Proportional odds model

Parametrisation

The proportional odds model, is for discrete observations

$$y \in \{1, 2, \ldots, K\}, \qquad K > 1,$$

defined via the cummulative distribution function

$$F(k) = \text{Prob}(y \leq k) = \frac{\exp(\gamma_k)}{1 + \exp(\gamma_k)}$$

where

$$\gamma_k = \alpha_k - \eta.$$

$\{\alpha_k\}$ is here increasing sequence of $K - 1$ cut-off points, and η is the linear predictor,

$$\alpha_0 = -\infty < \alpha_1 < \alpha_2 < \ldots < \alpha_{K-1} < \alpha_K = 1$$

The likelihood for an observation is then

$$\text{Prob}(y = k) = F(k) - F(k - 1).$$

Link-function

There is no option here.

Hyperparameters

The hyperparameters are $\theta_1, \ldots, \theta_{K-1}$, where

$$\alpha_1 = \theta_1,$$

and

$$\alpha_k = \alpha_{k-1} + \exp(\theta_k) = \theta_1 + \sum_{j=2}^{k} \exp(\theta_j)$$

for $k = 2, \ldots, K - 1$.

Specification

- family = `pom`
- Required arguments: y (observations)

Number of classes, K is determined as the maximum of the observations. Empty classes are not allowed.

Example

In the following example we estimate the parameters in a simulated example with Poisson responses.

```
## POM example
```

Notes