Simple Linear Regression Analysis – Auto MPG Dataset

Regression Results Summary

R^2 Score = 0.566
The R^2 value shows how much of the variation in MPG (fuel efficiency) is explained by horsepower. A score of 0.566 means that horsepower alone explains about **56.6%** of the variation in MPG. This indicates a moderate relationship: horsepower affects MPG, but other factors (weight, cylinders, displacement) also play a role.

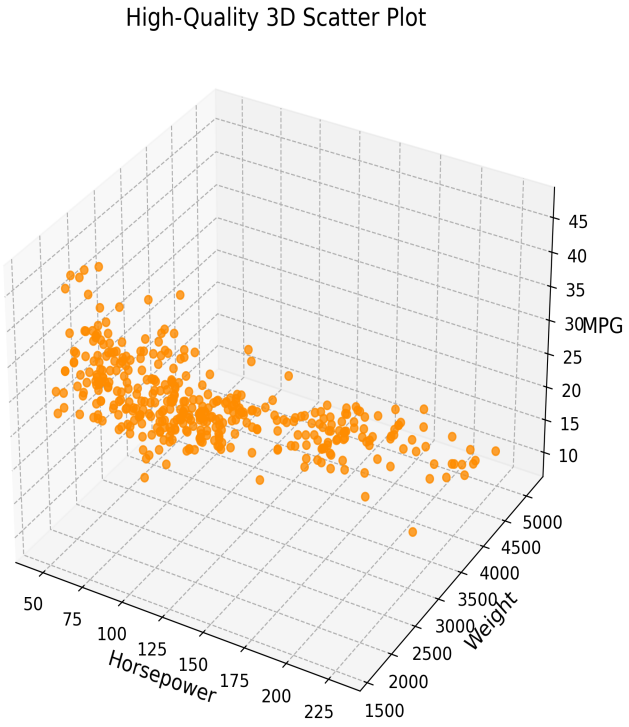
MSE = 22.153
MSE (Mean Squared Error) represents how far the predicted MPG values are from the actual values. An MSE of 22.15 indicates a moderate prediction error. Lower MSE values indicate more accurate predictions.

Regression Equation
MPG = 40.606 + (-0.163 × horsepower)

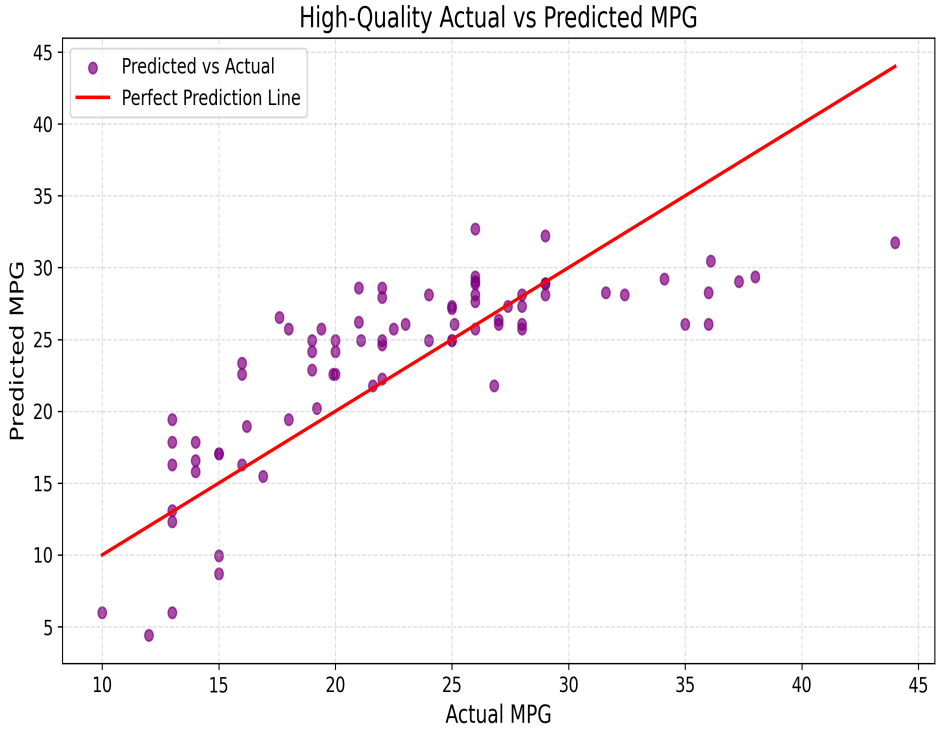
Interpretation:
• The negative slope (-0.163) shows that as horsepower increases, MPG decreases.
• For every 1 horsepower increase, MPG drops by approximately 0.163 units.
• The intercept (40.606) represents the estimated MPG when horsepower = 0 (mathematical reference only).
• This confirms that more powerful engines consume more fuel, reducing efficiency.

