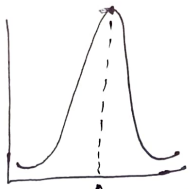
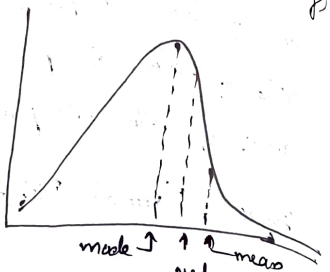
Symmetric

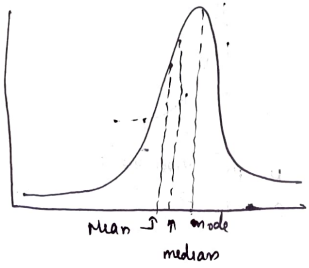


Mode = Mean = Median

Skewed Right (Positively)



Skewed left (Negatively)



Positive Skew (Right skew)

Tail on the right side is longer most data are on the left

Negative Skew (left skew)

Tail on the left side is longer most data are on the right

Zero skew (symmetric)

The data is evenly distributed around the mean (like a normal distribution)

$$\text{Skewness} = \frac{3(\text{mean} - \text{median})}{\text{Standard Deviation}}$$

If value near to -1, then it is -ve skew

If value near to +1, then it is +ve skew

If value lies in -0.5 to 0.5 then it is zero skew

Kurtosis

$$K = \frac{1}{n} \sum_{i=1}^{n} \left(\frac{x_i - \bar{x}}{\sigma} \right)$$

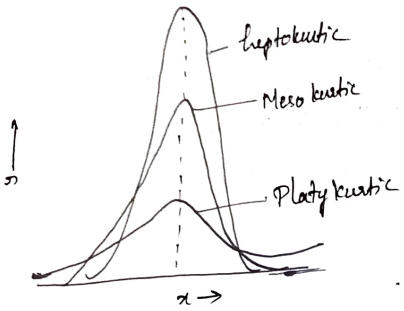
It Measures the tailedness or peakness of the data distribution

Types of kurtosis

1) Mesokurtic ($K = 3$)
   - * Normal Distribution
   - * No outliners
   - * Moderate tail and peak

2) Leptokurtic ($K > 3$)
   - * Heavy tail and sharp peak
   - * More outliers

3) platykurtic ($K < 3$)
   - * light tail and flat peak
   - * Fewer outliers



3) Bernoulli Distribution

It is simplest form of discrete Probability distribution and models a random Experiment with ~~exactly~~ exactly 2 outcomes.

Success denoted by = P

failure denoted by = 1-P

Total Probability = 1

The range is 0-1

$P(T) = \frac{1}{2} = 0.5$

$P(H) = \frac{1}{2} = 0.5$

4) Binomial Distribution

It generalizes the Bernoulli distribution to multiple trails. It models the number of Success in a fixed number of independent and identical Bernoulli trails.

$$P(x=k) = \binom{n}{k} p^k (1-p)^{n-k}$$

k = no of Success, n = no of trails

P = Probability of success.

5). Poison Distribution

It is used to model the number of events that occur in a fixed time interval or space and occurs independently the parameter λ represents the avg number of event in the interval

$$P(x=k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

λ is the avg no of events

k is the no of arrangements

Inferential statistics

Probability :-

It measures likelyhood of an event

eg :- Dice = {1,2,3,4,5,6}

$P(x) = \frac{\text{No of favourable outcome}}{\text{total no of outcomes}}$

$P(3) = \frac{1}{6}$

$P(2,4,5) = P(2) + P(4) + P(5)$

$= \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$

$= \frac{3}{6} = \frac{1}{2} // = 0.5$

Toss of 2 coins

{HH, HT, TH, TT}

? what is the prob of getting only 1H?

$\frac{2}{4} = \frac{1}{2}$

? what prob of getting both T?

$\frac{1}{4}$

There are 2 rules in probability :-

1) Addition Rule : OR
2) Multiplication Rule : AND

Addition Rule

1) Mutual Enclusive Event
2) Non mutual Enclusive Event

1) Mutual Enclusive Event

If the different events won't occur at the same time is called Mutual Enclusive Event.

Ex: If you toss the coin, what is the probability of landing on head or tail

$P(A \text{ or } B) = P(A) + P(B)$

$P(H \text{ or } T) = P(H) + P(T)$

$P(H \text{ or } T) = \frac{1}{2} + \frac{1}{2} = 1$

2) Non mutual Enclusive Event

Here multiple events can occur at the same time.

Ex: Picking the cards from deck of cards. what is the probability of getting Jack or heart?

$P(J \cup H) = P(J) + P(H) - P(J \cap H)$

$= \frac{4}{52} + \frac{13}{52} - \frac{1}{52}$

$= 0.07 + 0.25 - 0.01$

$P(J \cup H) = 0.31$

Multiplication Rule

1) Independent Rule

Here all the values have the same priority after n numbers trails also or 1 event don't depend on another event

1st toss the coin

$P(H) = \frac{1}{2}$

7th toss the coin

$P(H) = \frac{1}{2}$

Ex:- What is the probability of Dice ~~scardo~~ rolling and getting a 5 and then 4?

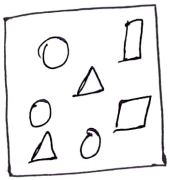
$P(A \text{ and } B) = P(A) * P(B)$

$P(\text{5 \& 4}) = P(5) * P(4)$

$= \frac{1}{6} * \frac{1}{6} = 2.7\% = 0.027$

2). Dependent Event

Present Event is depend on the previous event.



1st time

$P(\bigcirc) = \frac{3}{7} = 0.43$

2nd time

$P(\triangle) = \frac{2}{6} = 0.3$

3rd time

$P(\square) = \frac{2}{5} = 0.4$

4th time

$P(\bigcirc) = \frac{2}{4} = 0.5$

Ex: From a deck of cards what is the probability of getting a king and then 8?

$P(A \text{ and } B) = P(A) * P(B/A)$

$P(K \text{ and } 8) = P(K)$

$= \frac{4}{52} * \frac{4}{51}$

$P(K \text{ and } 8) = 0.07 \Rightarrow 7\%$ chance

Permutation and combination

Eg: {Dosa, Idly, Vada, Puri}

Dosa Idly

Dosa Idly
Dosa vada
Dosa puri
Idly dosa
Idly vada
Idly puri

vada Idly
vada dosa
vada puri
puri vada
puri Idly
puri dosa

$${}^nP_n = \frac{n!}{(n-r)!} = \frac{4!}{(4-2)!} = \frac{4 \times 3 \times 2!}{2!} = 12$$

Permutation refers to the different way in which a set of items can be arranged in order and in permutation the order of the items matters but not items.

Ex for combinations:-

Dosa Idly
Dosa Vada
Dosa Puri
Idly vada
Idly puri
vada puri

$${}^nC_r = \frac{n!}{(n-r)!\,2!} = \frac{4!}{(4-2)!\,2!} = \frac{4 \times 3 \times 2!}{2! \times 2!}$$

$= \frac{12}{2} = 6$

It refers to the different way of selecting items from a set where the order of selection doesn't matter but items should not repeat.