COLLOQUIUM

Department of Statistics and Probability
Michigan State University

Dongchu Sun
University of Missouri

Bayesian Analysis of Variance

Tuesday, November 8, 2011
A405 Wells Hall
10:20 a.m. - 11:10 a.m.
Refreshments: 10:00 a.m.

Abstract

The ANOVA models have been applied in analyzing data from a wide range of areas, such as biology, psychology, and sociology. We consider two versions of the ANOVA model that exist in literature, namely the fixed effect model and the random effect model. The main difference of these two types of models lies in whether or not the effects of the factor levels are treated as random variables. In practice, however, there are many cases where it is not clear whether or not the factor effects should be treated as fixed or random.

On the other hand, from the Bayesian point of view, all parameters are considered as random variables, making the distinction between the fixed effect model and the random effect model rather obscure. The primary goal of this talk is to seek a unified Bayesian approach to deal with ANOVA models with fixed effects and random effects.

In a Normal linear regression models are considered under a class of Zellner's (zell:1986) g-priors. The closed form expression of the marginal likelihood function is derived assuming the commutativity of the projection matrices from the design matrices. As illustrations, the marginal likelihood functions of the balanced m-way ANOVA models with either main effects only or with all interaction effects are calculated using the closed form expression. The commutativity condition is discussed using the tool of orthogonal arrays.

In case of one-way ANOVA models, we show that the proposed prior will result in good-consistency properties in terms of model selection and posterior distributions, in the settings of either the fixed effect model or the random effect model.

To request an interpreter or other accomodations for people with disabilities, please call the Department of Statistics and Probability at 517-355-9589.