BYM with PC priors

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```r
require('diseasemapping')

## Loading required package:  diseasemapping
## Loading required package:  sp

require("methods")
data('kentucky')
```

Incidence rates

```r
if (FALSE) {
    # must have an internet connection to do the following
    larynxRates = cancerRates("USA", year = 1998:2002, site = "Larynx")
    dput(larynxRates)
} else {
    larynxRates = structure(c(0, 0, 0, 0, 1e-06, 6e-06, 2.3e-05, 4.5e-05, 9.9e-05,
        0.000163, 0.000243, 0.000299, 0.000343, 0.000308, 0.000291, 0.000217,
        0, 0, 0, 1e-06, 1e-06, 3e-06, 8e-06, 1.3e-05, 2.3e-05, 3.5e-05, 5.8e-05,
        6.8e-05, 7.5e-05, 5.5e-05, 4.1e-05, 3e-05), .Names = c("M_10", "M_15",
        "M_20", "M_25", "M_30", "M_35", "M_40", "M_45", "M_50", "M_55", "M_60",
        "M_65", "M_70", "M_75", "M_80", "M_85", "F_10", "F_15", "F_20", "F_25",
        "F_30", "F_35", "F_40", "F_45", "F_50", "F_55", "F_60", "F_65", "F_70",
        "F_75", "F_80", "F_85"))


}


# get rid of under 10's
larynxRates = larynxRates[grep("_(0|5)$",names(larynxRates), invert=TRUE)]
# compute Sexpected
kentucky = getSMR(kentucky, larynxRates, larynx,
                regionCode="County")
```
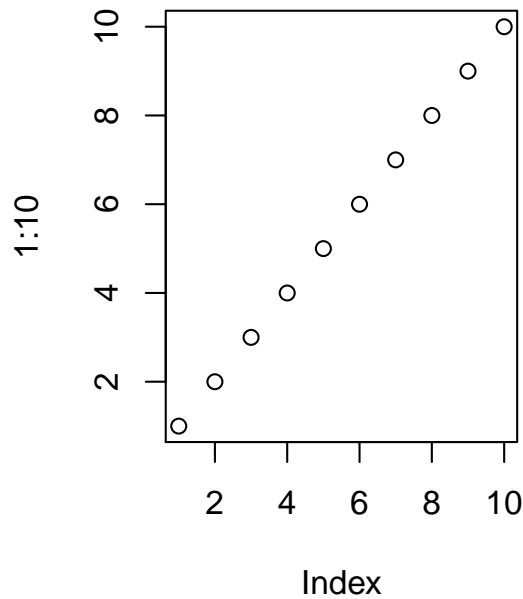
Figure 1: gamma priors sd parameters

BYM with gamma priors on precision

```
kBYM = bym(formula = observed ~ offset(logExpected) + poverty, data = kentucky,
    priorCI = list(sdSpatial = c(0.1, 5), sdIndep = c(0.1, 5)), region.id = "County")
```

```
if(!is.null(kBYM$parameters))
        knitr::kable(kBYM$parameters$summary[,c(1,3,5)], digits=3)
```

BYM with penalised complexity prior

$pr(sd > 1) = 0.05$ and $pr(phi < 0.2) = 0.95$

```
kBYMpc = try(bym(formula = observed ~ offset(logExpected) + poverty, kentucky,
    priorCI = list(sd = c(1, 0.05), propSpatial = c(0.2, 0.95))), silent = TRUE)
if (class(kBYMpc) == "try-error") kBYMpc = list()
```
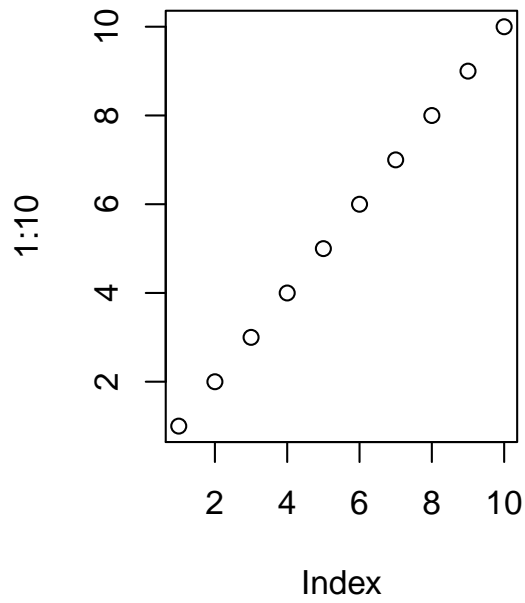
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Figure 2: PC priors variance parameters

```
if(!is.null(kBYMpc$parameters))
        knitr::kable(kBYMpc$parameters$summary[,c(1,3,5)], digits=3)
```
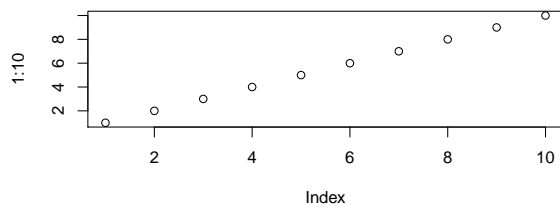

Figure 3: Random effects and fitted values