

THE CORRELATED GAMMA-RATIO DISTRIBUTION IN MODEL EVALUATION AND SELECTION

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ABSTRACT

The paper considers the problem of selecting one of two not necessarily nested competing regression models based on comparative evaluations of their abilities in each of two different issues: The first pertains to viewing the problem as a “best-fitting” model determination problem in the sense that a model is sought which is closest to the observed data, and utilizes some measure of the adequacy of the models to describe existing observations. The second is entirely different from the first in that it takes account of the predictive adequacy of the models.

It is shown that certain test statistics can be constructed which within each of the above settings can lead to appropriate model selection procedures based on sequential comparisons of the competing models in their abilities to describe the data or to predict future observations.

The null distribution of these statistics, termed as the “Correlated Gamma Ratio Distribution”, is obtained as the distribution of the ratio of two correlated gamma variates. Applications are given as well as some simulation results revealing the behaviour of the model selection procedures developed. Potential extensions of the proposed procedures are described.

Keywords: model selection; bivariate gamma distribution; F distribution; non-nested models; predictive ability.