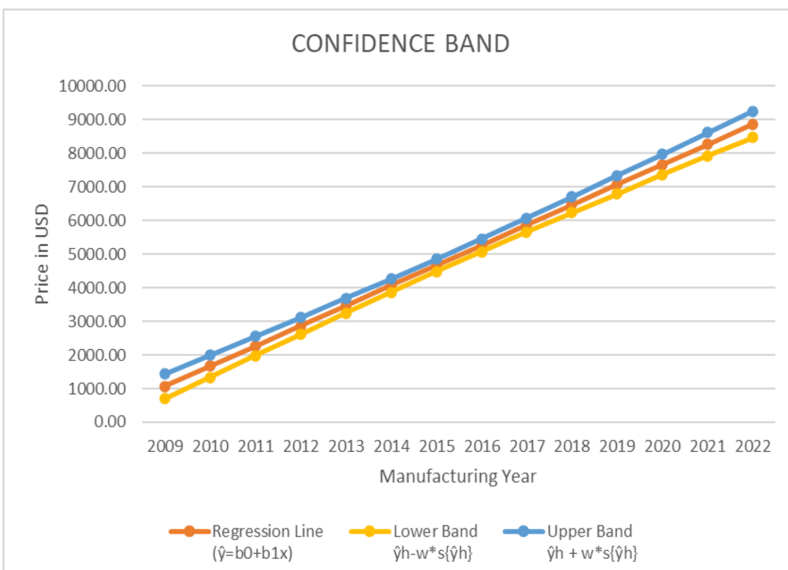

Figure 6: Confidence Band with fitted regression Line

The confidence bands are plotted in Figure 6. Along with a fitted regression line. The confidence band indicates that at any given point of x with confidence level 95%, the predicted value will lie in the confidence band. The confidence band converges at the center and diverges at the end which means Uncertainty is less in the center and starts increasing as we move ahead along the regression line.

MODEL ASSUMPTIONS

In this section, we will examine and validate the assumptions that underlie the model. Model assumptions are fundamental conditions that need to be verified to ensure the reliability and accuracy of the model's results.

1. Linear model is reasonable
2. Normal distribution of residuals
3. Constant variance of residuals
4. No outliers
5. Uncorrelation of residuals

