Coeffcient Investigation

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- This code assumes an array filled with spatially autocorrelated data has already been generated.

Now that the data has been generated, let's see how the accurary of the model coeffcients changes as the spatail range increases (Remebering that they should be close to the exspected values of: x1=2, x2=1, and x3=3).

```
# Load data
load("~/R/EVSS695/spatial_cv/resultsVarStagScaleStep.Rdata")

# Must match numMat from generated data
numMat = 100

# Must match numReps from generated data
numReps = 10

# ust match spat_range from generated data
spat_range =  seq(0.001, 60, length.out=numMat)

# ust match var_range from generated data
var_range = 1:10

# Set numbers of colmns in coeffcients array
numColsCoef = 5

# Create arrary filled with coeffcient values
coefVals = array(NA, dim=c(numMat, numColsCoef, numReps), dimnames = list(1:numMat,c('x1_dif', 'x2_dif'

# Fill  array with coeffcient values
for(i in 1:numReps) {
 for(j in 1:numMat) {
  model = glm(y ~ x1 + x2 + x3, data = as.data.frame(resultsArray[,,j,i]))
  coefVals[j, 1, i] = 2 - coef(model)[2]
  coefVals[j, 2, i] = 1 - coef(model)[3]
  coefVals[j, 3, i] = 3 - coef(model)[4]
  coefVals[j, 4, i] = spat_range[j]
  coefVals[j, 5, i] = var_range[i]
  }
}

# Check array
head(coefVals[,,1])
```

```
##         x1_dif       x2_dif       x3_dif spat_range var_range
## 1 -0.000364776  0.007487960  0.001283645  0.0010000         1
## 2 -0.001672900 -0.007414070  0.001695848  0.6070505         1
## 3 -0.003679532 -0.025158432 -0.004636865  1.2131010         1
## 4 -0.012699380 -0.012731045  0.018647603  1.8191515         1
```

```
## 5 -0.001277530 -0.017973304 -0.005635941  2.4252020         1
## 6  0.024120265 -0.003303756 -0.043411985  3.0312525         1
```

