Median :-

The median of a r.v. X is any number m that satisfies

$$\text{Prob}\{X < m\} \le 1/2 \text{ and } P\{X > m\} \le 1/2$$

$$\Rightarrow \text{Prob}\{X < m\} = \text{Prob}\{X > m\}$$

Mode :-

The mode is the mostly possible value of the r.v. X. It is the value for which the prob. mass fn. attains its maximum value. If m is the mode of a r.v. X, then $\text{Prob}\{X = m\} \geq \text{Prob}\{X = x\} \ \forall x$. Like median, and unlike the mean value, a r.v. may have multiple mode.

Quartiles (First, 2nd and 3rd).

Q_1 : 1st quartiles

$$\text{Prob}\{X < Q_1\} = \frac{1}{4} \text{ and } \text{Prob}\{X > Q_1\} = \frac{3}{4}$$

Q_2 : 2nd quartiles

$$\text{Prob}\{X < Q_2\} = \frac{1}{2} \text{ and } \text{Prob}\{X > Q_2\} = 1/2$$

$\Rightarrow Q_2 \rightarrow$ Median of X.

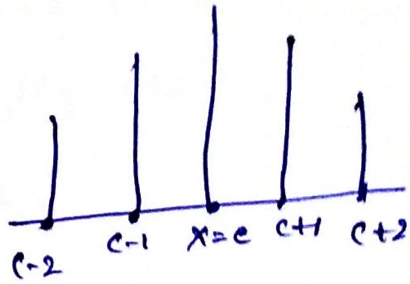
Q_3 : 3rd quartiles

$$\text{Prob}\{X < Q_3\} = \frac{3}{4} \text{ and } \text{Prob}\{X > Q_3\} = \frac{1}{4}.$$

A Banerji

Skewness:

Let X be a discrete r.v. with pmf $P_X(x)$. Then X is said to be symmetrical about a number $x=c$ if $P_X(x-c) = P_X(x+c)$



It is always observed that for a symmetric distribution $E(X) = c$.

A distribution which is not symmetrical is called asymmetrical or skew. Skewness means lack in symmetry of the distribution. Hence, skewness indicates the degree of departure from symmetry.

$\mu_1 = E(X - E(X)) = E(X) - E(X) = 0$.

Hence, $\mu_1 = 0$ for all distribution whether it is symmetrical or not.

For symmetrical distribution, all odd order central moments is zero.

Hence any odd order central moment (if it exists), except μ_1, can be taken as measures of skewness.

The coefficient of skewness is given by

$$\gamma_1 = \frac{\mu_3}{\sigma^3}, \text{ where } \sigma \text{ is the s.d. of } X.$$

P.T.O

Note that, though for all symmetrical distribution $\mu_3 = 0$, the converse is not true, i.e., it is possible to have $\mu_3 = 0$ for some asymmetrical distribution. In this case, γ_1 will be calculated using first non-zero odd order central moment, say μ_5 or μ_7 etc.

i.e., $\gamma_1 = \dfrac{\mu_5}{\sigma^5}$ OR $\gamma_1 = \dfrac{\mu_7}{\sigma^7}$ etc.

If $\mu_3 > 0$ then the distribution is said to have positive skewness. ~~In these cases the graphs~~

If $\mu_3 < 0$ then the dist. is said to have negative skewness.

Kurtosis :-

Kurtosis describes the degree of peakness near the centre of the graph of pmf. for a discrete r.v. or the graph of pdf for a continuous r.v.

The coefficient of kurtosis is denoted by β_2 and is given by $\beta_2 = \frac{\mu_4}{\sigma^4}$

Hence, a high value of β_2 is thought to mean a sharply peaked distribution, while a low value of β_2 signifies a relatively flat topped distribution.

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