

LGCP with PC priors

Patrick Brown

July 19, 2017

```
library('mapmisc')

## Loading required package: sp
## Loading required package: raster
## map images will be cached in /tmp/mapmiscCache_rforge

library("geostatsp")

## Loading required package: Matrix

data('murder')
data('torontoPop')
```

```
murderT = spTransform(murder, omerc(murder, angle=-20))
covList = list(
  pop=torontoPdens,
  inc = log(torontoIncome)
)

borderT = spTransform(torontoBorder, projection(murderT))
borderC = crop(borderT, extent(-12700, 7000, -7500, 3100))

## Loading required namespace: rgeos

formula = ~ inc + offset(pop, log=TRUE)
```

LGCP with gamma priors on precision

```
resG=lgcp(formula, data=murderT,
  grid=squareRaster(borderC, 30),
  covariates=covList,
```

```
border=borderC, buffer=2000,
priorCI = list(sd = c(0.05, 0.5), range = c(1, 10)*1000),
control.inla=list(verbose=TRUE)
)
```

LGCP with penalised complexity prior

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

```
resP=lgcp(formula, data=murderT,
grid=squareRaster(borderC, 30),
covariates=covList,
border=borderC, buffer=2000,
priorCI = list(sd = c(u=0.5, alpha=0.05), range = c(1, 10)*1000)
)
```

LGCP with table priors

```
sdSeq = seq(0,4,len=501)
rangeSeq = seq(0,15*1000, len=501)
resT=lgcp(formula, data=murderT,
grid=squareRaster(borderC, 30),
covariates=covList,
border=borderC, buffer=2000,
priorCI = list(
sd = cbind(sdSeq, dexp(sdSeq, 2)),
range = cbind(rangeSeq, dexp(rangeSeq, 1/5000))
)
)
```

Parameters

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

	mean	0.025quant	0.975quant
(Intercept)	-7.748	-12.977	-2.504
inc	-0.859	-1.346	-0.376
range/1000	1.371	0.927	1.952
sd	0.821	0.709	0.947

