Covariance

Covariance refers to a relationship between two variable with respect to effect of change in one variable over other

$$Covariance(x, y) = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})((y_i - \bar{y}))$$

Use cases

1. Dimensionality Reduction

Correlation

Correlation of a measure of the degree to which two random variables are correlated or go on in a sequence. When a change in one variable cause equivalent change in the second random variable

$$Correlation(x, y) = \frac{covariance(x, y)}{\sqrt{\sigma_x \sigma_y}}$$

Use Cases

1. Finding patterns
2. Dimensionality Reduction

Side note, that's something that you would usually use to plot the heatmap (reference hackathon)

Questions

1. What is the range of correlation b/w two random variables?
2. What is the range of covariance b/w two random variables?
3. which is unit free of the two?
4. Does change in scale affect covariance?
5. Does change in scale affect correlation?

Answers

1. $[-1, 1]$
2. $(-\infty, \infty)$
3. Correlation
4. Yes
5. No