# Carat Analysis

Humaid Billoo

The term Carat refers to a diamond's weight. One diamond carat is equal to 200 mg, or .2 grams, of a diamond. Diamond Carats can also be measured in points such as 100 points equals 1 carat. Even though carat is the size of the diamond it is not the only thing that impacts a diamond visually.

1. Univariate Analysis on Carat

The histogram shows the distribution of diamond carat sizes, showing a heacy right skewed pattern where smaller diamonds are more common than larger ones. The majority of diamonds fall within the 0.2 to 1.0 carat range, and have a sharp decline in frequency as carat size increases. This suggests that smaller diamonds are more readily available and purchased more often while larger diamonds are less readily available and purchased less often.
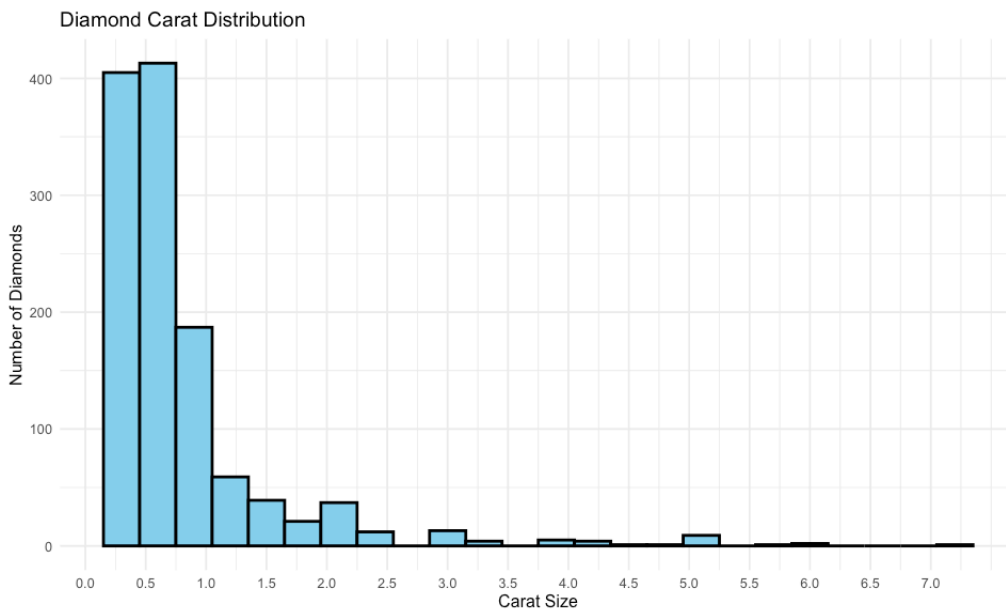
Distrubution Graph of Carat

The density plot further reinforces the right-skewed distribution observed in the histogram, showing that the majority of diamonds have a small carat size, with the highest density occurring below 0.5 carats

Density Plot of Diamond Carat
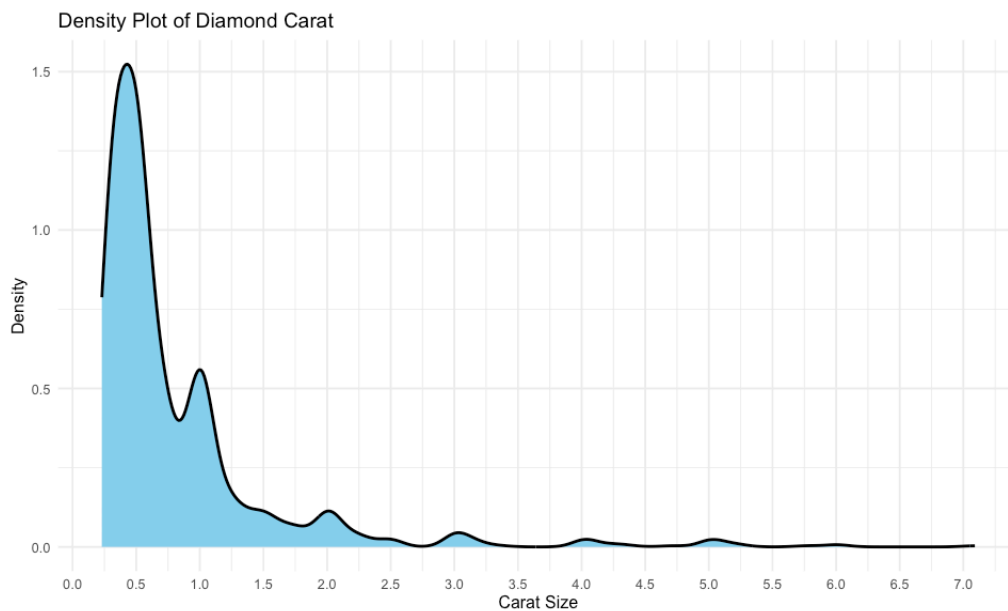
Density plot for Carat

