Custom Functions for Specifying Nonlinear Terms to `gnm`

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`gnm` is a function provided by the *gnm* package for fitting generalized nonlinear models. These models extend the class of generalized linear models by allowing nonlinear terms in the predictor. Nonlinear terms can be specified in the model formula passed to `gnm` by functions of class `nonlin`. A number of these functions are provided by the *gnm* package. Some specify basic mathematical functions, such as `Exp` for specifying an exponentiated term, whilst others are more specialized, such as the `Dref` function for specifying diagonal reference terms as proposed by Sobel (1981, 1985).

Users are able to nest the `nonlin` functions provided by *gnm* in order to specify more complex nonlinear terms. However this functionality is limited in the terms that can be specified and can result in rather long-winded model descriptions. The alternative is to write a custom `nonlin` function to fit the desired term. Turner and Firth (2007) explain how to write such a function using a standard example of a logistic model; whilst this provides a useful illustration, that particular model would be more simply handled in practice using `nls`. In this talk we demonstrate how to write a custom `nonlin` function in the context of a novel application of generalized nonlinear models.

Our application is modelling the hazard of entry into marriage for women in Ireland, based on data from the Living in Ireland Survey conducted in 1994-2001 by the Economic and Social Research Institute. We propose a nonlinear discrete-time hazard model, extending the approach of Blossfeld and Huinink (1991). This model may be fitted as a generalized nonlinear model, but requires a custom `nonlin` function to specify the terms. We show how to write such a function, exploring the different options available and considering the difficulties that can arise.

References

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