Spatial Covariance

Yi Li

June 18, 2016

1. Covariance by Threshoulding

1.1 Theory

In Bickel(2008) Covariance Estimation by Threshoulding, the estimator is

$$\hat{Cov} = S1_{S>c}$$

.

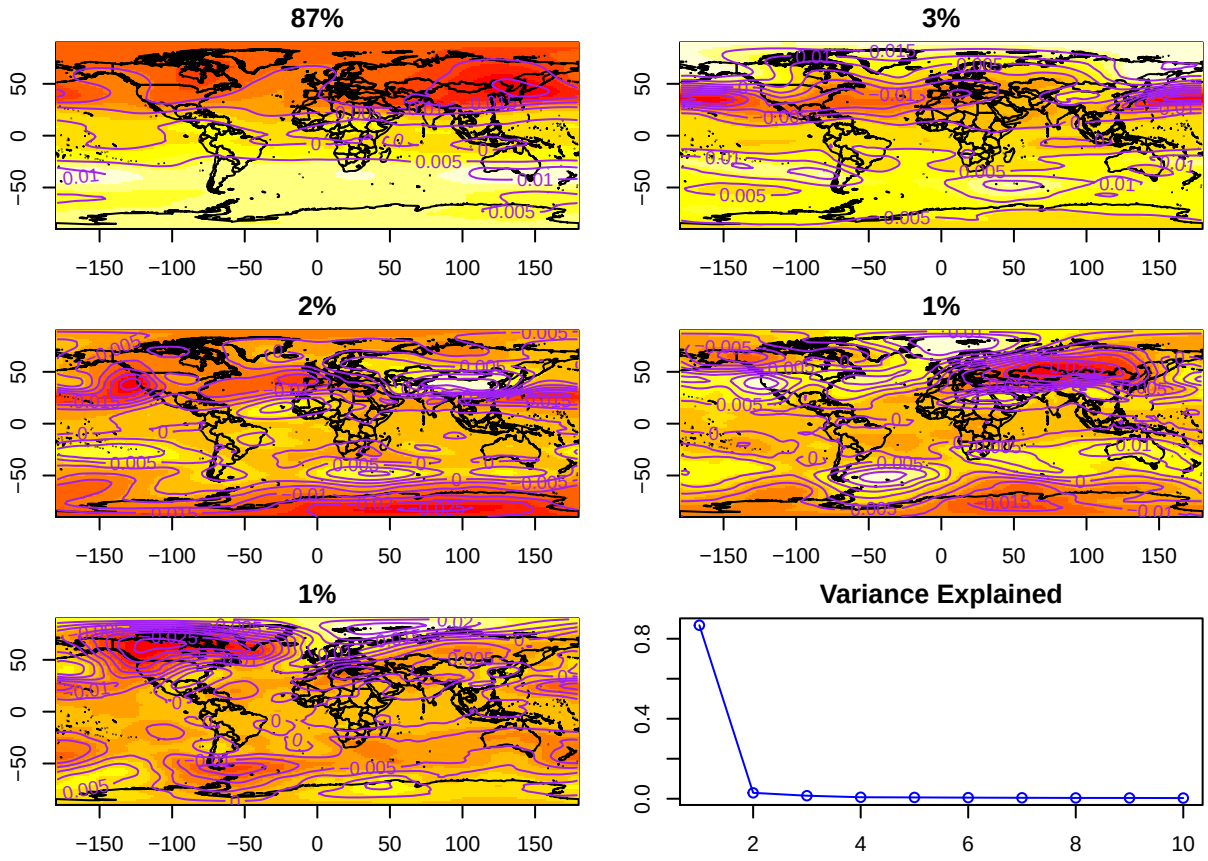
1.2 Application

Apply this in PCA with climate data, i.e. EOF. We reproduce the result of the Jan mean Temp based on GCM data.