RESIDUAL ANALYSIS

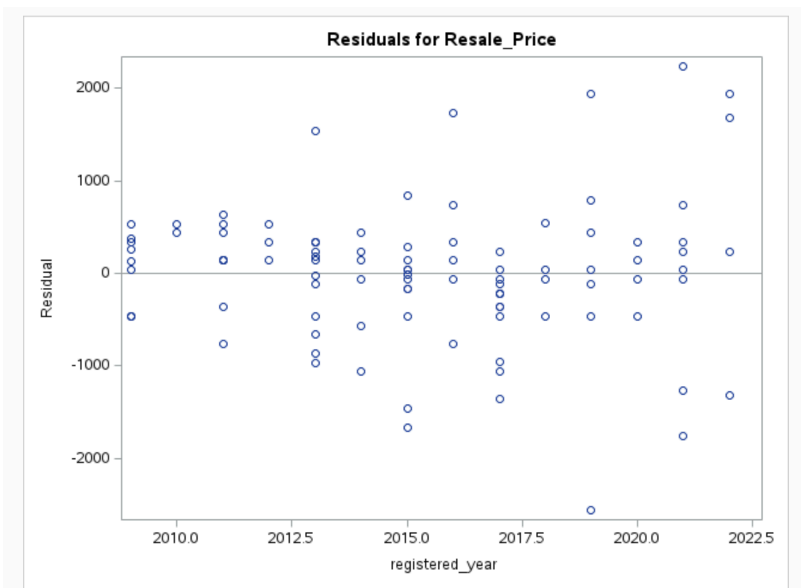

Figure 7: Residual(e) Vs. Registered_year

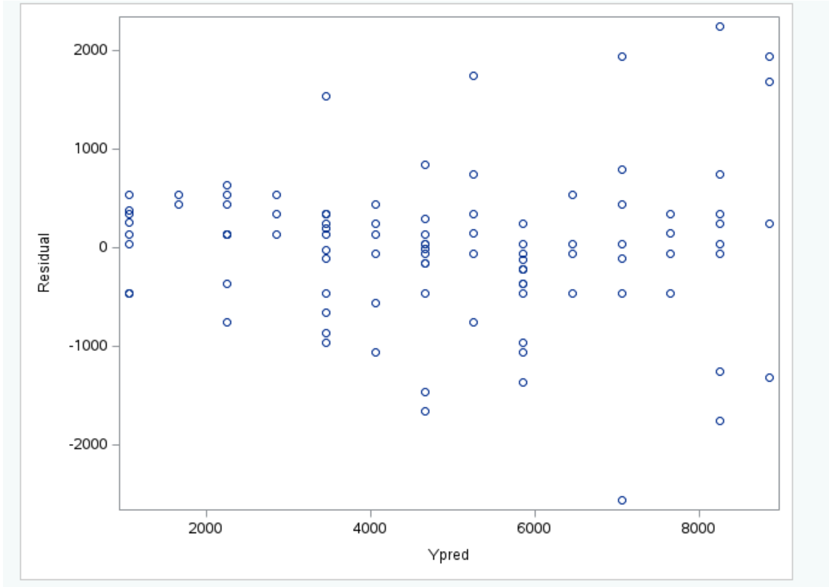

Figure 8: Residual(e) Vs. Ypred(Ŷ)

The residual(e) vsYpred(Ŷ) plot displays no discernible curvature or funnel shape, suggesting that the linearity assumption of the linear model is reasonably met. Therefore, there may be no immediate need for data transformation.

However, it's important to note that the presence of outliers in the residual plot indicates a potential violation of the assumption that there are no outliers in the data. This may necessitate further investigation and potentially the use of robust regression techniques or addressing the outliers through data preprocessing methods.

Additionally, it's important to assess other assumptions of the linear model, such as homoscedasticity and normality of residuals, to ensure the model's validity. If these assumptions are met, it strengthens the argument for the appropriateness of the linear model.

TEST FOR NORMALITY

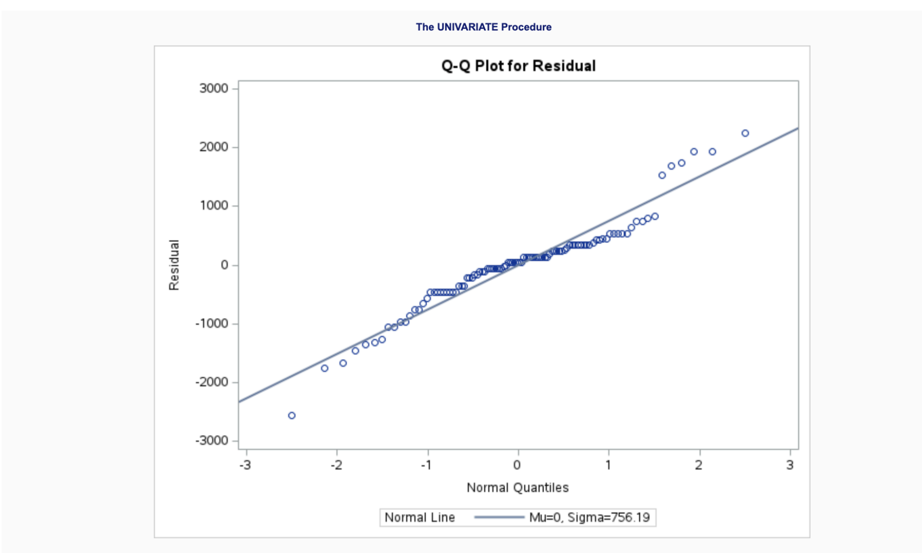

Figure 9: Normal Probability Plot

We can see two tails with outliers. If we draw a straight line, we can see a lot of divergence at the ends. Long tails at both the ends. Therefore, we perform the normality test.

