# 00_Toy_Example_2

Frances Lin

3/27/2022

## Load packages

```
library(INLA)
```

```
## Loading required package: Matrix
```

```
## Loading required package: foreach
```

```
## Loading required package: parallel
```

```
## Loading required package: sp
```

```
## This is INLA_22.03.16 built 2022-03-16 13:24:07 UTC.
##  - See www.r-inla.org/contact-us for how to get help.
```

## Simulate the data

```
N <- 100 # 500, 5000, 25000, 100000
x <- rnorm(N, mean = 5, sd = 1)
nu <- rnorm(N, 0, 0.1)
mu <- exp(1 + 0.5 * x + nu)
y <- rpois(N, mu)
data <- list(x = x, y = y, N = N, nu = nu, mu = mu)
```

## Fit the Poisson GLM

```
# Fit the Poisson GLM
nu <- 1:N
model <- inla(y ~ x + f(nu, model = "iid"),
              family = "poisson",
              data = data,
              control.predictor = list(link = 1)
)
```

### Produce results summaries

```
summary(model)
```

```
##
## Call:
##    c("inla.core(formula = formula, family = family, contrasts = contrasts,
##    ", " data = data, quantiles = quantiles, E = E, offset = offset, ", "
##    scale = scale, weights = weights, Ntrials = Ntrials, strata = strata,
##    ", " lp.scale = lp.scale, link.covariates = link.covariates, verbose =
##    verbose, ", " lincomb = lincomb, selection = selection, control.compute
##    = control.compute, ", " control.predictor = control.predictor,
##    control.family = control.family, ", " control.inla = control.inla,
##    control.fixed = control.fixed, ", " control.mode = control.mode,
##    control.expert = control.expert, ", " control.hazard = control.hazard,
##    control.lincomb = control.lincomb, ", " control.update =
##    control.update, control.lp.scale = control.lp.scale, ", "
##    control.pardiso = control.pardiso, only.hyperparam = only.hyperparam,
##    ", " inla.call = inla.call, inla.arg = inla.arg, num.threads =
##    num.threads, ", " blas.num.threads = blas.num.threads, keep = keep,
##    working.directory = working.directory, ", " silent = silent, inla.mode
##    = inla.mode, safe = FALSE, debug = debug, ", " .parent.frame =
##    .parent.frame)")
## Time used:
##     Pre = 2.96, Running = 0.314, Post = 0.0307, Total = 3.31
## Fixed effects:
##              mean    sd 0.025quant 0.5quant 0.975quant  mode kld
## (Intercept) 1.089 0.109      0.871    1.091      1.298 1.095   0
## x           0.483 0.020      0.445    0.483      0.522 0.482   0
##
## Random effects:
##   Name     Model
##     nu IID model
##
## Model hyperparameters:
##                      mean      sd 0.025quant 0.5quant 0.975quant  mode
## Precision for nu 2136.45 7911.62      42.73    98.58   27421.06 67.83
##
## Marginal log-Likelihood:  -354.66
##  is computed
## Posterior summaries for the linear predictor and the fitted values are computed
## (Posterior marginals needs also 'control.compute=list(return.marginals.predictor=TRUE)')
```

## Reference

Morrison, K. (2017). A gentle INLA tutorial. Precision Analytics. https://www.precision-analytics.ca/articles/a-gentle-inla-tutorial/.