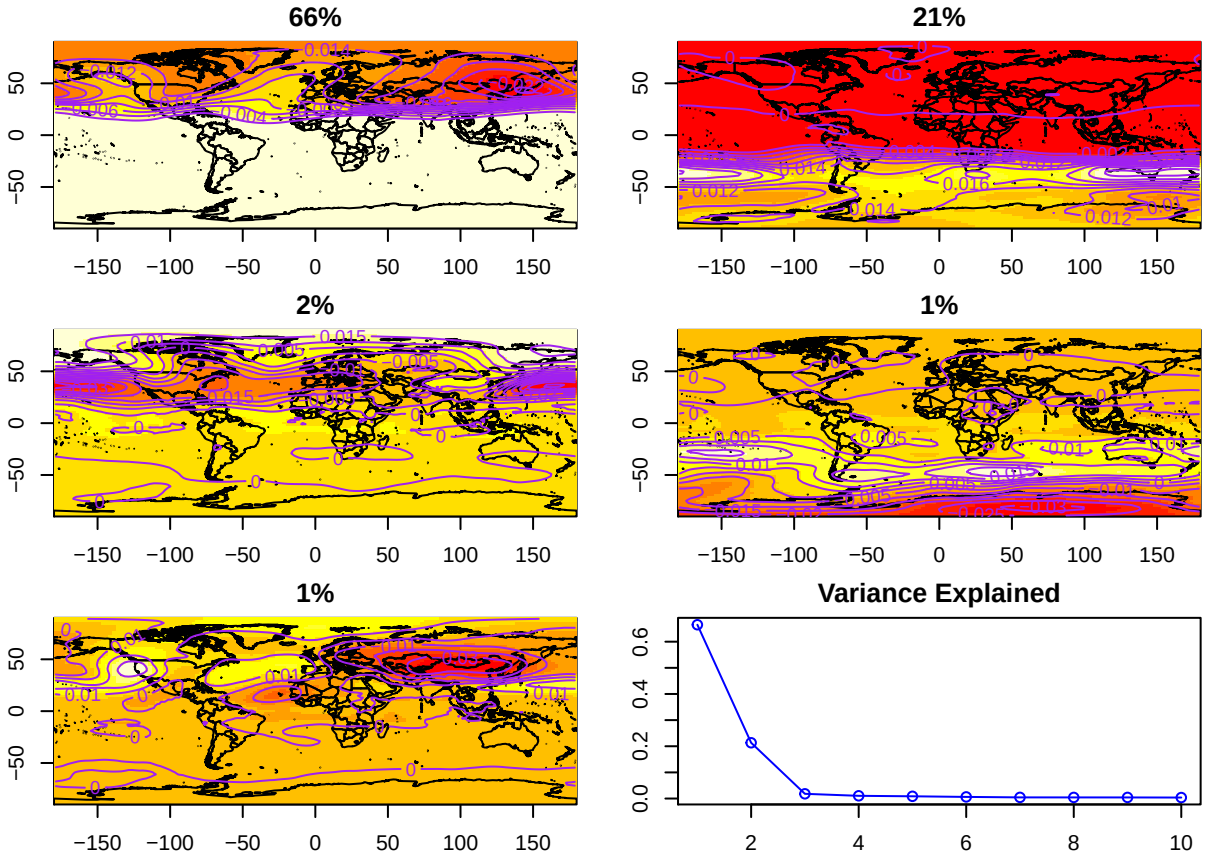
1.2.1 Without Threshoulding

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

```
## Checking rgeos availability: FALSE
##      Note: when rgeos is not available, polygon geometry     computations in maptools depend on gpcl
##      which has a restricted licence. It is disabled by default;
##      to enable gpclib, type gpclibPermit()
```


87%
3%
2%
1%
1%
Variance Explained
50
0
−50
−150
−100
−50
0
50
100
150
0.0
0.4
0.8
2
4
6
8
10

1.2.2 With Threshoulding



2. Spatial Covariance

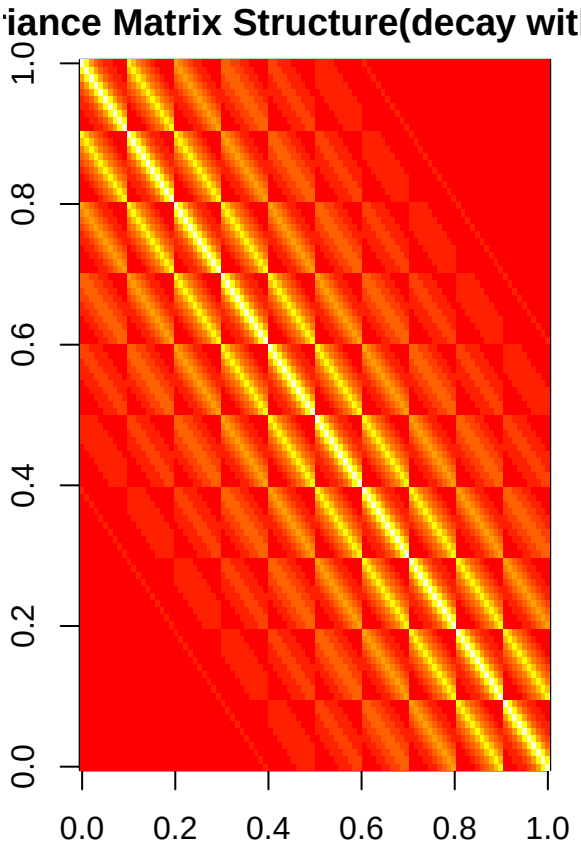
- Assume we label the station by row
- Assume the covariance is decrease with their distance