H_0 : Normality OK
H_1: Normality is violated

The CORR Procedure

2 Variables:	Resale_Price registered_year

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
Resale_Price	100	4823	2368	482340	600.00000	10800	Resale_Price
registered_year	100	2015	3.74127	201527	2009	2022	registered_year

Pearson Correlation Coefficients, N = 100
Prob > \|r\| under H0: Rho=0

	Resale_Price	registered_year
Resale_Price Resale_Price	1.00000	0.94764 <.0001
registered_year registered_year	0.94764 <.0001	1.00000

Table 3: Test for Normality

Test for normality shows Pearson's correlation. The sample correlation $\hat{\rho}$ is 0.94764 and the critical value c(α =0.05, n=100) = 0.195.
Decision rule: $\hat{\rho}$ < c(α , n), then reject H0 . As $\hat{\rho}$ > c(α , n), we fail to reject null hypothesis . So, we can say that Normality is OK.
Since we observed that the Normal probability plot does not appear to be a straight line, long tails appear at both ends. Normality is not violated; therefore we need to conduct a Modified-Levene Test to check the constant variance.

TEST FOR CONSTANT VARIANCE

The TTEST Procedure

Variable: Residual (Residual)

N	Mean	Std Dev	Std Err	Minimum	Maximum
100	1.79E-10	756.2	75.6194	-2560.5	2239.9

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1.79E-10	-150.0	150.0	756.2	663.9	878.5

DF	t Value	Pr > |t|
99	0.00	1.0000

Table 4: Modified Levene Test

From Figure 8, we observe that the plot displays constant variance. Initially, we assess whether the variances are equal or not through hypothesis testing.

H_0: Variances are equal
H_1: Variances are not equal

Looking at Table 4, we find that the p-value for the t-test is 1.000, which is less than $\alpha = 0.05$. Therefore, we reject H_0, indicating that the variances are not equal.

Next, we need to investigate whether the variance is constant or not:

H_0: Variance is Constant
H_1: Variance is not Constant

Examining Table 4, we find that the p-value is 1.0000, which is less than $\alpha = 0.05$. Consequently, we reject H_0, suggesting that the variance is not constant.

However, this conclusion appears to contradict the earlier assumption that the plot does not exhibit a funnel shape in Figure 8. Therefore, we assume that the variance is constant.

FINAL DISCUSSION

In this project, we conducted an analysis of the Car Resale 2023 dataset, consisting of 100 samples, with the goal of establishing a linear relationship between Resale Price (our response variable) and Make Year (our chosen predictor variable) through simple linear regression. We began by examining the correlations between Resale Price and each of the available predictor variables, ultimately selecting Make Year based on our visual assessment of scatter plots.

In the context of simple linear regression, our best model for predicting Resale Price using Make Year as the sole predictor variable can be expressed as: "Price = -1203876.416 + 599.71 *Make Year." Statistical analysis confirmed a significant linear association between Resale Price and Make Year, with a p-value less than 0.0001. The high R-Square value of 89% indicates the model's effectiveness in predicting values based on Make Year.

Our tests for normality and constant variance showed that the assumptions of normality and constant variance were generally met. While the assumption of constant variance was questioned, a closer examination of residual plots indicated that constant variance held, and no transformations were necessary.

