

17HS034 Statistical Inference

COURSE DESCRIPTION AND OBJECTIVES

Statistical inference involves using data from a sample to draw conclusions about a wider population. Given a partly specified statistical model, in which at least one parameter is unknown, and some observations for which the model is valid, it is possible to draw inferences about the unknown parameters and hence about the population from which the sample is drawn. As such, inference underpins all aspects of statistics. However, inference can take different forms. It may be adequate to provide a point estimate of a parameter, i.e. a single number. More usually, an interval is required, giving a measure of precision. It may also be necessary to test a pre-specified hypothesis about the parameter(s). These forms of inference can all be considered as special cases of the use of a decision function.

COURSE OUTCOMES

After the completion of the course, the student will be able to achieve the following outcomes:

COs	Outcomes
1	Provide estimates of unknown parameters from sample statistics.
2	Confidence intervals can be used to estimate population parameters such as means or proportions
3	Point estimates are sample statistics used to estimate the exact value of a population parameter
4	Perform testing of hypothesis for different populations
5	Establish a confidence interval for a mean or a proportion

SKILLS

- ✓ Explain the concepts of estimation, point estimates, confidence level, and confidence interval
- ✓ Calculate and interpret confidence intervals for means
- ✓ Describe the concept of risk and how to reduce it
- ✓ Calculate and interpret confidence intervals for attributes

UNIT-I

Theory of estimation: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency and. Statement of Neyman's factorization theorem. Estimation of parameters by the methods of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson & Normal Population parameters estimate by ML method. Confidence intervals of the parameters of normal population.

UNIT II

Concepts of Statistical hypothesis: Null and alternative hypothesis, critical region, two types of errors, level of significance, power of a test. 1 tailed, 2 tailed tests, Neyman - Pearson's lemma. Examples in of Binomial. Poisson, Normal distributions.

Unit-III

Large Sample Tests : Large sample tests for single mean, two means, Single proportion, Two proportions, Standard Deviation of single and double samples and Fisher's Z transformation .

Unit-IV

Small sample tests: Tests of significance based on χ^2 , t and F. χ^2 -test for test for independence of attributes, t-test for single, double and paired tests, Variance Ratio Test(F-test).

Unit-V

Non-parametric tests - Advantages and Disadvantages. Two sample run test, Two sample Median test and Two sample sign test.

TEXT BOOKS

1. BA/BSc II year statistics - statistical methods and inference - Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. Ravichandra Kumar.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

REFERENCE BOOKS:

1. Fundamentals of Mathematics statistics : VK Kapoor and SC Guptha.
2. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das Guptha B.
3. Introduction to Mathematical Statistics : Hoel P.G.