Exercícios Capitulo 1

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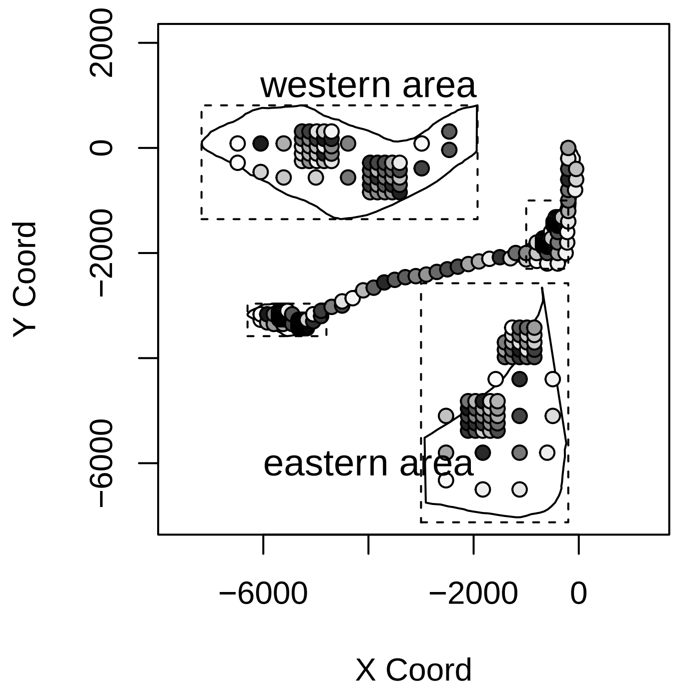
1.1 Produce a plot of the Rongelap data in which a continuous colour scale or grey scale is used to indicate the value of the emission count per unit time at each location, and the two sub-areas with the 5 by 5 sub-grids at 50 metre spacing are shown as insets.

```
library(geoR)
```

```
## Warning: package 'geoR' was built under R version 4.3.3
```

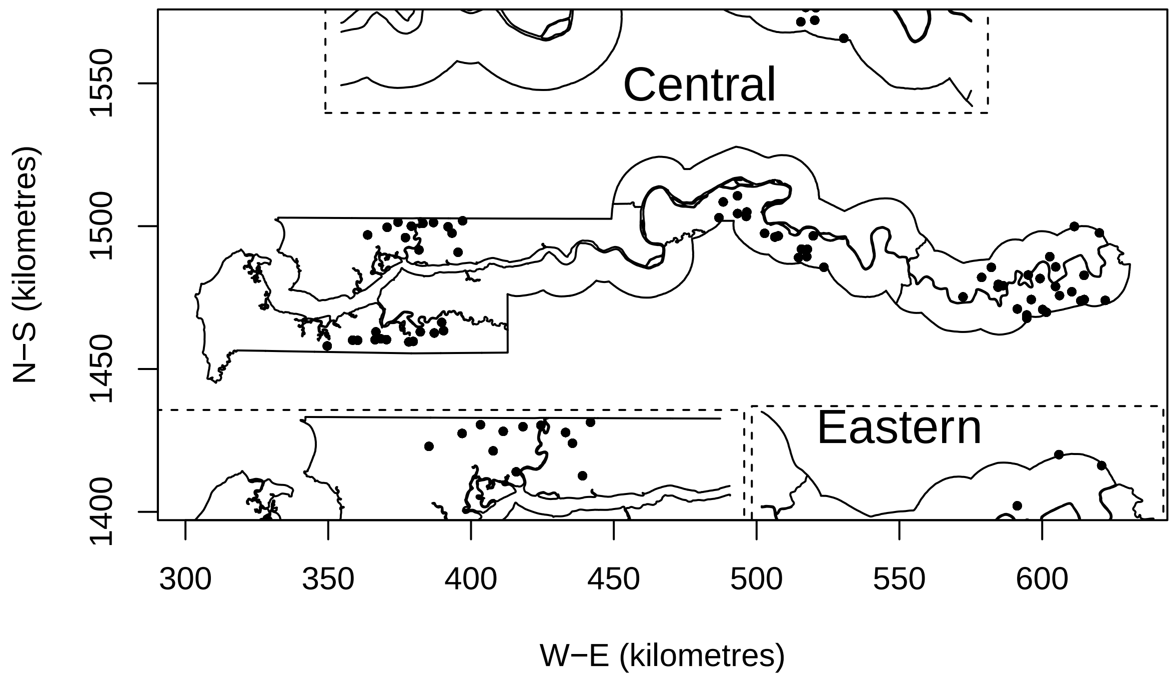
```
## --------------------------------------------------------------
##  Analysis of Geostatistical Data
##  For an Introduction to geoR go to http://www.leg.ufpr.br/geoR
##  geoR version 1.9-4 (built on 2024-02-14) is now loaded
## --------------------------------------------------------------
```

```
points(rongelap, cex.min = 1, cex.max = 1, col = "gray", ylim = c(-7000, 2000))
rongwest <- subarea(rongelap, xlim = c(-6300, -4800))
rongwest.z <- zoom.coords(rongwest, xzoom = 3.5, xoff = 1000, yoff = 3000)
points(rongwest.z, add = T, cex.min = 1, cex.max = 1, col = "gray")
rect.coords(rongwest$sub, lty = 2, quiet = T)
rect.coords(rongwest.z$sub, lty = 2, quiet = T)
text(-4000, 1200, "western area", cex = 1.2)




rongest <- subarea(rongelap, xlim = c(-1000, -200), ylim = c(-2300, -1000))
rongest.z <- zoom.coords(rongest, xzoom = 3.5, xoff = -1000, yoff = -3200)
points(rongest.z, add = T, cex.min = 1, cex.max = 1, col = "gray")
rect.coords(rongest$sub, lty = 2, quiet = T)
rect.coords(rongest.z$sub, lty = 2, quiet = T)
text(-4000, -6000, "eastern area",cex=1.2)
```