In summary, our analysis supports the choice of Make Year as an excellent predictor for Car Resale Value. This insight can be valuable for assessing a customer’s decision making, strategic planning, and predicting resale values to make informed decisions in the future

APPENDIX

registered_year(Xi)	Resale Price in Dollars(Yi)	$(Xi)^2$	$(Yi)^2$	XiYi	∑Xi-x	$\sum(Xi-x)^2$	Ypred	ei3	e_i^2
2017	4500	4068289	20250000	9076500	1.73	2.9929	5861.00	-1361.00	$ 18,52,329.82
2018	6000	4072324	36000000	12108000	2.73	7.4529	6460.77	-460.77	$ 2,12,312.59
2015	5500	4060225	30250000	11082500	-0.27	0.0729	4661.46	838.54	$ 7,03,146.11
2015	3000	4060225	9000000	6045000	-0.27	0.0729	4661.46	-1661.46	$ 27,60,455.72
2009	1400	4036081	1960000	2812600	-6.27	39.3129	1062.84	337.16	$ 1,13,678.24
2015	3200	4060225	10240000	6448000	-0.27	0.0729	4661.46	-1461.46	$ 21,35,870.95
2017	5640	4068289	31809600	11375880	1.73	2.9929	5861.00	-221.00	$ 48,842.43
2010	2200	4040100	4840000	4422000	-5.27	27.7729	1662.61	537.39	$ 2,88,789.49
2016	6000	4064256	36000000	12096000	0.73	0.5329	5261.23	738.77	$ 5,45,777.30
2009	1440	4036081	2073600	2892960	-6.27	39.3129	1062.84	377.16	$ 1,42,251.20
2014	4200	4056196	17640000	8458800	-1.27	1.6129	4061.69	138.31	$ 19,129.31
2018	6400	4072324	40960000	12915200	2.73	7.4529	6460.77	-60.77	$ 3,693.47
2020	7200	4080400	51840000	14544000	4.73	22.3729	7660.32	-460.32	$ 2,11,890.10
2021	9000	4084441	81000000	18189000	5.73	32.8329	8260.09	739.91	$ 5,47,472.91
2021	8200	4084441	67240000	16572200	5.73	32.8329	8260.09	-60.09	$ 3,610.31
2019	7500	4076361	56250000	15142500	3.73	13.9129	7060.54	439.46	$ 1,93,121.09
2016	5400	4064256	29160000	10886400	0.73	0.5329	5261.23	138.77	$ 19,256.40
2011	1500	4044121	2250000	3016500	-4.27	18.2329	2262.38	-762.38	$ 5,81,222.18
2011	2400	4044121	5760000	4826400	-4.27	18.2329	2262.38	137.62	$ 18,939.46
2021	8300	4084441	68890000	16774300	5.73	32.8329	8260.09	39.91	$ 1,593.14
2020	8000	4080400	64000000	16160000	4.73	22.3729	7660.32	339.68	$ 1,15,385.75
2014	3000	4056196	9000000	6042000	-1.27	1.6129	4061.69	-1061.69	$ 11,27,188.34
2011	2700	4044121	7290000	5429700	-4.27	18.2329	2262.38	437.62	$ 1,91,511.89
2015	4700	4060225	22090000	9470500	-0.27	0.0729	4661.46	38.54	$ 1,485.18
2011	2800	4044121	7840000	5630800	-4.27	18.2329	2262.38	537.62	$ 2,89,036.03
2011	2900	4044121	8410000	5831900	-4.27	18.2329	2262.38	637.62	$ 4,06,560.18
2021	10500	4084441	110250000	21220500	5.73	32.8329	8260.09	2239.91	$ 50,17,215.28
2018	6500	4072324	42250000	13117000	2.73	7.4529	6460.77	39.23	$ 1,538.69
2015	4650	4060225	21622500	9369750	-0.27	0.0729	4661.46	-11.46	$ 131.38
2014	4500	4056196	20250000	9063000	-1.27	1.6129	4061.69	438.31	$ 1,92,114.55
