Assignment 5

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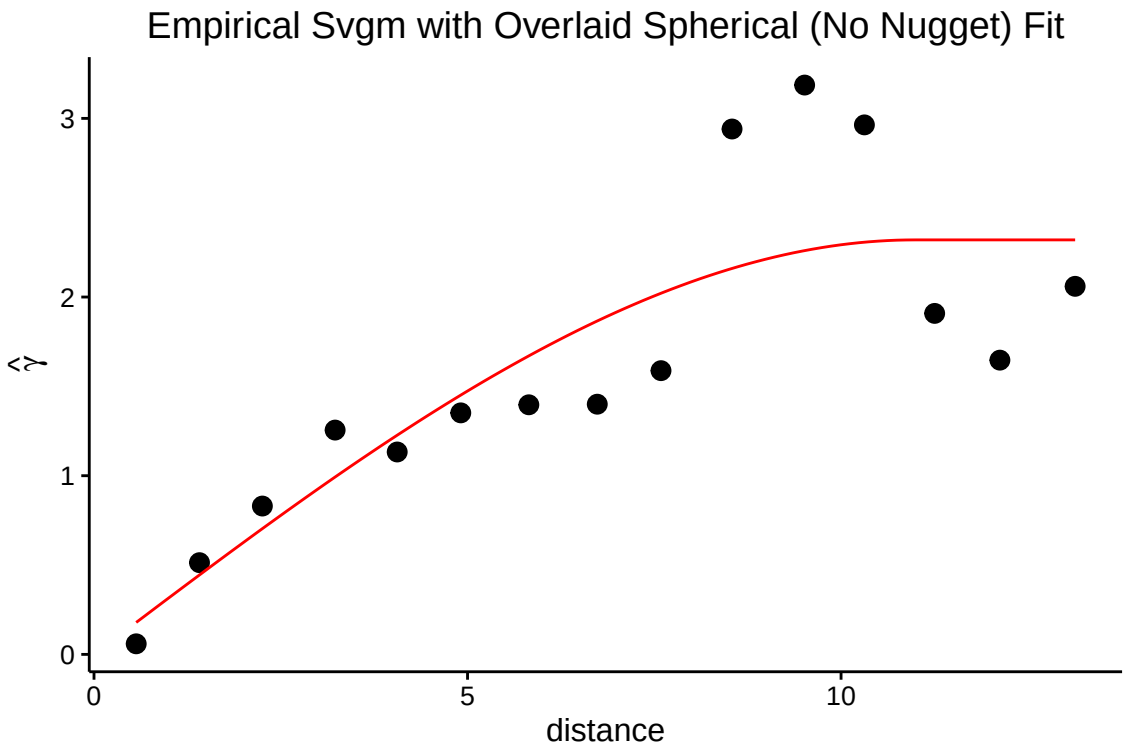
1. Fit the spherical svgm w/o a nugget using `gstat` and overlay the fitted model on a plot of the empirical svgm.



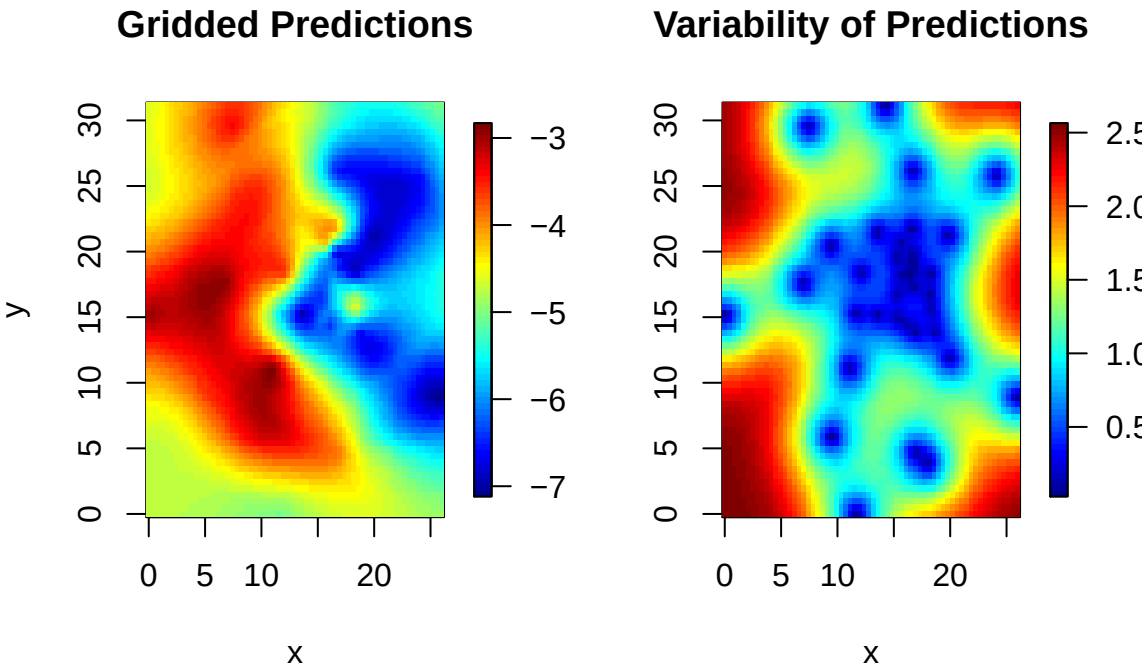
- Krige at all of the observed locations. Show that kriging "honors the data".

```
k <- krige(logT~1,locations=wipp,newdata=wipp,model=fit.vg,debug.level=0)
z <- wipp$logT
z.hat <- k$var1.pred
all.equal(z, z.hat)
```

```
## [1] TRUE
```

