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Batch Name: Data Analytics Nov Live Batch

Assignment 10:

Correlation and Covariance

Ques1: Define Covariance and explain how it differs from Correlation in terms of scale and interpretation.

Answer:

Covariance: whether two things are moving in the same direction together or different direction.

Positive covariance: variables move in the same direction

Negative covariance: variables move in opposite directions

Correlation: Correlation measures both direction and strength of relationship.

Always lies between -1 and $+1$

how it differs from Correlation in terms of scale and interpretation:

Covariance	Correlation
Depends on units	Unit-free

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Range not fixed	Always -1 to $+1$
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Ques2: What does a positive, negative, and zero covariance indicate about the relationship between two variables?

Answer:

Positive Covariance:

As X increases, Y also increases

Negative Covariance:

As X increases, Y decreases

Zero Covariance:

No linear relationship

Ques3: Discuss the limitations of covariance as a measure of relationship between two variables. Why is correlation preferred in many cases?

Answer:

Limitations of Covariance:

- Depends on units
- Cannot compare strength of relationships
- Large values are confusing

Why Correlation is Preferred:

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- Standardized (-1 to $+1$)
- Shows **direction + strength**
- Easy comparison

Ques4: Explain the difference between Pearson's correlation coefficient and Spearman's rank correlation coefficient. When would you prefer to use Spearman's correlation?

Answer:

Pearson's correlation	Spearman's rank correlation
Measures linear relationship	Measures monotonic relationship
Uses actual values	Uses ranks
Sensitive to outliers	Less sensitive

Use Spearman when:

- Data is ranked
- Non-linear but monotonic relationship
- Outliers present

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Ques5: If the correlation coefficient between two variables X and Y is 0.85, interpret this value in context. Can you infer causation from this value? Why or why not?

Answer:

Correlation = 0.85 – Interpretation

- **Strong positive correlation**
- Variables move together strongly

Can we infer causation?

No

- Correlation \neq Causation
- Another variable may influence both