2016	5200	4064256	27040000	10483200	0.73	0.5329	5261.23	-61.23	$ 3,749.43
2015	4500	4060225	20250000	9067500	-0.27	0.0729	4661.46	-161.46	$ 26,069.95
2012	3400	4048144	11560000	6840800	-3.27	10.6929	2862.15	537.85	$ 2,89,282.68
2013	3000	4052169	9000000	6039000	-2.27	5.1529	3461.92	-461.92	$ 2,13,370.64
2013	2800	4052169	7840000	5636400	-2.27	5.1529	3461.92	-661.92	$ 4,38,138.89
2013	3800	4052169	14440000	7649400	-2.27	5.1529	3461.92	338.08	$ 1,14,297.68
2013	2500	4052169	6250000	5032500	-2.27	5.1529	3461.92	-961.92	$ 9,25,291.25
2018	7000	4072324	49000000	14126000	2.73	7.4529	6460.77	539.23	$ 2,90,764.79
2017	4900	4068289	24010000	9883300	1.73	2.9929	5861.00	-961.00	$ 9,23,527.23
2019	7100	4076361	50410000	14334900	3.73	13.9129	7060.54	39.46	$ 1,556.73
2022	10540	4088484	111091600	21311880	6.73	45.2929	8859.86	1680.14	$ 28,22,882.06
2017	5900	4068289	34810000	11900300	1.73	2.9929	5861.00	39.00	$ 1,520.75
2017	6100	4068289	37210000	12303700	1.73	2.9929	5861.00	239.00	$ 57,119.45
2019	9000	4076361	81000000	18171000	3.73	13.9129	7060.54	1939.46	$ 37,61,487.41
2013	3700	4052169	13690000	7448100	-2.27	5.1529	3461.92	238.08	$ 56,681.80
2009	1600	4036081	2560000	3214400	-6.27	39.3129	1062.84	537.16	$ 2,88,543.05
2011	2400	4044121	5760000	4826400	-4.27	18.2329	2262.38	137.62	$ 18,939.46
2011	1900	4044121	3610000	3820900	-4.27	18.2329	2262.38	-362.38	$ 1,31,318.75
2017	4800	4068289	23040000	9681600	1.73	2.9929	5861.00	-1061.00	$ 11,25,727.88
2017	5640	4068289	31809600	11375880	1.73	2.9929	5861.00	-221.00	$ 48,842.43
2017	5740	4068289	32947600	11577580	1.73	2.9929	5861.00	-121.00	$ 14,641.78
2017	5640	4068289	31809600	11375880	1.73	2.9929	5861.00	-221.00	$ 48,842.43
2014	4300	4056196	18490000	8660200	-1.27	1.6129	4061.69	238.31	$ 56,791.05
2022	10800	4088484	116640000	21837600	6.73	45.2929	8859.86	1940.14	$ 37,64,156.66
2012	3200	4048144	10240000	6438400	-3.27	10.6929	2862.15	337.85	$ 1,14,142.66
2019	6950	4076361	48302500	14032050	3.73	13.9129	7060.54	-110.54	$ 12,220.10
2009	1100	4036081	1210000	2209900	-6.27	39.3129	1062.84	37.16	$ 1,381.02
2016	5600	4064256	31360000	11289600	0.73	0.5329	5261.23	338.77	$ 1,14,763.36
2010	2100	4040100	4410000	4221000	-5.27	27.7729	1662.61	437.39	$ 1,91,311.21
2021	6500	4084441	42250000	13136500	5.73	32.8329	8260.09	-1760.09	$ 30,97,902.29
2021	8500	4084441	72250000	17178500	5.73	32.8329	8260.09	239.91	$ 57,558.79
2013	3800	4052169	14440000	7649400	-2.27	5.1529	3461.92	338.08	$ 1,14,297.68
2021	7000	4084441	49000000	14147000	5.73	32.8329	8260.09	-1260.09	$ 15,87,816.42
2022	7540	4088484	56851600	15245880	6.73	45.2929	8859.86	-1319.86	$ 17,42,021.27
2013	3650	4052169	13322500	7347450	-2.27	5.1529	3461.92	188.08	$ 35,373.86