When predicting at the observed values, kriging returns the observed values themselves; thus the actual `logT` values in the dataset and the output of `krige` are identical. This is R's way of saying that $\hat{Z}(\boldsymbol{s}_i) = Z(\boldsymbol{s}_i)\ \forall i$.

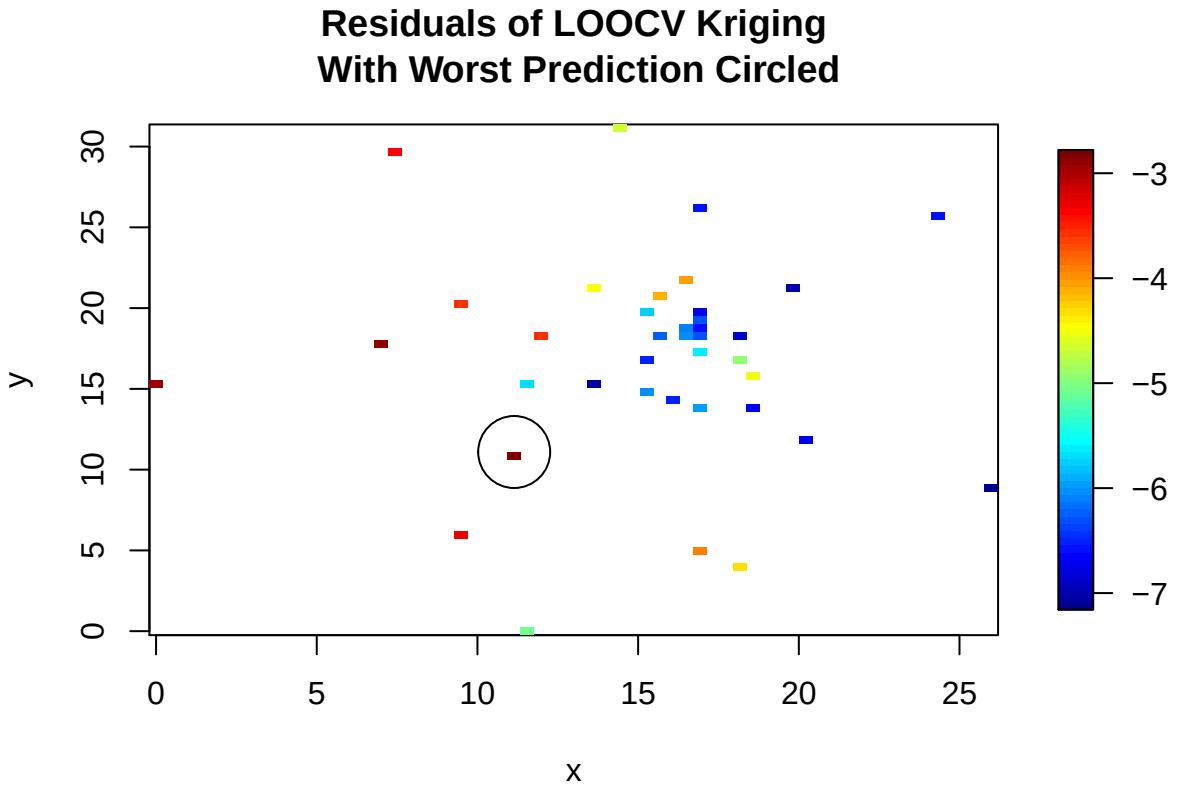
- Krige at grid nodes, plotting predictions and kriging variance.



