Stat-323 Order Statistics and Non-parametric Methods

100 Marks: 03 Credits

Number of Class: 35-40

Order Statistics: Definition and distribution function of order statistics for both discrete and continuous case, asymptotic distribution, sample cumulative distribution function, joint distribution of n order statistics, marginal distribution of order statistics, conditional distributions of order statistics, distribution of median and range, exact moments of order statistics, large-sample approximations to mean and variance of r^{th} order statistics, simple estimation of parameters based on order statistics, best linear unbiased estimation based on order statistics, estimation based on selected statistics.

Non-parametric Estimation: Estimation of moments, point and interval estimation of distribution function and density function with examples, point and interval estimation of percentiles, confidence interval for distribution function.

Non-parametric Test

Overview of Non-parametric tests, difference between parametric and non-parametric tests, concepts of distribution free test, distribution theory of runs, test based on total number of runs, test based on length of longest run, runs up and down, and randomness test based on ranks, distribution theory of Kolmogorov-Smirnov (K-S) one sample test statistic and test based on K-S test, comparison of Chi-Square test and kolmogorov-smirnov, test for goodness of fit, definition, correlation between variate values and ranks, treatment of ties in rank tests.

One-Sample and paired-Sample Techniques: Sign test, Wilcoxon signed-rank test and their distributional properties, power and confidence interval procedure, binomial and quantile test.

General Two Sample Problem: Wald-Wolfowitz runs test, Kolmogorov-Smirnov two-sample test, median test and Mann-Whitney U test and their distribution under null hypothesis, confidence interval procedures, linear rank statistics.

Linear Rank Test for Location Problem: Wilcoxon rank-sum test, terry hoeffding test, Van Der Waerden test and their distributions under null hypothesis.

Linear Rank Test for Scale Problem: Mood test, Freund-Ansari-Bradley-David-Barton test, Seigel-Tukey test, Klotz-normal score test, Sukhatme test and their distributions under null hypothesis, moments under null hypothesis.

Tests of Equality of k Independent Samples: Extension of median test, Kruskal-Wallis one-way anova test, distributional properties of each test, test against ordered alternatives, comparisons with control.

Text

1. Arnold B.C., Balakrishnan, N. and Nagaraja, H.N.: *First Course in Order Statistics*, Wilely New York.
2. Gibbons, J.D. and Chakraborti, S Gibbons, (1992): *Nonparametric Statistical Inference*, *Marcel Dekker*, Inc, USA.

References

1. Conover.W.J.: *Practical Non parametric Statistics*, Wiley, New York.
2. David, H.A.: *Order Statistics*, 2nd Ed, John Wiley, New York.
3. Hollander,M. *Nonparametric Statistical Methods*, Wiley, New York.
4. Krishnaith,R.R.: *Non parametric Methods.*
5. Wolfe, D.A.: *Introduction to the theory of Non parametric Statistics.*