

# Preface

This book is an overview of statistical inference in stationary, discrete time stochastic processes.

We begin our discussion with martingales and strong mixing sequences. We illustrate how these properties enable us to generate various classes of CAN estimators in the case of dependent observations.

Next, we discuss likelihood inference for finite and infinite Markov chains, higher order Markov chains, Raftery's Mixture Transition Density model and Hidden Markov chains. In [Chap. 3](#), we discuss a number of processes which have a non-Gaussian stationary distribution. Such models can be viewed as extensions of linear Auto-Regressive Moving Average models. Models discussed therein include standard discrete distributions such as Binomial, Poisson, Geometric, and continuous distributions such as Exponential, Gamma, Weibull, Lognormal, Inverse Gaussian and Cauchy.

[Chapter 4](#) deals with semi-parametric methods of estimation wherein few conditional moments are specified and the form of underlying distribution is not specified. Here, Conditional Least Squares methods are discussed. The main theme of the chapter is the estimation and confidence interval procedures based on estimating functions.

In the last two chapters, we discuss non-parametric methods of estimation. In [Chap. 5](#), kernel-based estimation of density and conditional expectation are discussed. Here, it is assumed that the underlying process is strong mixing. Asymptotic normality of these estimators is reported therein. The last chapter has a discussion on bootstrap and other resampling procedures for dependent sequences such as Markov chains, Markov sequences, linear Auto-Regressive Moving Average sequences. Block-based bootstrap for stationary sequences and other block-based procedures are discussed in some details. The main result reported therein is that block-based bootstrap, under certain conditions, is a better approximation to the sampling distribution than the traditional normal approximation. The discussion is concluded by bootstrap procedures for confidence intervals based on estimation functions.

This book can be useful for researchers interested in knowing developments in inference in discrete time stochastic processes. It can be used as a material for advanced level research students. A good background of probability, asymptotic inference and stochastic processes is desirable.

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