vGramExample.R

nychka

2021-06-02

```
library( fields)
```

```
## Loading required package: spam
```

```
## Loading required package: dotCall64
```

```
## Loading required package: grid
```

```
## Spam version 2.5-1 (2019-12-12) is loaded.
## Type 'help( Spam)' or 'demo( spam)' for a short introduction
## and overview of this package.
## Help for individual functions is also obtained by adding the
## suffix '.spam' to the function name, e.g. 'help( chol.spam)'.
```

```
##
## Attaching package: 'spam'
```

```
## The following objects are masked from 'package:base':
##
##     backsolve, forwardsolve
```

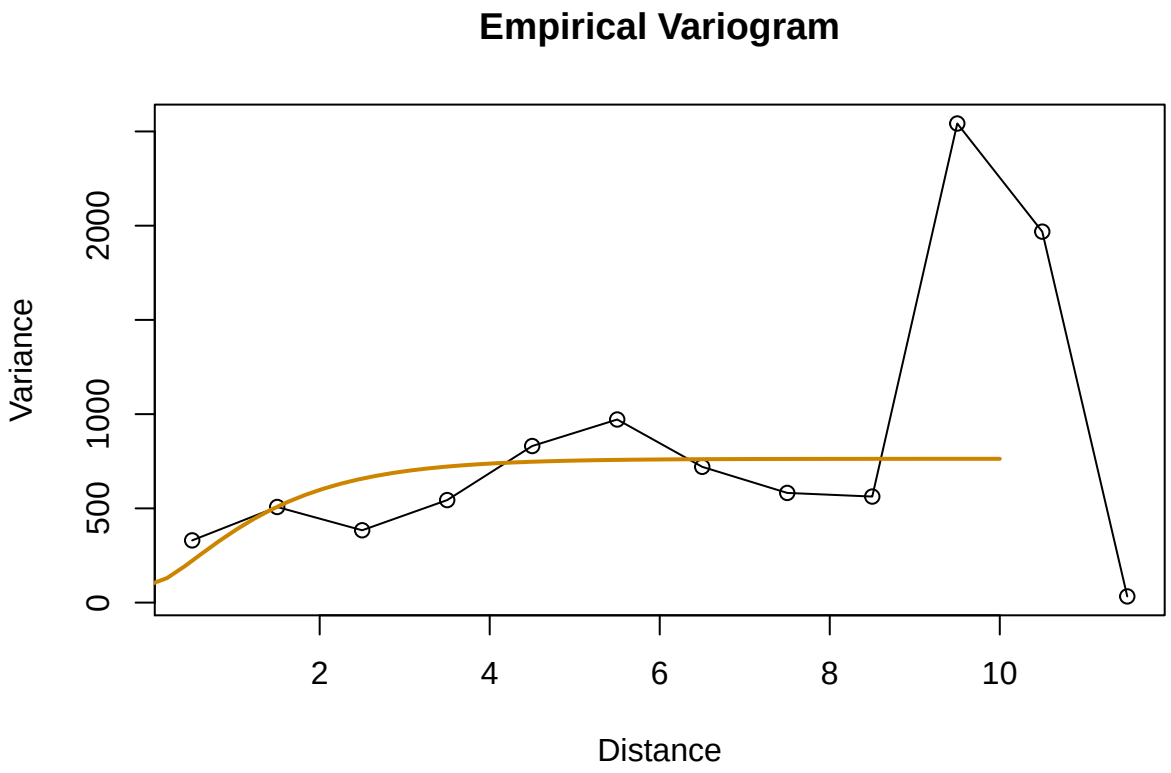
```
## Loading required package: viridis
```

```
## Loading required package: viridisLite
```

```
## See https://github.com/NCAR/Fields for
##  an extensive vignette, other supplements and source code
```

```
data(ozone2)

s<- ozone2$lon.lat
y<- ozone2$y[16,]
# omit missing values to make the simulation below easier
ind<- !is.na(y)
s<- s[ind,]
y<- y[ind]

# only take out a constant in the fixed part of model
 obj<- spatialProcess( s,y, mKrig.args= list( m=1) )

 vObj<- vgram( s,y, N= 15)
 # add fitted variogram from spatialProcess

 dGrid<- seq( 0, 10, length.out=50)

 vFit<- obj$summary["tau"]^2 +
   obj$summary["sigma2"]*( 1- Matern( dGrid/obj$summary["aRange"],
```

```
                                    smoothness=1.0 )
                        )
plot(vObj)
lines( dGrid, vFit, col="orange3", lwd=2)
```




```
# now simulate data from the fitted model and examine variability in
# the variograms
vTest<- NULL
MLETest<- NULL
set.seed(222)
ySim<- simSpatialData( obj, M=20)
for( k in 1:20){
  cat( k, " ")

  vTemp<- vgram( s, ySim[,k], N= 15)
  vTest<- cbind( vTest, c(vTemp$stats[2,]) )

  objTest <- spatialProcess( s,ySim[,k], mKrig.args= list( m=1) )
  vFitTest<- objTest$summary["tau"]^2 +
    objTest$summary["sigma2"]*( 1- Matern( dGrid/objTest$summary["aRange"],
                                    smoothness=1.0 )
    )
  MLETest<- cbind( MLETest, vFitTest)

}
```

```
## 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20
```

