RAMA UNIVERSITY

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FACULTY OF EGINEERING

DATA MINING & WAREHOUSEING
LECTURE-38

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OUTLINE

- MEASURING THE CENTRAL TENDENCY
- MEASURING THE DISPERSION OF DATA
- BOXPLOT ANALYSIS
- BOXPLOT
- VISUALIZATION OF DATA DISPERSION: BOXPLOT ANALYSIS
- MCQ
- REFERENCES

Measuring the Central Tendency

- Mean $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$
  - Weighted arithmetic mean $\bar{x} = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$
- Median: A holistic measure
  - Middle value if odd number of values, or average of the middle two values otherwise
  - estimated by interpolation $median = L_1 + (\frac{n/2 - (\sum f)l}{f_{median}})c$
- Mode
  - Value that occurs most frequently in the data
  - Unimodal, bimodal, trimodal
  - Empirical formula: $mean - mode = 3 \times (mean - median)$

Measuring the Dispersion of Data

- Quartiles, outliers and boxplots
  - Quartiles: Q_1 (25th percentile), Q_3 (75th percentile)
  - Inter-quartile range: $IQR = Q_3 - Q_1$
  - Five number summary: min, Q_1, M, Q_3, max
  - Boxplot: ends of the box are the quartiles, median is marked, whiskers, and plot outlier individually
  - Outlier: usually, a value higher/lower than 1.5 x IQR
- Variance and standard deviation
  - Variance s^2: (algebraic, scalable computation)

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2 = \frac{1}{n-1}\left[\sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2\right]$$

  - Standard deviation s is the square root of variance s^2

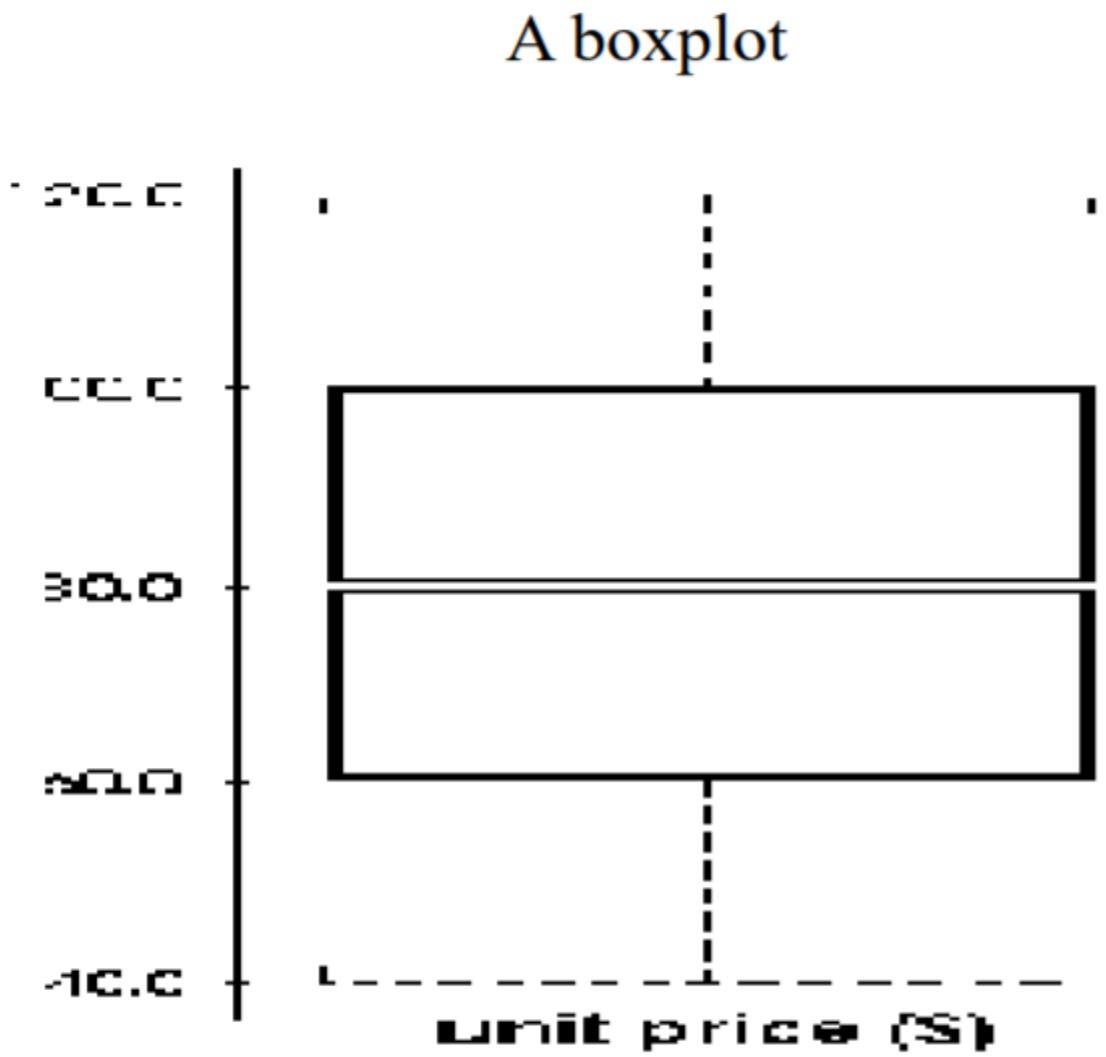
Boxplot Analysis

- Five-number summary of a distribution:

