PROPORTIONAL INVERSE GAUSSIAN REGRESSION MODEL FOR THE ANALYSIS OF CONTINUOUS DATA IN THE OPEN UNIT INTERVAL

Abstract

Outcomes in the form of fractions, proportions, rates and percentages often appear in various fields. Existing beta and simplex distributions are frequently unable to exhibit a satisfactory performance for fitting such continuous proportional data. In order to provide researchers and practice users an additional candidate distribution for modeling observations in the open unit interval (0, 1), we introduce a new Proportional Inverse Gaussian (PIG) distribution constructed by two independent single-parameter inverse Gaussian distributions. The derived density function involves the modified Bessel function of the second kind, which hinders the development of efficient estimation methods. To overcome this difficulty, we propose a novel Minorization–Maximization (MM) algorithm to calculate the Maximum Likelihood Estimates (MLEs) of the parameters in the PIG distribution without covariates. Bootstrap confidence intervals and testing hypothesis on symmetry of the density function are also presented. In addition, an MM algorithm facilitated by the gradient descent algorithm is developed for the PIG regression model. Some simulation studies are conducted. The comparison among the PIG, beta and simplex models shows that the PIG distribution has a best robustness performance when data violate distribution assumption. The hospital stay data of Barcelona in 1988 and 1990 are analyzed to illustrate the proposed methods. (This is a joint work with Mr. Pengyi LIU, Professor Kam Chuen YUEN, and Professor Man-Lai TANG)

on

Wednesday, July 31, 2019

(Refreshments will be served from 2:15 p.m. outside Room 301 Run Run Shaw Building)

2:30 p.m. – 3:30 p.m.

at

Room 301, Run Run Shaw Building

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All interested are welcome