

# Practice Questions and Problems on Quantiles in Machine Learning

## 1. Multiple Choice Questions (MCQs)

Q1. What does the 0.75 quantile represent?

- A. Median
- B. First quartile
- C. Third quartile
- D. Mean

Answer: C. Third quartile

Q2. Which of the following is not true about quantiles?

- A. They divide the data into intervals with equal probabilities.
- B. They are affected by extreme values.
- C. They help in detecting outliers.
- D. Median is a type of quantile.

Answer: B. They are affected by extreme values.

Q3. Which of the following plots is most commonly used to visualize quantiles?

- A. Histogram
- B. Line plot
- C. Box plot
- D. Scatter plot

Answer: C. Box plot

Q4. Which quantile corresponds to the median?

A. 0.25

B. 0.50

C. 0.75

D. 1.00

Answer: B. 0.50

Q5. In a dataset, the 90th percentile is also known as:

A. Q1

B. Q3

C. P90

D. D9

Answer: C. P90

## 2. Numerical Problems

Q6. Given the data set: [4, 7, 10, 15, 18, 21, 22, 26, 30, 34]

Find Q1, Median (Q2), and Q3.

Answer: Q1 = 12.5, Q2 = 19.5, Q3 = 24

Q7. In a dataset, the 25th, 50th, and 75th percentiles are 40, 60, and 80.

Find IQR and outlier bounds.

Answer: IQR = 40, Lower bound = -20, Upper bound = 140

## 3. Conceptual/Short Answer Questions

Q8. What are quantiles and why are they important in ML?

Answer: Quantiles divide a dataset into intervals with equal probabilities. They help in understanding

data distribution, detecting outliers, normalizing features, etc.

Q9. How is quantile normalization useful?

Answer: It makes feature distributions uniform across samples, enhancing comparability and model performance.

Q10. Differentiate percentiles, deciles, and quartiles.

Answer: Percentiles = 100 parts, Deciles = 10 parts, Quartiles = 4 parts.

#### 4. Advanced Application Problem

Q11. Quantile regression predicts house prices as:  $Q0.25 = \$120k$ ,  $Q0.5 = \$150k$ ,  $Q0.75 = \$180k$ .

Interpret.

Answer: 25% of prices < \$120k, median = \$150k, 75% of prices < \$180k. This provides a range of predictions, not just a point estimate.