The majority of diamonds fall within the 0.25 to 0.75 carat range, which collectively accounts for about 65.3% of the dataset. The proportion drops significantly beyond 1 carat, with diamonds between 1 and 1 carats making up only 16.3%, and as the carat increases the number of diamonds in those ranges decreases.

Summary of Diamonds by Carat Range

| Carat Range	Count	Proportion
[0,0.25)	22	0.018
[0.25,0.5)	397	0.327
[0.5,0.75)	394	0.325
[0.75,1)	67	0.055
[1,1.5)	198	0.163
[1.5,2)	48	0.040
[2,3)	47	0.039
[3,4)	17	0.014
[4,5)	11	0.009
[5,6)	10	0.008
[6,7)	2	0.002
[7,8)	1	0.001

The Pie graph shows the samne that most diamonds fall udner the range of 0.25-0.5 through 0.5-0.75 carat range.
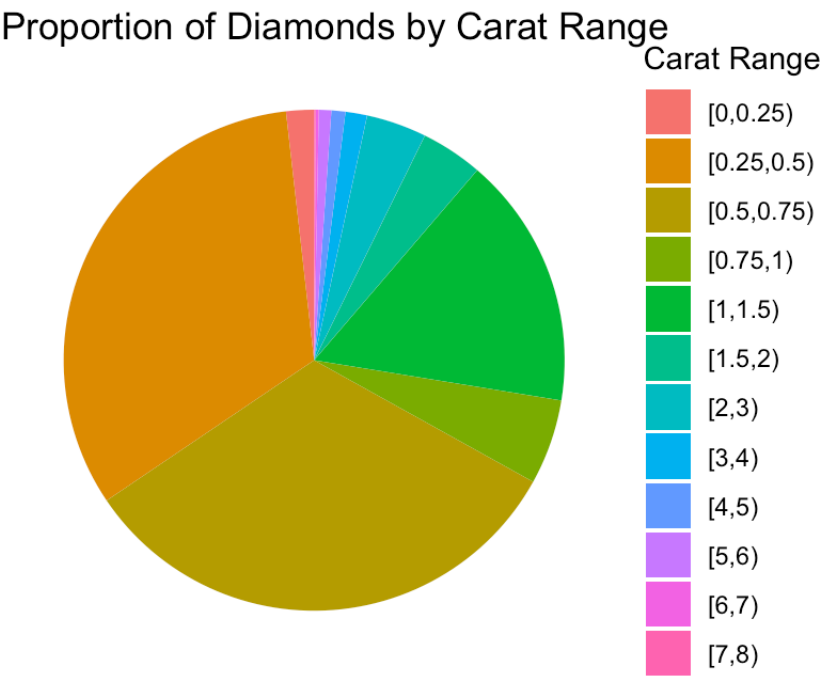
Pie graph summarizing Carat proportion

