

Probability :- Degree of measurement of uncertainty. Events

Degree of belief :- Absolute certainty $\rightarrow 1/0$.

Law of large nos :- more expt. we run, we will tend to get the expected probability.

↳ Gambler's fallacy :- When a certain individual believes which is less likely or more likely.

Random Variable \Rightarrow It has a probability associated with it.

Discrete Continuous

PMF :- Probabilities of given discrete variable.

PDF :- " " " continuous variable.

Expected Value

↳ Mean of probability distribution. $E = \sum x P(x)$
 ↳ expected probability.

$\mu \approx E(x)$ \rightarrow law of large nos.

Central Tendency \rightarrow identify the central position of the data.

① Mean :- Continuous data

↳ most common & actual value present in data.

↳ If data has outliers, then mean gives wrong interpretation of data.

② Median :- Middle score of arranged data
 ↳ less affected by outliers

③ Mode :- most freq. score in the dataset

Quantiles

→ sample divided into equal-sized subgroups. Dividing into areas of equal probability.

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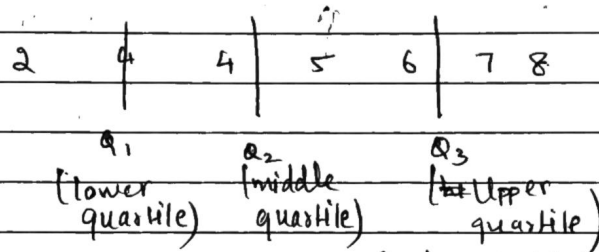
→ Quartiles: Divides into 4 ~~qua~~ equal parts

→ Percentiles: " " " 100 " "

→ Deciles: " " " 10 " "

* Quartiles: Divides the dataset in 4 ~~qua~~ equal parts:

→ Q_1, Q_2, Q_3 quartiles.



Interquartile Range

→ $Q_3 - Q_1$

→ Resistant of outliers

Q_1 → smallest and median

$$Q_1 = n \times 1/4$$

Q_3 → middle value b/w Q_2 & highest score

Percentile: Contains % of scores fall below that number.

Decile: 10% → 1st decile }
60% → 6th decile }

Variance: How far data points differ from mean.

↑ variance ↑ scattered

$$\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

↓
 σ : Std. deviation.

↗ value of observation

Covariance:- Relationship b/w two random variables (directional)

If both increase \Rightarrow +ve covariance

→ if ^{Date} ~~one demand~~, \$ increase \rightarrow -ve covariance.

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$$Cov(X, Y) = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

Correlation:- defines the strength of relationship. (Ranges from -1 to 1)

↳ Pearson coefficient: $r_{xy} = \frac{\text{Cov}(x, y)}{\sigma_x \cdot \sigma_y}$ σ_x :- standard deviation of x , σ_y :- standard deviation of y .

Joint Probability Distribution :- two probabilities are at same time.

Conditional probability: $P(A|B) = \frac{P(A \cap B)}{P(B)}$
If $A \not\supset B$ are disjoint $A \cap B = \emptyset \Rightarrow P(A|B) = 0$

Distributions :- (i) Uniform distribn:- Probabilities is constant over a range.

$$f(x) = \frac{1}{b-a} \begin{cases} a \leq x \leq b \\ 0, \text{ otherwise} \end{cases}$$

② Normal Distribution:- Data which is closer is more freq. to occur.

↳ if graph is normally distributed

→ mean = median = mode

→ Symmetric about curve.

Empirical Rule:- Where the most of values in ND.

$$7) f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

68% lies in 1SD

95% lie in 2SD

99.7% Wein3SD

$\hookrightarrow z = \frac{x - \mu}{\sigma}$ | Geometric Distribution: $(1-p)^{n-1} p$
 $\hookrightarrow \mu = \frac{1}{p}$; $\sigma^2 = \frac{1-p}{p^2}$

$$\hookrightarrow \eta = \frac{1}{p} ; \sigma^2 = \frac{1-p}{p^2}, \sigma = \sqrt{\frac{1-p}{p^2}}$$