Visualizations

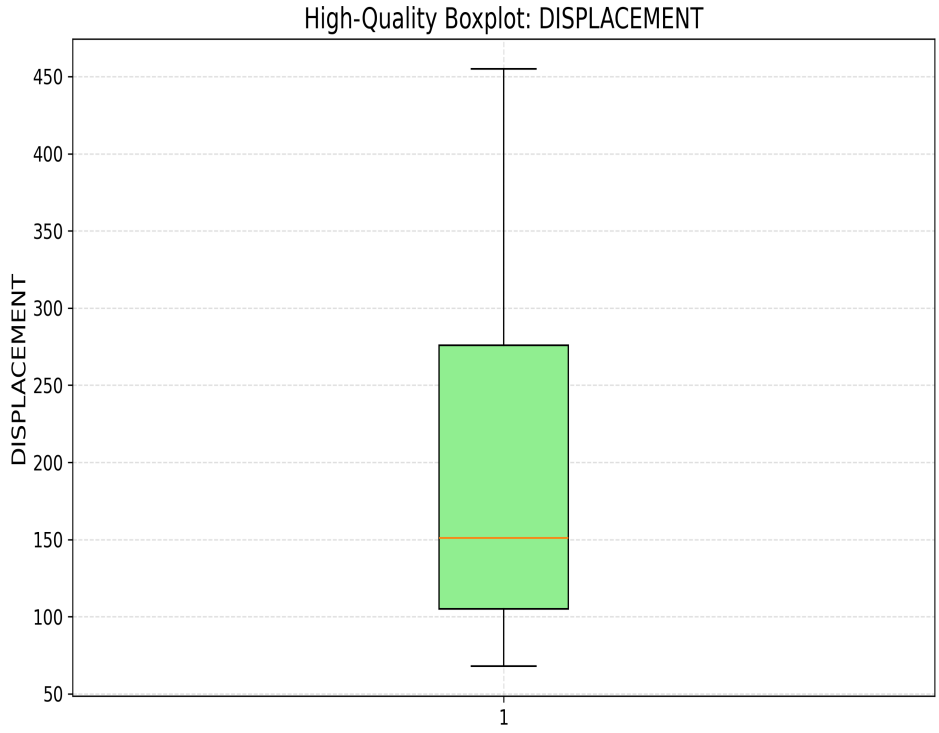
3D Scatter



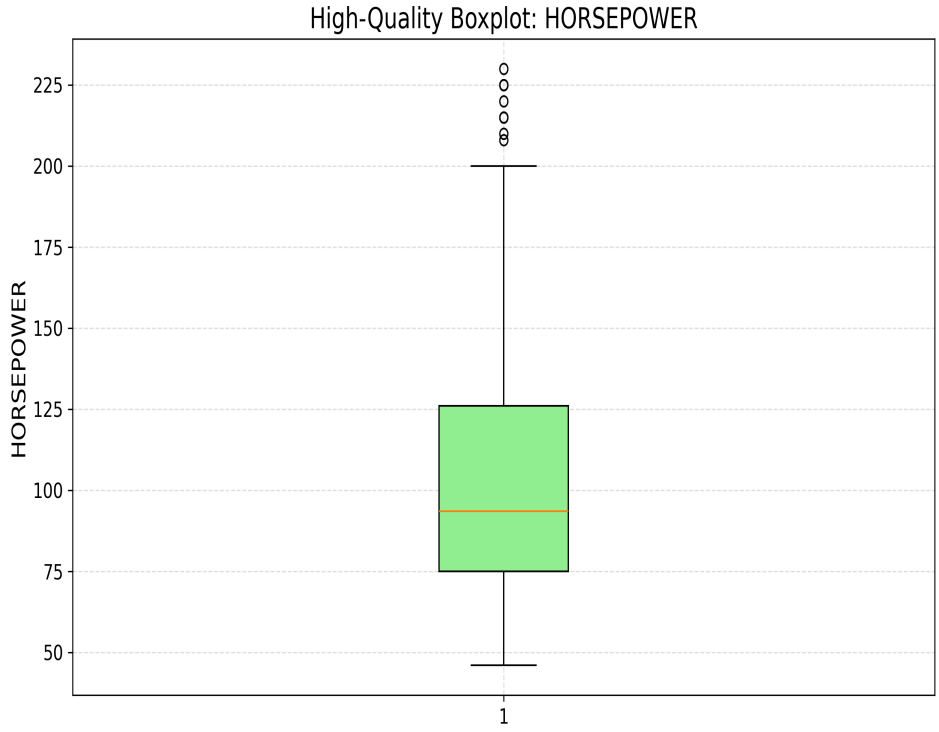
Actual Vs Predicted



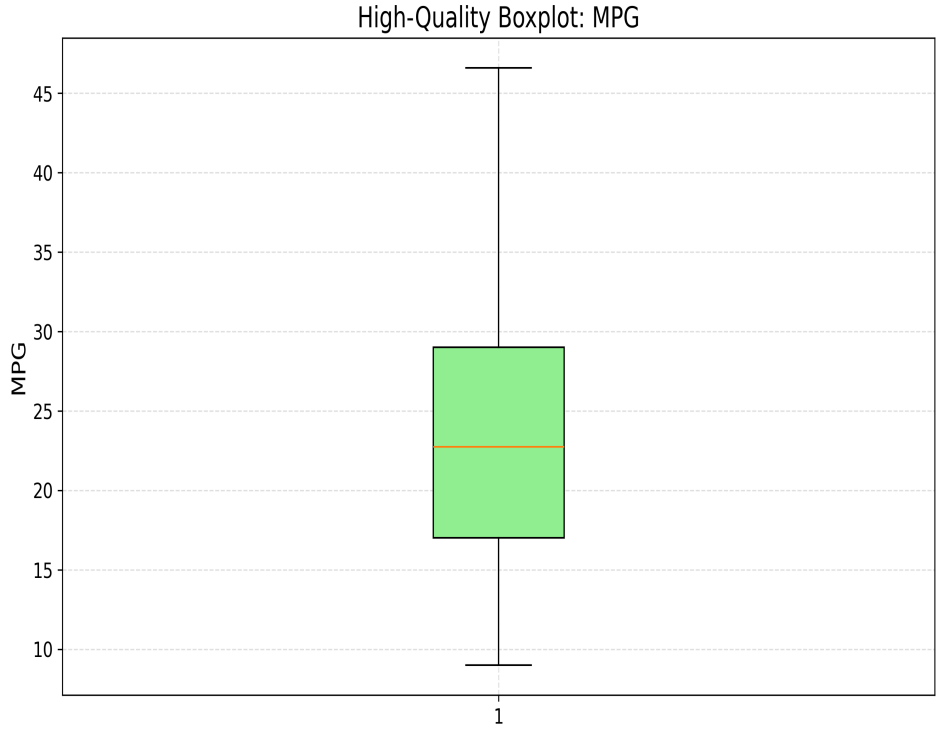
Boxplot Displacement