2. Bivariate Analysis on Clarity and Price

The scatter plot shows the relationship between carat and price with a fitted regression line as the trend. There is a positive correlation between carat and price, meaning that the diamonds with higher carats tend to be more expensive. The regression line shows the overall trend which reflects a increase in price as carat size increases. There are some outliers that appear in the higher carat range which could be due to cut, color, and clarity.
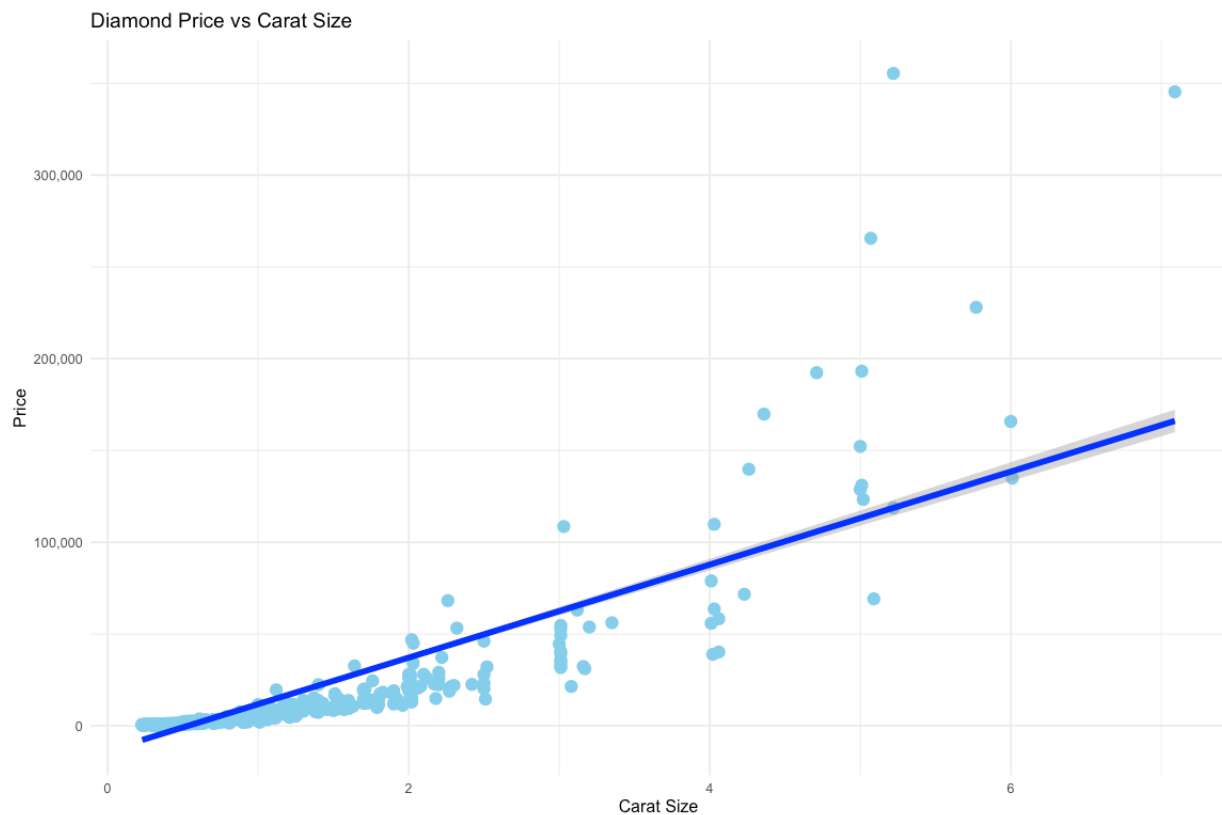
Diamond Price vs Carat Size

This shows the average diamond cost in each carat range and from this table we can see an increase in price as the range values in each raneg increase.

Summary of Diamond Prices by Carat Range

Carat Range	Min Price	Max Price	Average Price
[0,0.25)	322	716	485.32
[0.25,0.5)	326	1523	650.45
[0.5,0.75)	711	3767	1618.75
[0.75,1)	1462	8412	3633.90
[1,1.5)	1952	22412	6757.12
[1.5,2)	8347	32604	13789.92
[2,3)	12917	68173	25610.77
[3,4)	21412	108560	46056.41
[4,5)	38916	192351	92632.27
[5,6)	69144	355403	176524.90
[6,7)	134856	165766	150311.00
[7,8)	345397	345397	345397.00