General information about GAMs

Pablo E. Gutiérrez-Fonseca

3/18/2022

Model construction

s (Both GAMs)

s = represent smooth function

```
gam(value ~s(date,...
```

Define knots (Both GAMs)

k = knots. 12 month per year or 24 sampling event per year.
Seleccione 12 por Simpson, del siguiente enlace:
https://fromthebottomoftheheap.net/2014/05/09/modelling-seasonal-data-with-gam/

bs= basis spline (Both GAMs)

bs= basis spline.
Smooth classes are invoked directly by s terms.
https://stat.ethz.ch/R-manual/R-devel/library/mgcv/html/smooth.terms.html

```
brms::brm(bf(value ~ s(date, bs="cs"...))
```

Cubic regression splines & A cyclic cubic regression spline.
bs="cr". These have a cubic spline basis defined by a modest sized set of knots spread evenly through the covariate values.
bs="cs" specifies a shrinkage version of "cr".
bs="cc" specifies a cyclic cubic regression splines. i.e. a penalized cubic regression splines whose ends match, up to second derivative.

P-splines
bs="ps".

bf (Bayesian GAMs) Note that we use the bf() argument to specify this nonlinear model.

Output

Hay que ver el Smooth Terms: -> sds(sdate_1) -> sds(stimes_1) is the variance parameter, which has the effect of controlling the wiggliness of the smooth - the larger this value the more wiggly the smooth. https://fromthebottomoftheheap.net/2018/04/21/fitting-gams-with-brms/

Check models

pp_check()

The pp_check allows for graphical posterior predictive checking. We can generate figures to compare the observed data to simulated data from the posterior predictive distribution. This is a great graphical way to evaluate your model.
https://tem11010.github.io/regression_brms/

Here, nsamples refers to the number of draws from the posterior distribution to use to calculate yrep values.

```
pp_check(model, nsamples=100)
```

bayes_r2

Bayes R2 quantifies the expected fit or variance explained by a model

We can also get an R-squared estimate for our model, thanks to a newly-developed method from Andrew Gelman, Ben Goodrich, Jonah Gabry and Imad Ali, with an explanation here. http://www.stat.columbia.edu/~gelman/research/unpublished/bayes_R2.pdf https://tem11010.github.io/regression_brms/

r2(cc.qp_A.Bayes_mod) Existe esta otra, pero usare la de Gelman

```
bayes_R2(model)
```

AIC

AIC and DIC are not recommended in particular not with Bayesian models. So it is not necessarily surprising that the results differ (buerkner).

https://discourse.mc-stan.org/t/waic-aicc-and-dic-differences-in-a-bernoulli-glmm-in-brms-vs-glmmtmb/5966