12-12-2020

Unit -10

Sampling distribution

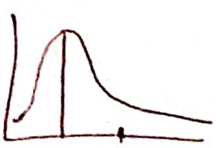
- We are often interested in knowing population parameters, like population mean, population std. But it is not possible to calculate it.
- So we select some sample and calculate sample parameters, and estimate the value of population parameters using sample parameters.

Sampling distribution :-
Distribution of statistic obtained from larger number of samples drawn from a specific population.

⇒ Estimating shape of the sampling distribution.
~~of the~~ data ($p \rightarrow$ population statistic)

- if $np \geq 10$ and $n(1-p) \geq 10$ = Normal (approx)

if not normal then, check the population mean



⇒ Infering population mean from sample mean.

- Using sample mean to infer population mean.

population mean = μ

sample mean = $\bar{x}$

⇒ <u>Central</u> <u>limit</u> <u>theoram</u>

- CLT states that if you have a population, with mean μ and std σ, and take sufficiently large random samples from the population, with replacement, then the dist. of the sample mean (or any other statistic would be approximately normally distributed.
- This is true even if population is normal or not.
- Sampling distribution of sample mean is normal.
- Mean of this distribution is equal to the population mean. (for large n)

⇒ Change in sampling dist. as n changes

population → sample of size $\boxed{n}$ → calculate sample statistic (eg sample mean) → plot the dist of sample statistic (large n)

CLT says that for large # sample, this distribution approaches normal.

- As n ↑ dist. is more normal.
- As n ↑ std of distribution decreases.
- Let std of population is σ

Then for sampling dist,

$$\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n}, \quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$