- The RMSE for the transmissivity data is

```
## [1] 0.9689079
```

- Plot the predicted vs. observed values. Identify the worst prediction



Observation 35 is predicted the worst, with a residual of 1.96.

2. Inverse Distance Weighting

- Does IDW honor the data as Kriging does?

```
invdw <- idw(logT~1,locations=wipp,newdata=wipp,idp=p,debug.level=0)
z <- wipp$logT
z.hat <- k$var1.pred
all.equal(z, z.hat)
```

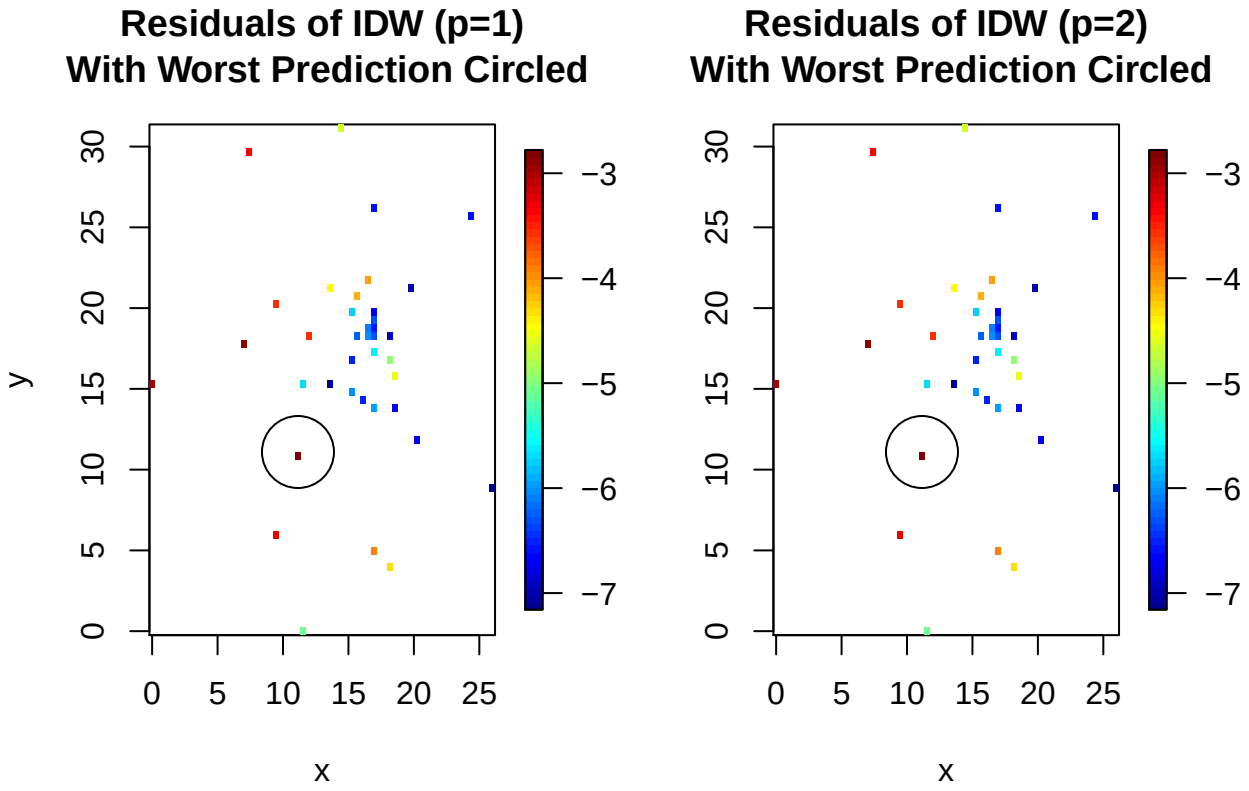
```
## [1] TRUE
```

Again, the output of Inverse Distance Weighting prediction *is* the observed values.

- The RMSE for the transmissivity data using Inverse Distance Weighting is

```
##         p1      p2
## 1 1.245515 1.14883
```

- Plot the predicted vs. observed values. Identify the worst prediction



As with the kriging prediction, observation 35 is predicted the worst.

- Compare the RMSE of IDW and Kriging predictions

```
##       Krige    IDWp1   IDWp2
## 1 0.9689079 1.245515 1.14883
```

Predicting using Kriging based on the spherical model fit is better than using Inverse Distance Weighting.