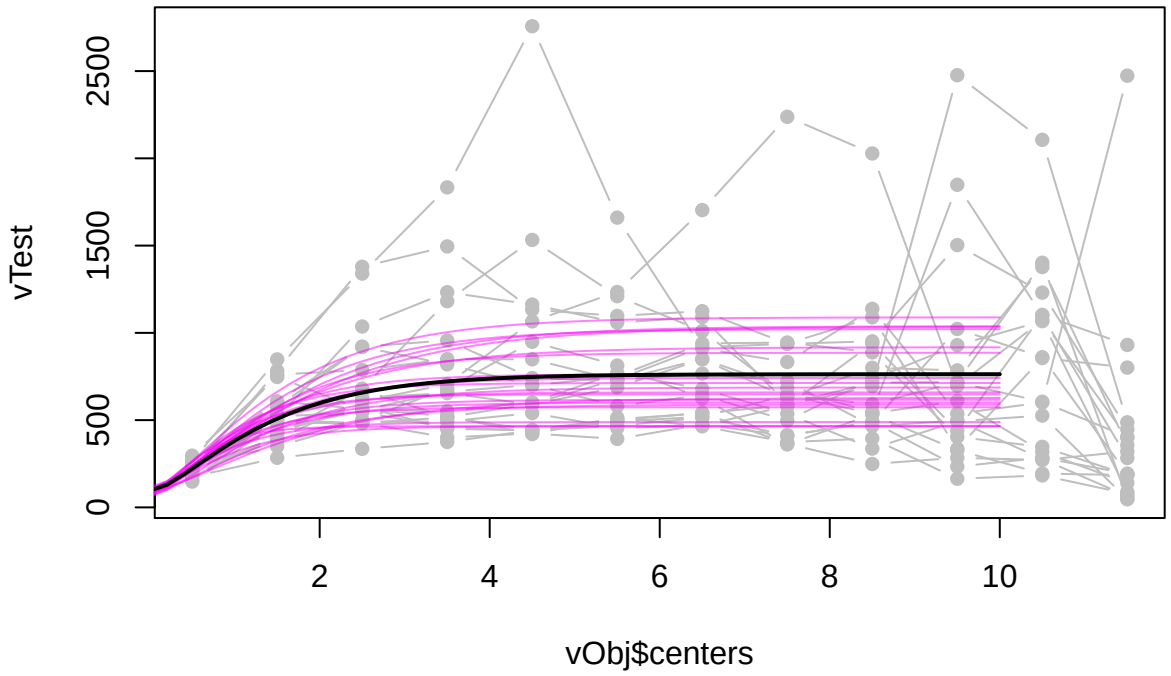
```
library( scales)
```

```
##
```

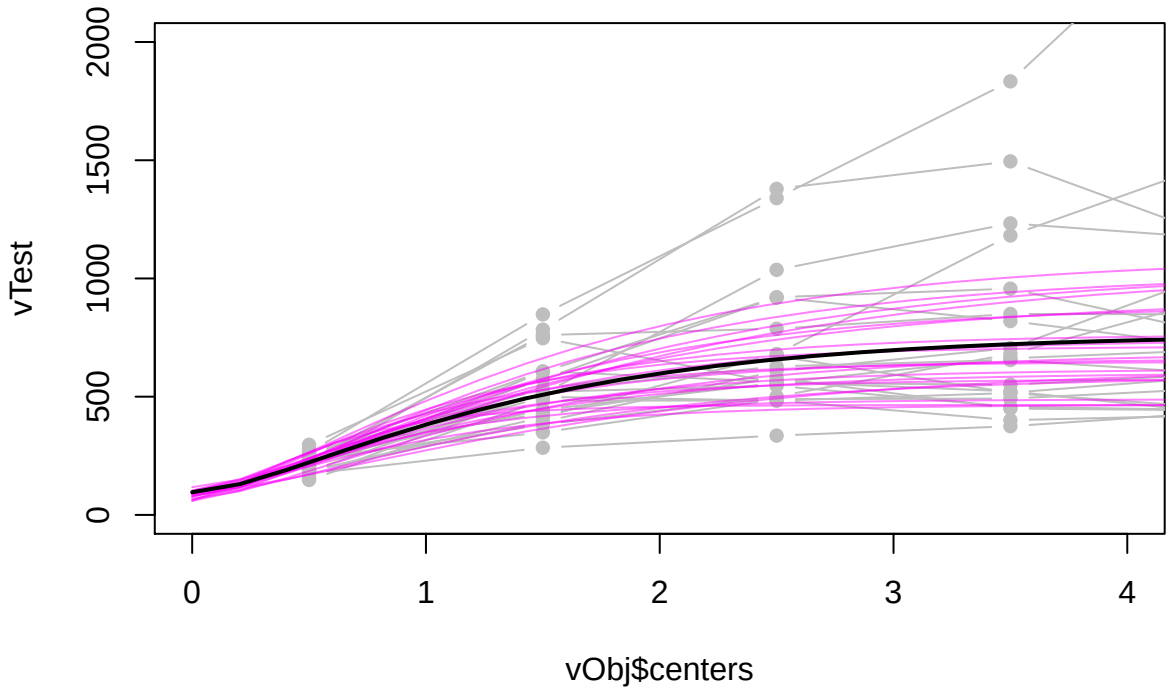
```
## Attaching package: 'scales'
```

```
## The following object is masked from 'package:viridis':
##
##     viridis_pal
```

```
matplot(vObj$centers, vTest, type="b", lty=1, col="grey", pch=16 )
matlines( dGrid, MLETest, col=alpha("magenta",.5), lty=1)
lines( dGrid, vFit, col="black", lwd=2)
```




```
matplot(vObj$centers, vTest, type="b", lty=1, col="grey", pch=16,
        xlim=c(0,4), ylim=c(0,2000))

matlines( dGrid, MLETest, col=alpha("magenta",.5), lty=1)
matlines( dGrid, vFit, col="black", lwd=2)
```


vTest
0
500
1000
1500
2000
0
1
2
3
4
vObj$centers