PREFACE

This volume originates from a conference that I organized in Lincoln, Nebraska, U. S. A., during March 24-26, 1999. One of the main themes of the conference was the growing field of model selection. The conference was supported by the United States Postal Service, the National Center for Health Statistics, the Gallup Organization and the University of Nebraska-Lincoln. About eighty researchers including some of the contributors of this volume attended the conference.

Shortly after the conference, I discussed the possibility of publishing a volume on model selection with David Ruppert, the former editor of the IMS Lecture Notes-Monograph Series. We agreed that a volume containing a few long review papers on model selection would be of great interest to researchers. The intent was not to publish a volume of conference proceedings but to provide an overview of model selection from the perspective of a few experts in the field.

This volume contains four review papers with discussions and rejoinders. Since the papers are long, a table of contents at the beginning of each paper is provided.

We start the volume with the paper by C. R. Rao and Y. Wu, who survey various model selection procedures with reference to regression, categorical data and time series analysis. The paper also discusses the impact of carrying out statistical analysis after a model is selected.

The second paper by H. Chipman, E. I. George and R. E. McCulloch reviews the basics of Bayesian model selection and discusses at length two important practical issues associated with the implementation of Bayesian model selection: (i) specification of the prior distributions and (ii) the calculation of posterior distributions. These practical issues are then illustrated in variable selection for the linear models and CART model selection problems.

In the third paper, J. O. Berger and L. R. Pericchi motivate the Bayesian model selection and point out the need for objective Bayesian methods in model selection. The authors provide a comprehensive review of four objective Bayesian model selection approaches and extensively discuss criteria for evaluating different model selection methods. The objective Bayesian model selection methods are then critically examined and compared.

We conclude this volume with the paper by B. Efron and A. Gous who compare different model selection methods using hypothesis testing, a simple case of model selection. In one-dimensional case, the authors demonstrate how two apparently different approaches (Fisher's and Jeffreys') to hypothesis testing can be possibly reconciled by