

# Hmw II: Regression, Package Development

2025-03-18

## ! Important

- Due : April 27 2025
- Work in pairs
- 🔄 Deliver your work through a github repository
- 🗨 Present your work (10 minutes) on 2025-04-29 between 11:00 and 13:00 (Olympe de Gouges 358)

## 📖 Objectives

This homework is about

1. developing methods for objects produced by functions like `gpava()` and `activeSet()` from package `isotone` (R)
2. applying monotone regression techniques to a dataset.

### I. Supplementing the broom and the ggfortify packages

The [broom package](#) offers S3 generic functions for building dataframes from the output of a variety of statistical techniques (for example `lm`, `prcomp`, or `kmeans`): `augment()`, `tidy()`, and `glance()`.

The first goal of this homework is to design and code methods for generic functions `augment`, `tidy`, `glance`, and `autoplot` for classes `gpava` and `activeSet` defined in the [isotone package \(monotone regression\)](#).

Package `ggplot2` offers a generic function `autoplot()`. See [Tidyverse documentation on autoplot](#). Package `'ggfortify'` offers a large collection of methods for `autoplot`.

More generally have a look at [automatic plotting](#) Also have a look at `autolayer()` generic in `ggplot2`.

## II. Applying monotone regression methods to real data

The `Abalone` dataset can be obtained from [UIC Machine learning repository site](#). The usual problem consists in predicting *age (rings)* as a function of the other variables (this is a regression problem).

You are expected to conduct exploratory analysis on this dataset. Besides linear regression of the response variable with respect to the others, you shall fit a *monotone regression* function to the dataset. Use the functions developed in the first part of the homework to discuss your results.

Use the `quarto` package for reproducible research to write your report.

The report should be rendered at least in HTML format, and possibly also in PDF format.

### Package development

The function and methods coded in this homework should be delivered as a package.


Follow the package development guidelines in [R Packages \(2e\)](#).

- Define a dedicated `rstudio` project for this homework
- Don't forget documentation and testing

### References

- [Advanced R Programming](#)
  - [Functional programming](#)
  - [S3](#)
  - [Meta programming](#)
- [Packages](#)
- [Programming with/for ggplot2](#)
- [Programming with dplyr](#)
- [tidyeval helpers](#)
- [Cheatsheets](#)
- [Package isotone on CRAN](#)

Table 1:  Grading criteria

Criterion	Points	Details
Documentation/Report	40%	English/French 
Testing	25%	✓
Coding	35%	</>