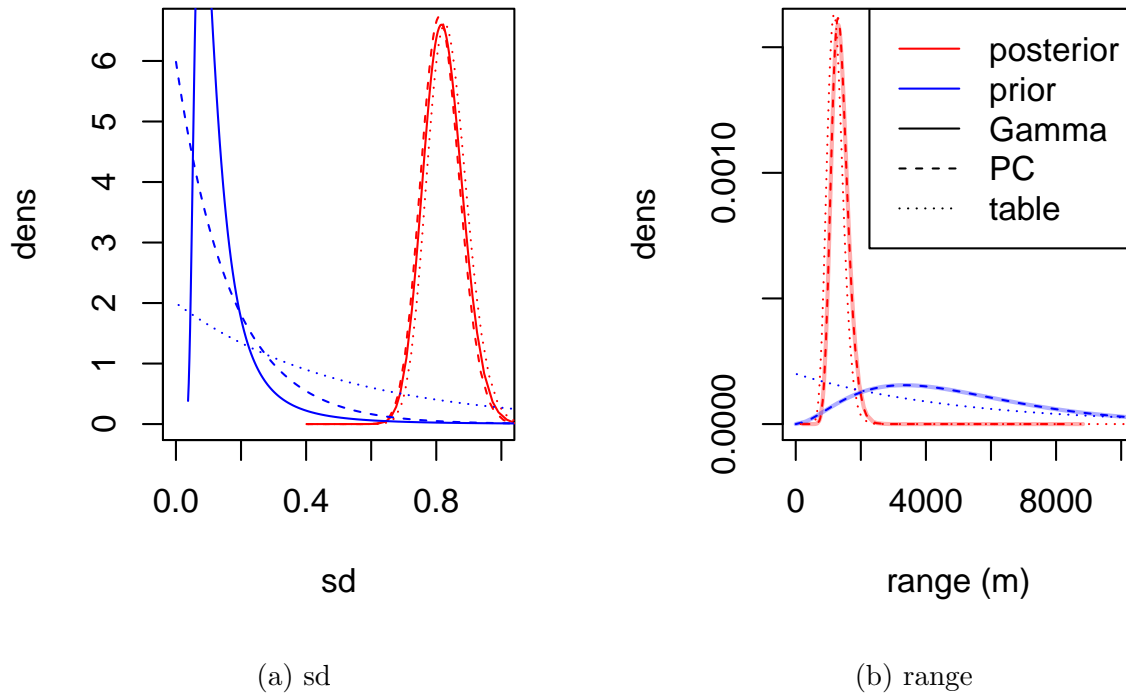


Figure 1: Priors and posteriors

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

	mean	0.025quant	0.975quant
(Intercept)	-7.770	-12.958	-2.564
inc	-0.857	-1.340	-0.378
range/1000	1.367	0.930	1.937
sd	0.814	0.703	0.937

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

	mean	0.025quant	0.975quant
(Intercept)	-7.361	-12.613	-2.109
inc	-0.896	-1.383	-0.410
range/1000	1.227	0.796	1.770
sd	0.833	0.722	0.962

Maps

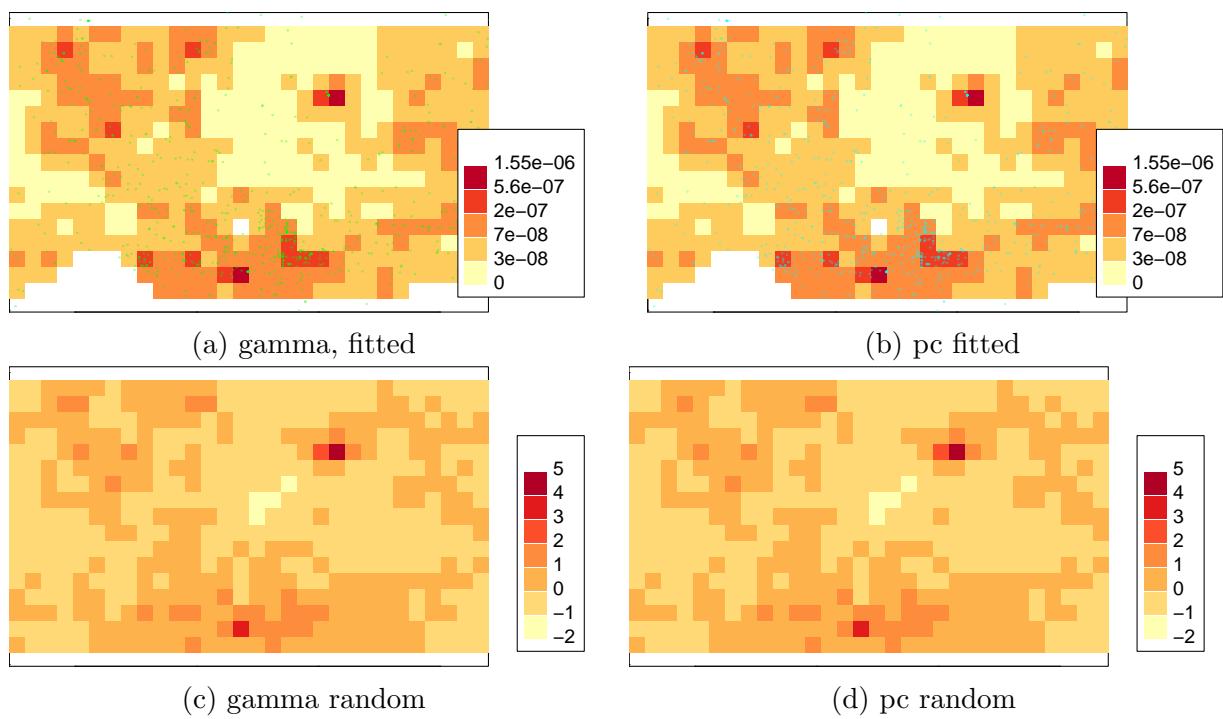


Figure 2: Random effects and fitted values