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Statistical Inference: An Integrated Bayesian/Likelihood Approach

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This book sets out an integrated Bayesian and likelihood approach to statistical inference, using the likelihood as the primary measure of evidence for statistical model parameters, and for the statistical models themselves.

To assess the strength of evidence from the data for competing parameter values or competing models, it uses likelihood ratios between the parameter values or the models. To interpret the likelihood ratios it uses a Bayesian approach which requires in general only the non-informative priors that are widely used in posterior inference about model parameters, though it can accommodate informative priors.

Comparison of different statistical models requires a treatment of the unknown model parameters. This problem is usually treated by Bayes factors; the book gives a different approach which uses the full posterior distribution of the likelihood for each model. This quite small change to standard Bayesian analysis allows a very general and unified approach to a wide range of apparently different inference problems.

A further contribution of the book is to develop a general Bayesian approach to finite population inference. This approach, using the multinomial distribution and a non-informative Dirichlet prior, can also be adapted to provide a general Bayesian "non-parametric" analysis.

The book is intended to provide both an exposition of an alternative to standard Bayesian inference, and the foundation for a course sequence in modern Bayesian theory at the graduate or advanced undergraduate level.

Contents

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