Course Overview

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Statistical Modeling in R
Universidad de Concepción
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Overview

1. **Introduction to R**
   data, plots, tests, linear models, projects, help, functions, packages
2. **Extending the Linear Model**
   generalized linear models, additive models, mixed effects
3. **Nonlinear Models**
   uncertainty, maximum likelihood, hessian, simulations
4. **RTMB**
   automatic differentiation, writing models, running models
5. **Software Development**
   interacting with other programs, writing packages, github

Teach yourself programming in 10 years

Famous essay by Peter Norvig, a computer scientist

It takes around 10 years to develop expertise in a given field:
chess, painting, tennis, swimming, piano, programming, ...

Use the programming languages that your friends use

Work with other programmers, contribute to open source projects

Learning goals and AI

It's important to think about learning goals

You will probably work with statistical models in your career

How can you benefit the most from this course?

AI can be useful, but it can also slow down your learning

You can do well in this course without using AI

Organizing your notes and code this week

Some ideas . . .

Take personal **course notes** (day by day), either in a word processor, text editor, or just on paper.

Organize **long-term notes** (by subject) in a word processor or text editor. You can gradually build these notes over months and years, and use them as a reference.

Organize and save your work as **R scripts**. Scripts are text files that contain code (and often comments) that can be pasted or sourced into R.

Format of the course

Challenges

- A lot of statistics and programming concepts in a short time $\Rightarrow$ may feel too fast and confusing
- Participants have different background in statistical computing

Approach

- Emphasis on exercises and discussion rather than lectures
- Open-ended exercises $\Rightarrow$ participants can work on basic or advanced aspects, depending on their background
- Bring your own exercises and projects to class
- Work together in pairs as much as we can; we gain deeper insight when discussing with others

Introduce ourselves

Name and workplace

Project(s) you are working on

Previous background in R and statistical computing in general

What you hope to learn this week

Course evaluation

R scripts that you create (75%)

from Monday, Tuesday, and Wednesday

Group project (25%)

present on Friday

Course evaluation

R scripts that you create (75%)

At the end of each day, email me all R code that you wrote that day. The R scripts should:

- Reach me before class starts the next day.
- Run on my computer without returning an error, but if you want you can also send a separate file with R code that doesn't quite work.
- Not include unnecessary code.
- Include some comments describing the purpose of each part of the code. Well organized code doesn't need a lot of comments. The comments should enable an experienced R programmer to read quickly through the script and understand it.

Course evaluation

Group project (25%)

- Form groups and discuss datasets on Wednesday.
- Analyze a dataset and write R functions.
- Present on Friday.

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