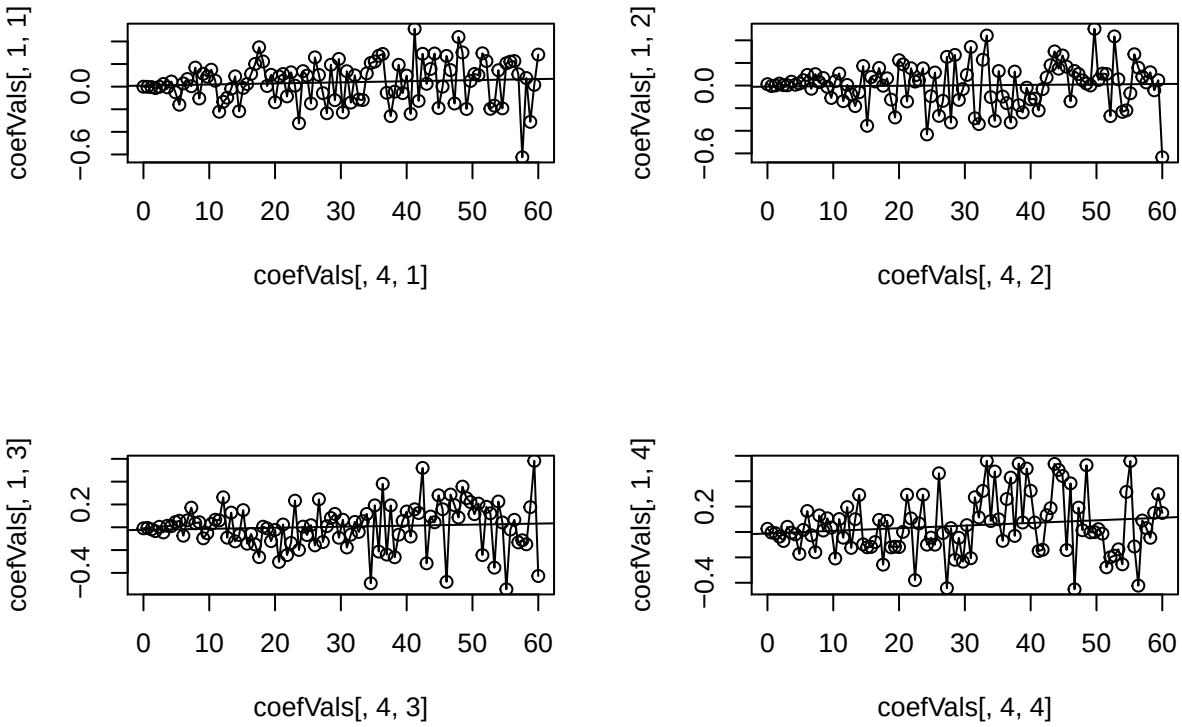
```
head(coefVals[,,5])
```

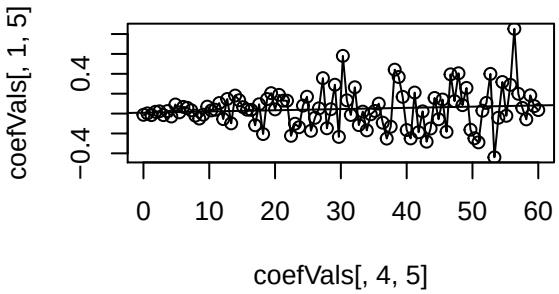
```
##         x1_dif        x2_dif        x3_dif spat_range var_range
## 1 -0.012276188 -0.0192985607 -0.0040470746  0.0010000         5
## 2  0.002150259 -0.0002968889  0.0051174141  0.6070505         5
## 3 -0.015388971  0.0046331308  0.0002646123  1.2131010         5
## 4  0.017822810  0.0163953828 -0.0152363895  1.8191515         5
## 5  0.022723972 -0.0253002927 -0.0042946876  2.4252020         5
## 6 -0.015619837 -0.0156150866 -0.0712717121  3.0312525         5
```

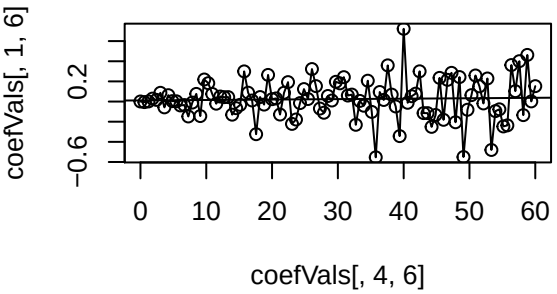
```
head(coefVals[,,10])
```

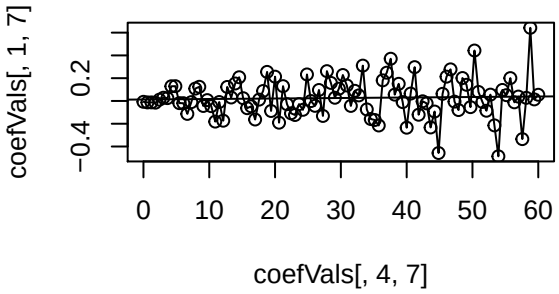
```
##         x1_dif        x2_dif       x3_dif spat_range var_range
## 1 -0.003048424  0.0049080826 -0.003078637  0.0010000        10
## 2 -0.005351462  0.0005459124  0.001954698  0.6070505        10
## 3 -0.024410876  0.0129280014 -0.006218236  1.2131010        10
## 4 -0.027896899 -0.0446239591 -0.008066931  1.8191515        10
## 5  0.033434246 -0.0297341170  0.004654499  2.4252020        10
## 6 -0.009138082 -0.0737190095 -0.017273967  3.0312525        10
```

