PROBABILITY – II WITH EXAMPLES USING R

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PRE-REQUISITES : Class XII Mathematics

INTENDED AUDIENCE : Undergraduate students

INDUSTRY SUPPORT : Data Science companies

COURSE OUTLINE :

The course is part-2 of the two part Probability course. It will begin with a review of probability densities on the real line, and then discuss Bivariate continuous distributions including the Bivariate normal distribution. Then we will compute distribution of sums and quotients of continuous random variables. Expectation/mean, moments, variance, and conditional expectation will be understood for continuous random variables. It will conclude by proving Weak law of large numbers using Tchebyshev's inequality and a discussion of the strong law of large numbers and Central Limit Theorm. We will use the package R to illustrate examples and give exercises.

ABOUT INSTRUCTOR :

Prof. Siva Athreya, is a Professor at the Indian Statistical Institute, Bangalore. He works in the area of Probability theory. He teaches in the B.Math (hons.), M.Math and Ph.d programs.

COURSE PLAN :

1. Review of continuous random variables and probability densities on the real line,
2. Bivariate continuous distributions, bivariate cummulative distribution functions. Independence and marginal distributions.Conditional distribution, conditional density. E.g. : Bivariate Dirichlet and Normal Distributions
3. Distributions of sums and quotients for continuous distributions.
4. Expectation, variance and moments of random variables. Conditional expectation and variance.
5. Moment generating functions. Markov's inequality, Tchebyshev's inequality
6. Discussion of convergence with probability one, convergence in probability and distribution. Weak law of large numbers. State- ments of CLT and Strong law of large numbers for i.i.d. random variables.