AD Model Builder Introductory Workshop

http://admb-project.org/

Welcome and Introduction

ADMB Foundation

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Workshop Outline

Morning: 9:00 to 13:30; Lunch: 13:30 to 14:30; Afternoon: 14:30 to 17:00.

1. Introductions
2. Installation
3. Why "AD" in AD Model Builder
4. First example
5. How to specify model parameters
6. Likelihood based inference
7. Data input and reporting results.
8. Random effects
9. Estimating uncertainty
10. Feedback on course
Introductions

Instructors

- Anders Nielsen (Technical University of Denmark, DTU-Aqua)
- John Sibert (Pelagic Fisheries Research Program, University of Hawaii)

With a lot of help from

- Johnoel Ancheta (Pelagic Fisheries Research Program, PFRP)
- Mark Maunder (Inter-American Tropical Tuna Commission, IATTC)

Please introduce yourselves

- Name and Organization
- Your research and what you would like to do with ADMB?
What is ADModel Builder?

- A tool for building models and challenging them with data.
- Enables efficient estimation of model parameters.
- Consists of a template language, similar to a fourth-generation computer language.
- Includes template processor, C++ libraries and utility scripts.
ADMB Simplifies model development

• Manages description and input of data.
• Manages description of model parameters and objective function.
• Manages the interface between model parameters and numerical function minimizer.
• Includes for describing and estimating model uncertainty.
• Vector and matrix operators.
• C++ implementation allows creation of complex data structures and use of specialized libraries.
Efficient estimation of model parameters

- ADMB Minimizer uses analytically correct partial derivatives of objective function.
- Parameters may be estimated in user-specified order — estimation “phases”.
- Bounds may be imposed on all parameters.
**MCMC algorithm**

- Starts at the mode of the posterior distribution to reduce “burn-in” time.
- Jumping rules based on the covariance matrix at the mode of the posterior distribution.
- Enables rapid and accurate Bayesian integration.
Random effects parameters

- Uses Laplace’s approximation (and importance sampling).
- Analytically correct second derivatives.
- Adaptable for process error and meta analysis.
The ADMB Project

• Make ADMB Free
• Make ADMB open source
• Promote further development of ADMB
• Facilitate the use of ADMB
• Promote application of ADMB in many disciplines