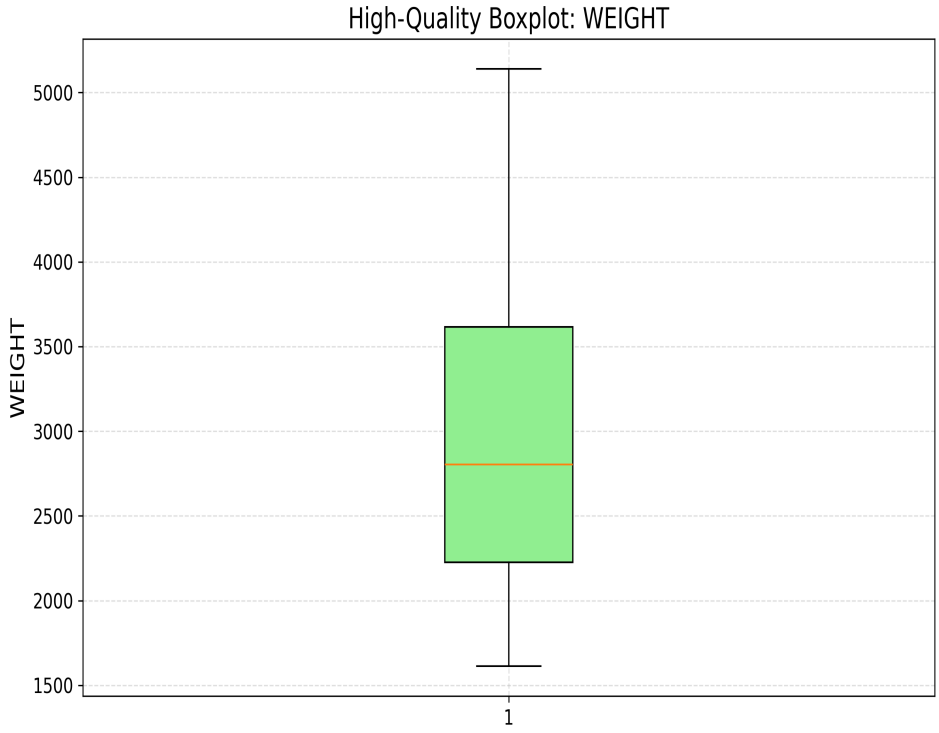
Boxplot Horsepower


High-Quality Boxplot: HORSEPOWER
HORSEPOWER
225
200
175
150
125
100
75
50
1

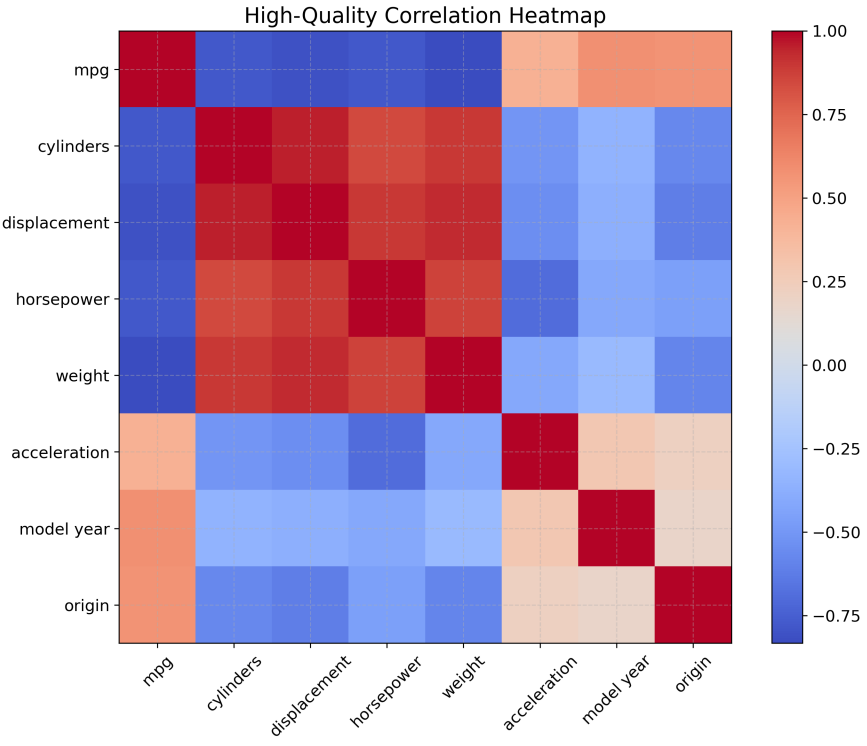
