

Ordinal Regression Diagnostics in R: An Introduction to the `ordr` package

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Abstract An abstract of less than 150 words.

Introduction

Coming soon!

Ordinal regression (OR) models...

Ordinal regression

Coming soon!

- Provide brief background on OR models.
- Provide brief background on relevant packages.

Li-Shepherd residuals

Coming soon! These are available in package [rms](#).

Surrogate-based residuals

Coming soon!

Graphical properties

Coming soon!

Residual-based OR diagnostics in R

Coming soon!

```
library(MASS)
houses.polr <- polr(Sat ~ Infl + Type + Cont, weights = Freq, data = housing)
```

Talk about model.

```
res <- resids(houses.polr)
```

Drawing multiple samples

```
res <- resids(houses.polr, nsim = 50)
```

Detecting heteroscedasticity

For this example, we generated $n = 2000$ observations from the following ordered probit model:

$$\Pr\{\mathcal{Y} \leq j\} = \Phi\left\{\left(\alpha_j + \beta X\right) / \sigma_X\right\}, \quad j = 1, 2, 3, 4, 5,$$

where $\alpha_1 = -36$, $\alpha_2 = -6$, $\alpha_3 = 34$, $\alpha_4 = 64$, $\beta = -4$, $X \sim \mathcal{U}(2, 7)$, and $\sigma_X = X^2$.

The following block of code uses the **MASS** package function `polr` to fit a probit model to the `hd` data.

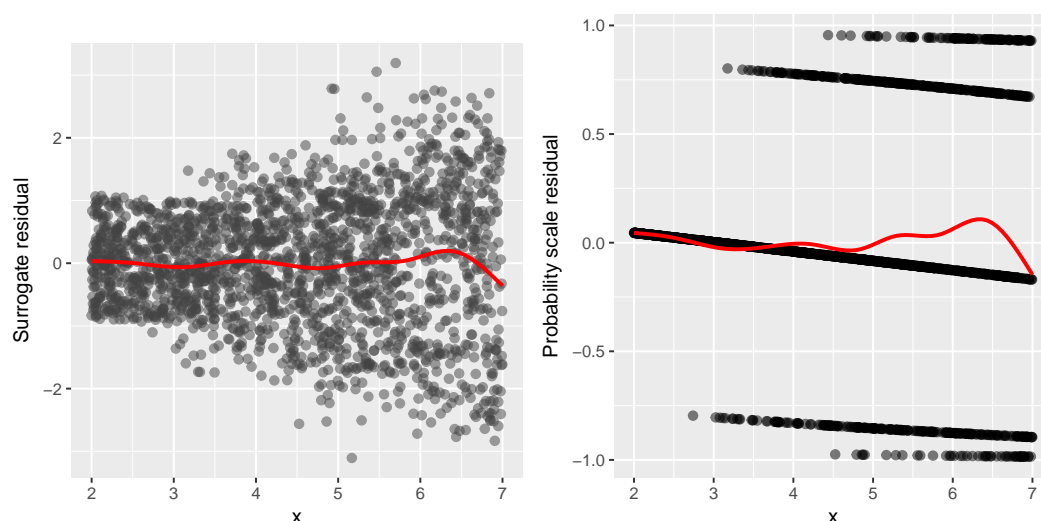


Figure 1: Residual vs. covariate plots for the simulated heteroscedastic data. *Left:* Surrogate residuals. *Right:* Probability scale residuals.

```
library(ggplot2)
library(MASS)
library(ordr)
fit.polr <- polr(y ~ x, data = hd, method = "probit")
```

```
# Figure 1 (left)
autoplot(fit.polr, what = "covariate", x = hd$x) +
  xlab("x") +
  ylab("Surrogate residual") +
  ggtitle("")
```

We can also easily obtain and plot the standard Li-Shepherd residuals against x using the **PResiduals** package function `presid`:

```
library(PResiduals)
ls.res <- presid(fit.polr)
ggplot(data.frame(x = hd$x, y = ls.res)) +
  geom_point(alpha = 0.5) +
  geom_smooth(color = "red", se = FALSE) +
  ylab("Probability scale residual")
```

Detecting a misspecified mean structure

Coming soon!

Detecting a misspecified link function

Coming soon!

Checking the proportionality assumption

Coming soon!

Assessing goodness-of-fit

Coming soon!

```
plot(gof(houses.polr, nsim = 1000))
```

Summary

This file is only a basic article template. For full details of *The R Journal* style and information on how to prepare your article for submission, see the [Instructions for Authors](#).

Acknowledgments

TBD.

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