2015	4200	4060225	17640000	8463000	-0.27	0.0729	4661.46	-461.46	$ 2,12,947.11
2021	8600	4084441	73960000	17380600	5.73	32.8329	8260.09	339.91	$ 1,15,541.61
2016	7000	4064256	49000000	14112000	0.73	0.5329	5261.23	1738.77	$ 30,23,312.14
2013	3600	4052169	12960000	7246800	-2.27	5.1529	3461.92	138.08	$ 19,065.92
2017	5500	4068289	30250000	11093500	1.73	2.9929	5861.00	-361.00	$ 1,30,323.34
2015	4700	4060225	22090000	9470500	-0.27	0.0729	4661.46	38.54	$ 1,485.18
2009	1200	4036081	1440000	2410800	-6.27	39.3129	1062.84	137.16	$ 18,813.42
2015	4800	4060225	23040000	9672000	-0.27	0.0729	4661.46	138.54	$ 19,192.80
2020	7600	4080400	57760000	15352000	4.73	22.3729	7660.32	-60.32	$ 3,637.93
2019	7850	4076361	61622500	15849150	3.73	13.9129	7060.54	789.46	$ 6,23,239.89
2019	6600	4076361	43560000	13325400	3.73	13.9129	7060.54	-460.54	$ 2,12,101.29
2014	3500	4056196	12250000	7049000	-1.27	1.6129	4061.69	-561.69	$ 3,15,497.07
2019	4500	4076361	20250000	9085500	3.73	13.9129	7060.54	-2560.54	$ 65,56,388.44
2015	4600	4060225	21160000	9269000	-0.27	0.0729	4661.46	-61.46	$ 3,777.57
2009	1320	4036081	1742400	2651880	-6.27	39.3129	1062.84	257.16	$ 66,132.31
2009	600	4036081	360000	1205400	-6.27	39.3129	1062.84	-462.84	$ 2,14,218.98
2020	7800	4080400	60840000	15756000	4.73	22.3729	7660.32	139.68	$ 19,511.84
2015	4500	4060225	20250000	9067500	-0.27	0.0729	4661.46	-161.46	$ 26,069.95
2017	5500	4068289	30250000	11093500	1.73	2.9929	5861.00	-361.00	$ 1,30,323.34
2013	3440	4052169	11833600	6924720	-2.27	5.1529	3461.92	-21.92	$ 480.51
2022	9100	4088484	82810000	18400200	6.73	45.2929	8859.86	240.14	$ 57,668.88
2017	5400	4068289	29160000	10891800	1.73	2.9929	5861.00	-461.00	$ 2,12,523.99
2017	5800	4068289	33640000	11698600	1.73	2.9929	5861.00	-61.00	$ 3,721.40
2011	2400	4044121	5760000	4826400	-4.27	18.2329	2262.38	137.62	$ 18,939.46
2013	2600	4052169	6760000	5233800	-2.27	5.1529	3461.92	-861.92	$ 7,42,907.13
2015	4950	4060225	24502500	9974250	-0.27	0.0729	4661.46	288.54	$ 83,254.22
2012	3000	4048144	9000000	6036000	-3.27	10.6929	2862.15	137.85	$ 19,002.64
2013	3350	4052169	11222500	6743550	-2.27	5.1529	3461.92	-111.92	$ 12,526.22
2011	2400	4044121	5760000	4826400	-4.27	18.2329	2262.38	137.62	$ 18,939.46
2016	4500	4064256	20250000	9072000	0.73	0.5329	5261.23	-761.23	$ 5,79,475.04
2014	4000	4056196	16000000	8056000	-1.27	1.6129	4061.69	-61.69	$ 3,805.81
2009	600	4036081	360000	1205400	-6.27	39.3129	1062.84	-462.84	$ 2,14,218.98
2009	600	4036081	360000	1205400	-6.27	39.3129	1062.84	-462.84	$ 2,14,218.98
2013	3800	4052169	14440000	7649400	-2.27	5.1529	3461.92	338.08	$ 1,14,297.68
2013	5000	4052169	25000000	10065000	-2.27	5.1529	3461.92	1538.08	$ 23,65,688.23
201527	482340	406132703	2881604200	972876440	0.0000	1385.7100		0.00	56611131.12