Boxplot Mpg


High-Quality Boxplot: MPG
MPG
45
40
35
30
25
20
15
10
1

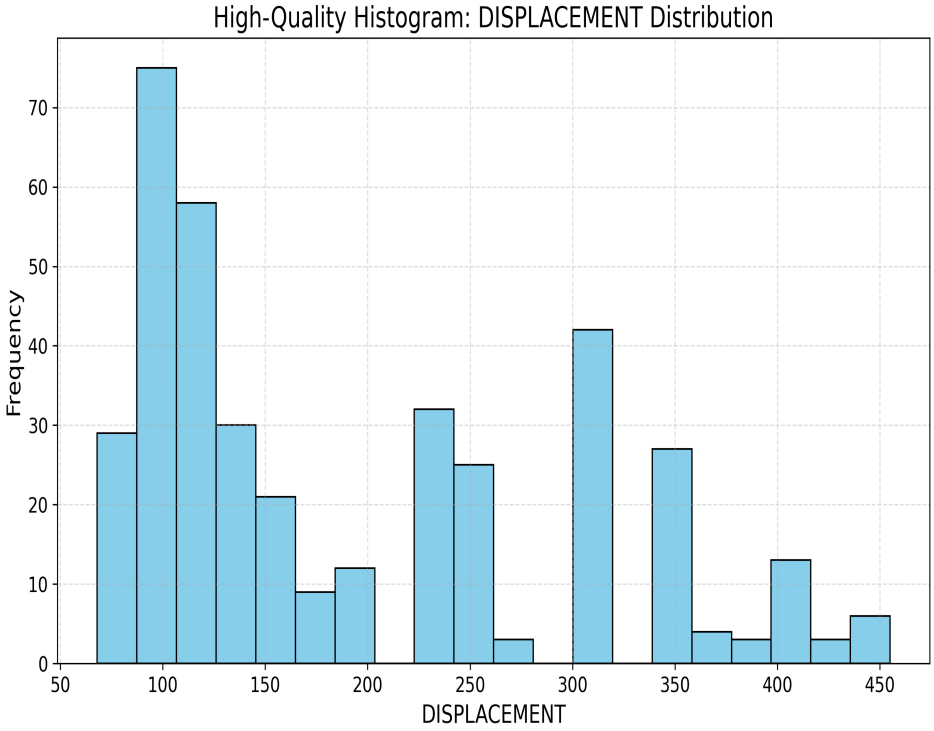
Boxplot Weight



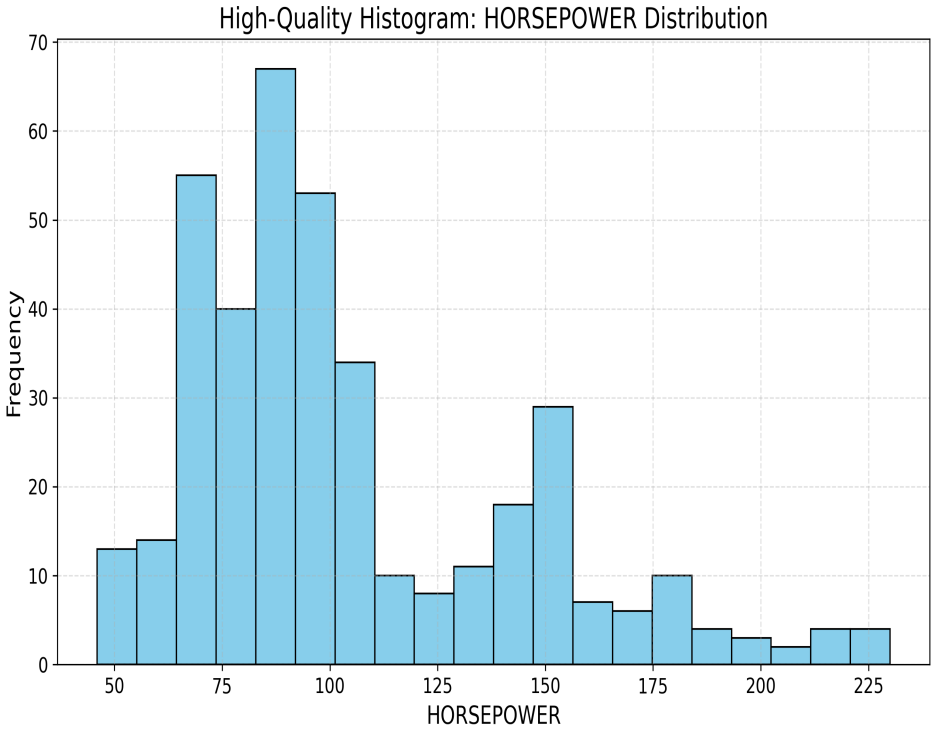
Correlation Heatmap



