Preface

We have worked on our Ph.D. theses on *Statistical Signal Processing* although in a gap of almost 15 years. The first author was introduced to the area by his Ph.D. supervisor Professor C. R. Rao, while the second author was introduced to this topic by the first author. It has been observed that frequency estimation plays an important role in dealing with different problems in the area of *Statistical Signal Processing*, and both the authors have spent a significant amount of their research career dealing with this problem for different models associated with Statistical Signal Processing.

Although an extensive amount of literature is available in the engineering literature dealing with the frequency estimation problem, not much attention has been paid to the statistical literature. The book by Quinn and Hannan [1] is the only book dealing with the problem of frequency estimation written for the statistical community. We were thinking of writing a review article on this topic for quite sometime. In this respect, the invitation from Springer to write a Springer Brief on this topic came as a pleasant surprise to us.

In this Springer Brief, we provide a review of the different methods available till date dealing with the problem of frequency estimation. We have not attempted an exhaustive survey of frequency estimation techniques. We believe that would require separate books on several topics themselves. Naturally, the choice of topics and examples are based, in favor of our own research interests. The list of references is also far from complete.

We have kept the mathematical level quite modest. Chapter 4 mainly deals with somewhat more demanding asymptotic theories, and this chapter can be avoided during the first reading without losing any continuity. Senior undergraduate level mathematics should be sufficient to understand the rest of the chapters. Our basic goal to write this Springer Brief is to introduce the challenges of the frequency estimation problem to the statistical community, which are present in different areas of science and technology. We believe that statisticians can play a major role in solving several problems associated with frequency estimation. In Chap. 8, we have provided several related models, where there are several open issues which need to be answered by the scientific community.

Every book is written with a specific audience in mind. This book definitely cannot be called a textbook. It has been written mainly for senior undergraduate and graduate students specializing in Mathematics or Statistics. We hope that this book will motivate students to pursue higher studies in the area of Statistical Signal Processing. This book will be helpful to young researchers who want to start their research career in the area of Statistical Signal Processing. We will consider our efforts to be worthy if the target audience finds this volume useful.

Kanpur, January 2012   Debasis Kundu
Delhi, January 2012   Swagata Nandi

Reference

1. Quinn, B.G., & Hannan, E.J. (2001). *The estimation and tracking of frequency*. New York: Cambridge University Press.