MAXIMUM LIKELHOOD ESTIMATION IN BIOLOGY: 2FEB

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Aim:

Maximum likelihood estimation (MLE) plays a key role in statistical estimation. It provides a framework to obtain the “best” set of parameters given the observation with an associated statistical model. Many statistical methods used in ecology, including most of the general and generalised linear models described in the statistics module, are consequences of maximum likelihood under specific applications. This module aims to give a formal definition to MLE, and to apply the technique to problems in ecology. By the end of this module, student will be able to understand the concepts of MLE, and implement MLE in R for standard and non-standard problems.

Detailed timetable:

Day 1: Common discrete/continuous random variables. Probability mass/density function. Expectation of random variables. Central limit theorem.

Day2: Multivariate random variables. Definition of a likelihood function. Maximisation in R.

Day 3: Properties of maximum likelihood estimators.

Day 4: Likelihood-ratio test. Confidence interval estimation.

Day 5: Examples of MLE. Long practical.

Readings:

Millar, R.B., *Maximum Likelihood Estimation and Inference – With Examples in R, SAS and ADMB.* Wiley-Blackwell, 2011.

Casella, G. & Berger, R.L., *Statistical Inference*, second edition, Cengage Learning, 2001.