Editorial

After over one year of planning, we are delighted to see the first issue of Statistics and Its Interface (SII) in print. As the editors, we are grateful to the trust and support from the advisory board of SII. We thank the members of our editorial board, and International Press and its staff, particularly Mr. Lixin Qin, for their financial, editorial, and logistic support of SII. Most importantly, we would not have a successful debut without the strongest support from the authors of the 16 articles included in this first issue. Together, we are beginning to define a distinctive journal to promote the interface between statistics and other disciplines.

This is an exciting time for statisticians and the statistical discipline. Advances in science, engineering, and finance have created enormous challenges for statistical science. Those challenges have presented statisticians with unprecedented opportunities. The most effective way for us to make a difference in science and in the society is to interact with researchers in other fields. This is the spirit that we endorse and share through SII, as demonstrated by the collection of articles in this issue.

To highlight statistical interface with other fields, we loosely grouped the 16 articles into several categories. One category consists of two excellent reviews—one on varying coefficient models by Fan and Zhang and the other on applied statistical projects in China by Zhong, Geng, Guo, and Tao. The remaining articles are original research papers with "interface" at their hearts.

Imaging has become an indispensable technology in our lives. As noted by Pavlicova, Santner, and Cressie, "Functional magnetic resonance imaging (fMRI) has revolutionized the study of linking physical stimuli with localized brain activity." Not surprisingly, we have three articles on the topics related to detection of signals in noisy images (by Siegmund and Yakir) and in fMRI (by Pavlicova et al.), and a new approach to fast FMRI (by Zhang, Lindquist, Cho, and Shepp). Siegmund and Yakir make use of the classic theory in sequential analysis. Pavlicova et al. base their work on the notion of False Discovery Rate and a wavelet transformation to derive nearly uncorrelated data, and hence enhance the power of their signal detection. Busch and Gather develop a control chart to detect signals in the spectrum of a time series and to separate non-chattering from chattering process parts of a single-lip deep-hole boring machine. In Zhang et al., the authors note a critical limitation in fMRI for studying cognition due to the inadequate time-resolution, and describe an echo-volumar imaging sampling scheme to speed up the image reconstruction.

Closely related to imaging data are spatial, functional, and longitudinal data. Several authors propose effective models and techniques to deal with such data that arise from different applications. Ye, Lin, and Talyor focus on joint modeling of longitudinal and time-to-event data; Wang, Neill, and Miller introduce an agglomerative clustering algorithm to perform clustering analysis for functional data that include fMRI data. Zhu, He, and Zhou use an auto-multicategorical regression model to understand a unique problem, namely, the distribution of vegetation types based on climate variables in British Columbia, Canada.

Biostatistics has been an area of remarkable growth. The introduction of latent variables and mixed effects provides powerful techniques for analyzing correlated data, including the imaging, functional, and longitudinal data as described above. Motivated by a colon carcinogenesis experiment that studies the effects of cell DNA damage on the expression level of oncogene bcl-2, Hui and Wang propose a mixed-effects model in which the response and the main covariate are linked by time or position and the covariate corresponding to the observed response is not directly observable. Gadbury, Supapakorn, Coffey, Keith, and Allison use a latent-variable model to improve our understanding of the causal relationship between weight loss among obese individuals and mortality. In another direction, Song, Cai, and Lee attempt to tackle a complicated issue involving non-ignorable missing data using structural equation modeling.

Hu, Gwise, and Hu propose using optimal biased coins to improve the power in commonly used two-arm clinical trials. In a collaborative effort, Shi, Wahba, Wright, Lee, Klein, and Klein propose the LASSO-Pattern search algorithm as a two-step method to identify clusters or patterns of multiple risk factors for outcomes of interest in demographic and genomic studies. Finally, we include two articles by Zhang and Ye, and by Noe and He, on new and effective use of the tree-based methods to analyze complex data.

We hope that these sixteen articles offer a glimpse of the diversity of the articles of interest to SII. We note a common thread underlying those articles: the data of this century are often correlated and high dimensional. We will not be surprised if this trend continues. On the other hand, the first issue of SII cannot represent all disciplines with which statistical research interact. The future issues will touch on financial statistics, machine learning, and many other topics of interest. We welcome submissions of high-quality articles in broad areas of statistical science, and SII is for statisticians who strive to make a difference in science and society.

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