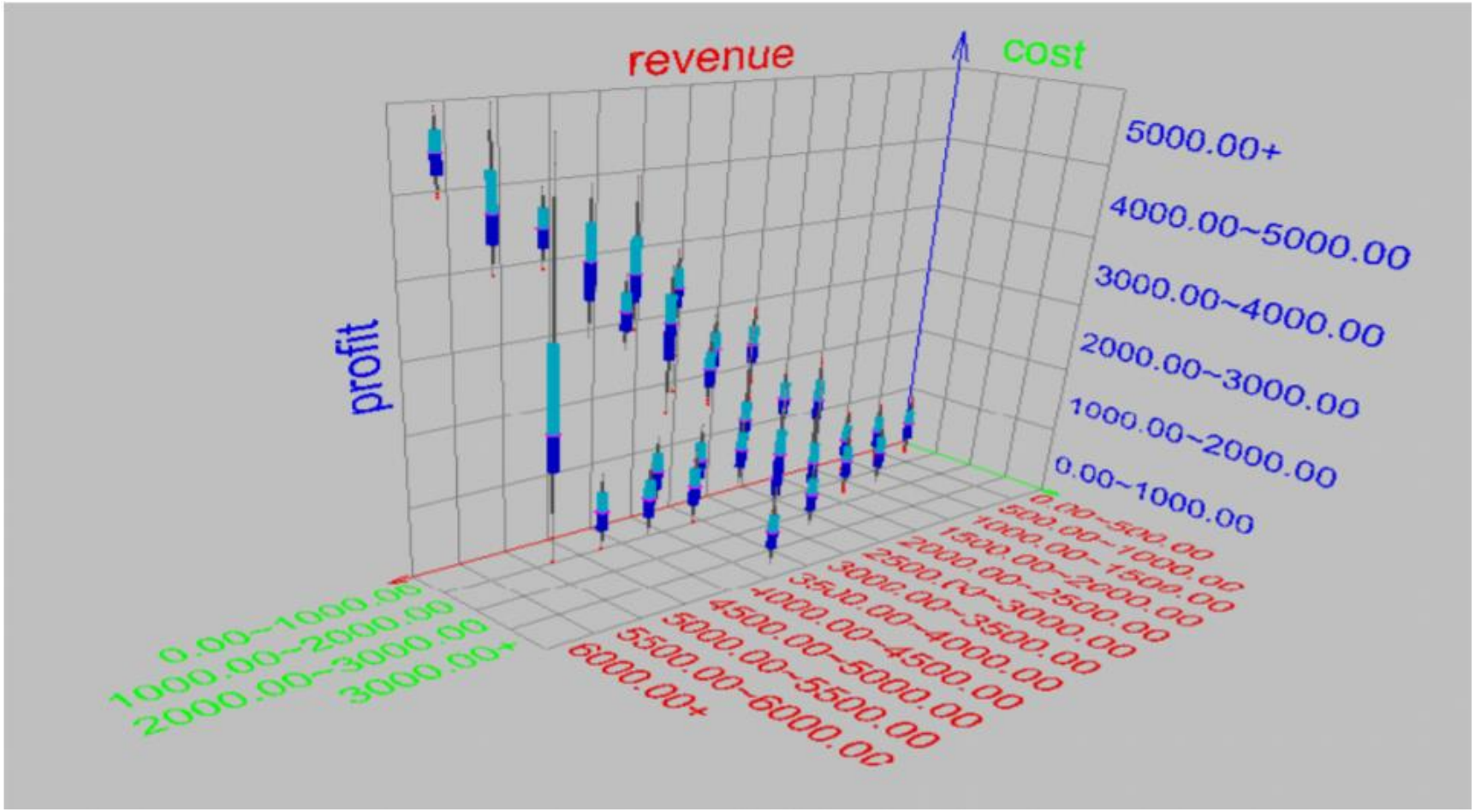
  Minimum, Q1, M, Q3, Maximum

- Boxplot
  - Data is represented with a box
  - The ends of the box are at the first and third quartiles, i.e., the height of the box is IRQ
  - The median is marked by a line within the box
  - Whiskers: two lines outside the box extend to Minimum and Maximum

Boxplot



Visualization of Data Dispersion: Boxplot Analysis



Multiple Choice Question

1. Various visualization techniques are used in _____ step of KDD.
a) selection
b) transformaion
c) data mining.
d) interpretation.

2. Extreme values that occur infrequently are called as _____.
a) outliers
b) rare values.
c) dimensionality reduction.
d) All of the above.

3. Box plot and scatter diagram techniques are _____.
a) Graphical
b) Geometric
c) Icon-based.
d) Pixel-based.

4. _____ is used to proceed from very specific knowledge to more general information.
a) Induction
b) Compression.
c) Approximation.
d) Substitution.

5. Describing some characteristics of a set of data by a general model is viewed as _____
a) Induction
b) Compression
c) Approximation
d) Summarization

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