Statistical Techniques in Electrical and Computer Engineering

FOREWORD

Stochastic models and statistical inference from them have been popular methodologies in a variety of engineering disciplines, notably in electrical and computer engineering. Recent years have seen explosive growth in this area, driven by technological imperatives. These now go well beyond their traditional domain of queuing models and signal processing to novel methodologies deriving from a variety of areas such as random graphs, stochastic differential equations, classification and regression etc. These find applications ranging from artificial intelligence and manufacturing to bioinformatics.

The present issue collects together some of the material presented at two discussion meetings held under the auspices of the Indian Academy of Sciences, and/or related material provided by some of the speakers. The meetings were on 'Monte Carlo Methods and Related Techniques' in Coorg during Nov. 2004, and on 'Machine Learning' in Bangalore during Sept. 2005. It covers a broad spectrum of statistical methodologies currently having impact on electrical and computer engineering. While not exhaustive, it is fairly representative of where things are headed.

This special issue consists of six papers. The first paper by Karandikar is a tutorial on modern techniques for Markov Chain Monte Carlo with some emphasis on the computational issues. The paper by Nag and others discusses an application of exploratory data analysis methods from statistics to some problems in bioinformatics. Iyer and Manjunath provide an overview of topological issues in wireless *ad hoc* networks that call for random graph theory and present results for a special case. The paper by Bhatt revisits the classical problem of Kalman filtering under a much broader class of noise. Jalnapurkar presents a critical survey of some recent developments in statistical learning theory. The final paper by Laxman and Sastry provides a survey of some recent techniques in temporal data mining that have many industrial applications.

I am grateful to the authors and the referees whose commitment made this issue possible. The support of the Indian Academy of Sciences for the two meetings leading to this issue is greatly appreciated. Finally, the professionalism of the *Sādhanā* staff is something one has learned to value and appreciate in the past. This is one more in their long series of special issues put together with great finesse.

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