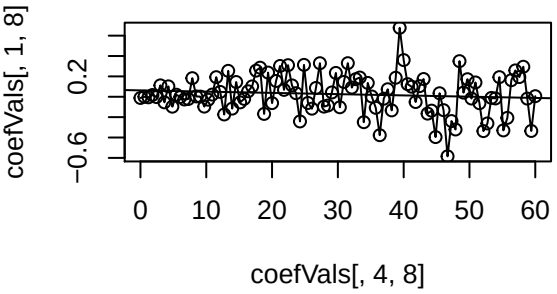
X1 Coeffcient Difference Plots

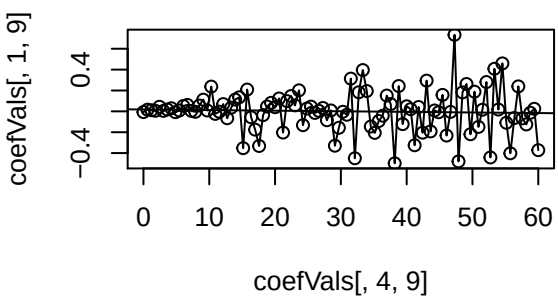


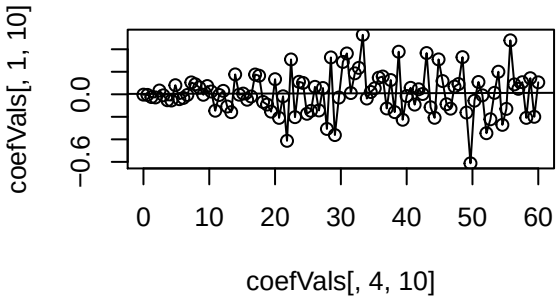

coefVals[, 1, 5]
−0.4
0.4
0
10
20
30
40
50
60
coefVals[, 4, 5]


coefVals[, 1, 6]
−0.6
0.2
0
10
20
30
40
50
60
coefVals[, 4, 6]

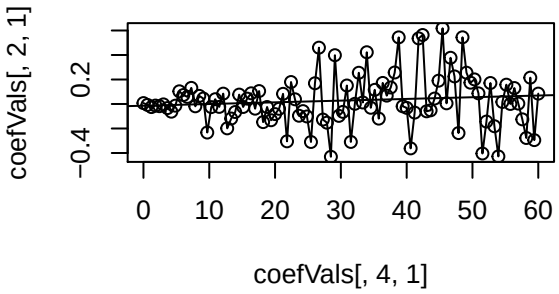

coefVals[, 1, 7]
−0.4
0.2
0
10
20
30
40
50
60
coefVals[, 4, 7]


coefVals[, 1, 8]
−0.6
0.2
0
10
20
30
40
50
60
coefVals[, 4, 8]

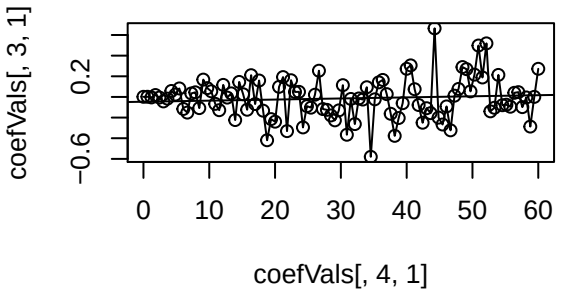

coefVals[, 1, 9]
−0.4
0.4
0
10
20
30
40
50
60
coefVals[, 4, 9]


coefVals[, 1, 10]
−0.6
0.0
0
10
20
30
40
50
60
coefVals[, 4, 10]

X2 Coeffcient Difference Plots



X3 Coeffcient Difference Plots



From the plots, it appears that the model coeffceints are somewhat accrurate. Now lets look at how the precision changes.

```
"
coefVals = matrix(NA, nrow=numMat, ncol=3, dimnames=list(1:numMat,c('x1_dif', 'x2_dif', 'x3_dif')))
for(i in 1:numMat) {
  model = glm(y ~ x1 + x2 + x3, data = as.data.frame(resultsArray[,,i]))
  coefVals[i,] = coef(model)[2:4]

}

coefVals[,1] = abs(2 - coefVals[,1])
coefVals[,2] = abs(1 - coefVals[,2])
coefVals[,3] = abs(3 - coefVals[,3])
coefVals = cbind(coefVals, spat_range)

# Plot precision
par(mfrow=c(2,2))
plot(coefVals[,4], coefVals[,1], type='o')
abline(lm(coefVals[,1] ~ coefVals[,4]))


plot(coefVals[,4], coefVals[,2], type='o')
abline(lm(coefVals[,2] ~ coefVals[,4]))
```

```
plot(coefVals[,4], coefVals[,3], type='o')
abline(lm(coefVals[,3] ~ coefVals[,4]))
"
```

```
## [1] "\ncoefVals = matrix(NA, nrow=numMat, ncol=3, dimnames=list(1:numMat,c('x1_dif', 'x2_dif', 'x3_di
```