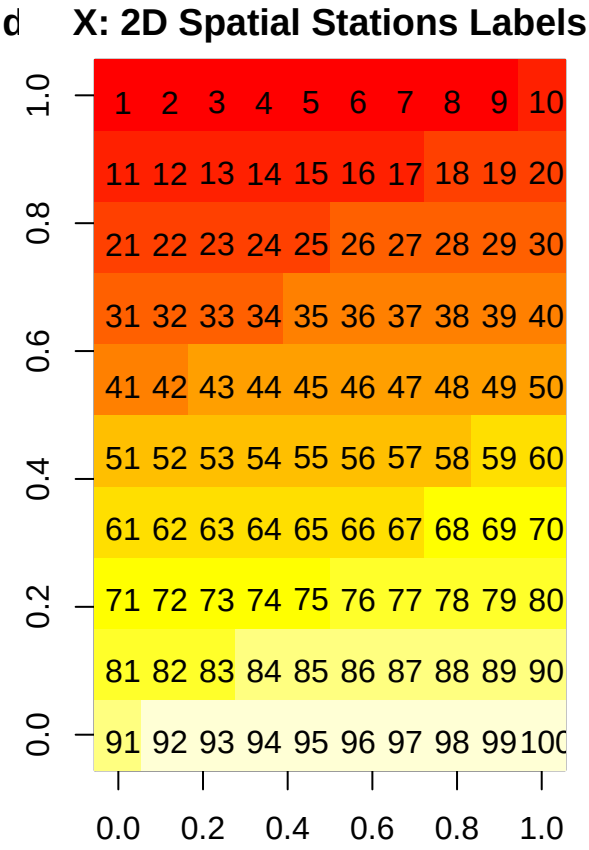
2.1 On Simulate Data

Simulate the data based on

$$e^{-0.4||s_i - s_j||}$$

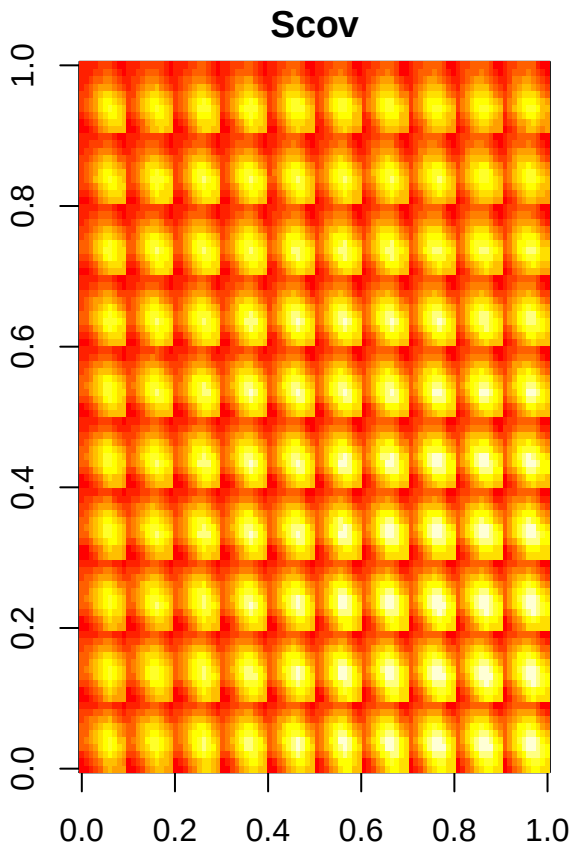
with 10 by 10 grids.

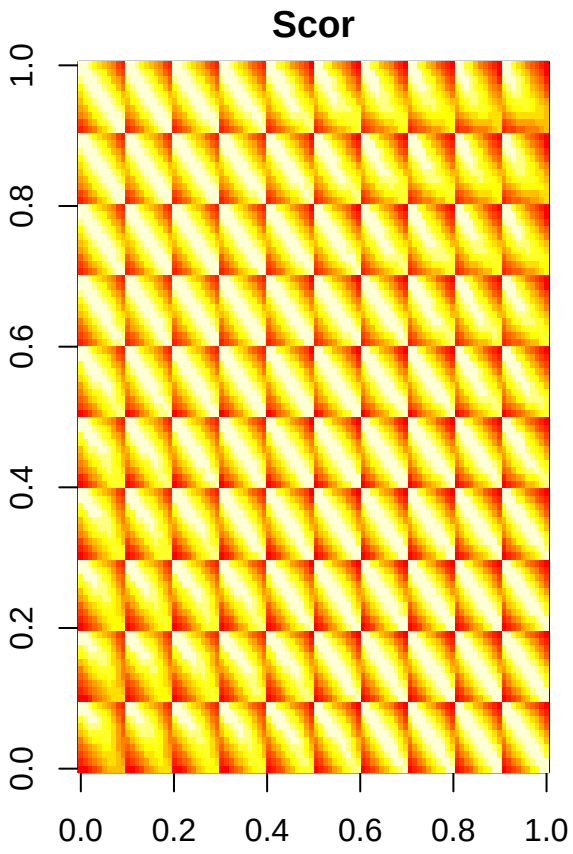




2.2 On Real Data

Real data based on Temp with 10 by 10 GCM grids.


Scov
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0


Scor
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0