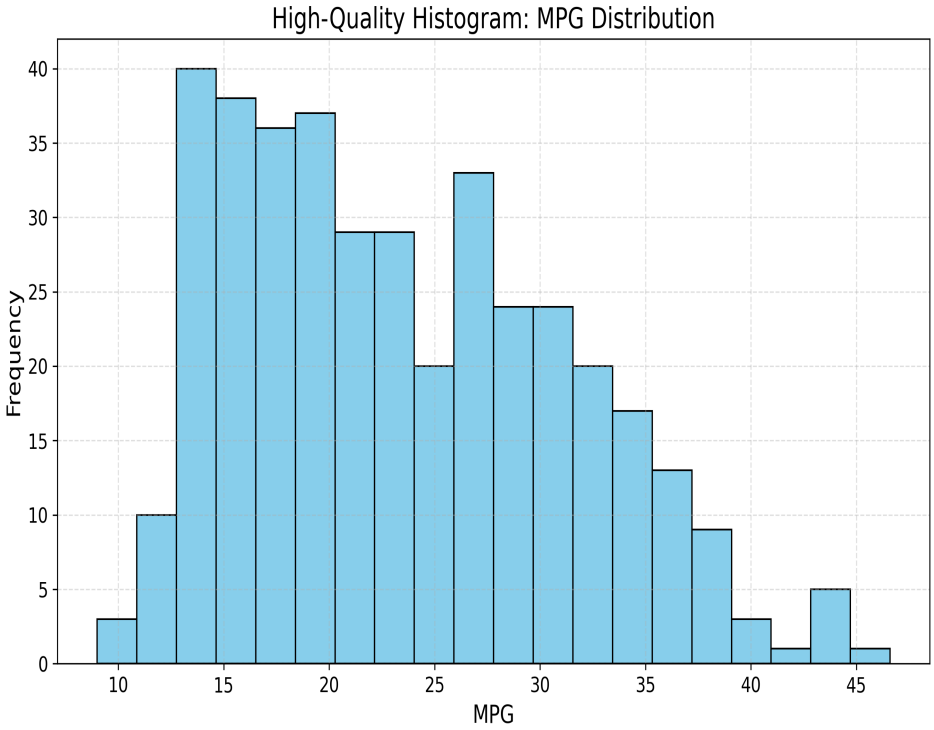
Hist Displacement



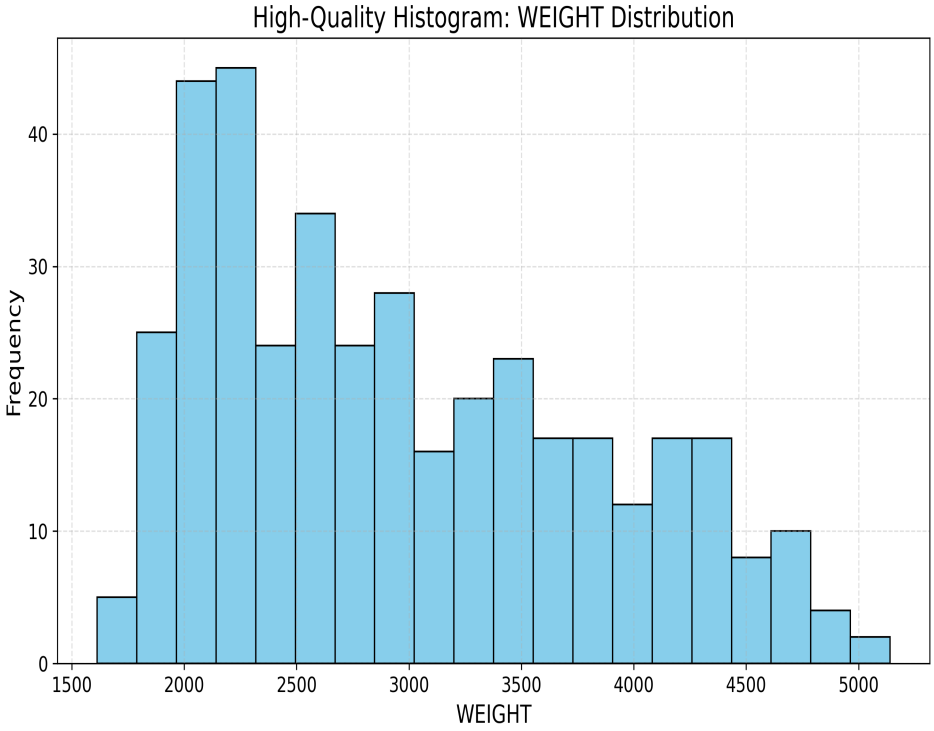
Hist Horsepower



Hist Mpg


High-Quality Histogram: MPG Distribution
Frequency
MPG
0
5
10
15
20
25
30
35
40
10
15
20
25
30
35
40
45

Hist Weight


High-Quality Histogram: WEIGHT Distribution
Frequency
WEIGHT
0
10
20
30
40
1500
2000
2500
3000
3500
4000
4500
5000

Regression Plot