1.2 Construct a polygonal approximation to the boundary of The Gambia. Construct plots of the malaria data which show the spatial variation in the values of the observed prevalence in each village and of the greenness covariate.

```
library(geoR)
data(gambia)
gambia.map()
```



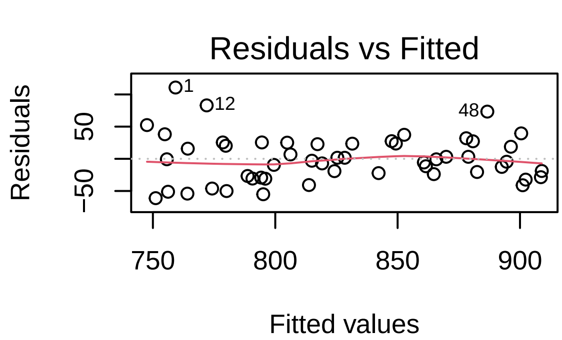
1.3. Consider the elevation data as a simple regression problem with elevation as the response and north-south location as the explanatory variable. Fit the standard linear regression model using ordinary least squares. Examine the residuals from the linear model, with a view to deciding whether any more sophisticated treatment of the spatial variation in elevation might be necessary.

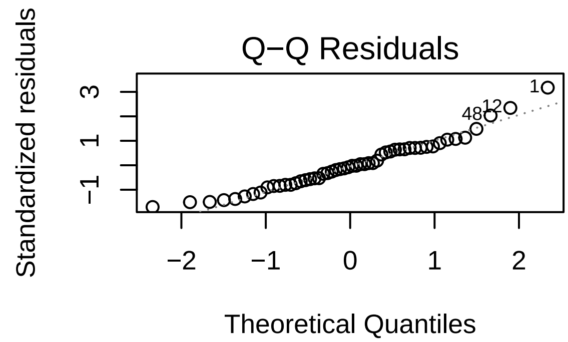
```r
data(elevation)
elevation
```

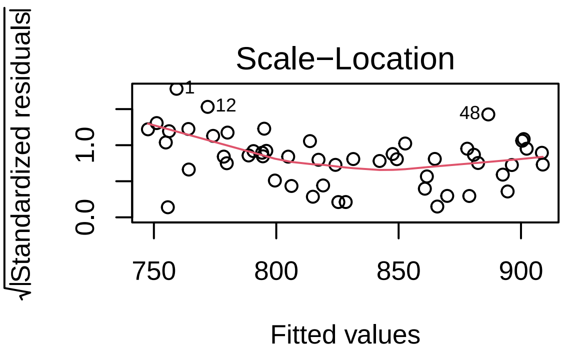
```
## $coords
##       x   y
## 1  0.3 6.1
## 2  1.4 6.2
## 3  2.4 6.1
## 4  3.6 6.2
## 5  5.7 6.2
## 6  1.6 5.2
## 7  2.9 5.1
## 8  3.4 5.3
## 9  3.4 5.7
## 10 4.8 5.6
## 11 5.3 5.0
## 12 6.2 5.2
```

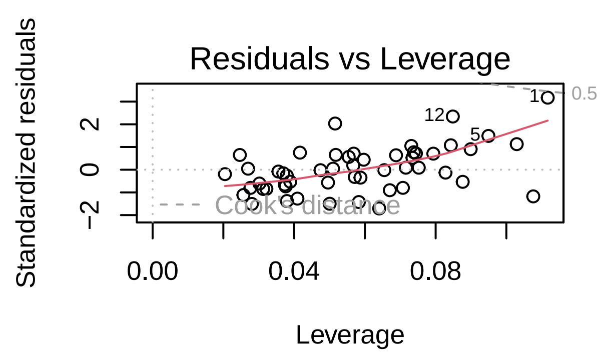
```
## 13 0.2 4.3
## 14 0.9 4.2
## 15 2.3 4.8
## 16 2.5 4.5
## 17 3.0 4.5
## 18 3.5 4.5
## 19 4.1 4.6
## 20 4.9 4.2
## 21 6.3 4.3
## 22 0.9 3.2
## 23 1.7 3.8
## 24 2.4 3.8
## 25 3.7 3.5
## 26 4.5 3.2
## 27 5.2 3.2
## 28 6.3 3.4
## 29 0.3 2.4
## 30 2.0 2.7
## 31 3.8 2.3
## 32 6.3 2.2
## 33 0.6 1.7
## 34 1.5 1.8
## 35 2.1 1.8
## 36 2.1 1.1
## 37 3.1 1.1
## 38 4.5 1.8
## 39 5.5 1.7
## 40 5.7 1.0
## 41 6.2 1.0
## 42 0.4 0.5
## 43 1.4 0.6
## 44 1.4 0.1
## 45 2.1 0.7
## 46 2.3 0.3
## 47 3.1 0.0
## 48 4.1 0.8
## 49 5.4 0.4
## 50 6.0 0.1
## 51 5.7 3.0
## 52 3.6 6.0
##
## $data
##  [1] 870 793 755 690 800 800 730 728 710 780 804 855 830 813 762 765 740 765 760
## [20] 790 820 855 812 773 812 827 805 840 890 820 873 875 873 865 841 862 908 855
## [39] 850 882 910 940 915 890 880 870 880 960 890 860 830 705
##
## attr(,"class")
## [1] "geodata"
```

```
fit <- lm(elevation$data ~ elevation$coords)
par(mfrow = c(2,2))
plot(fit)
```





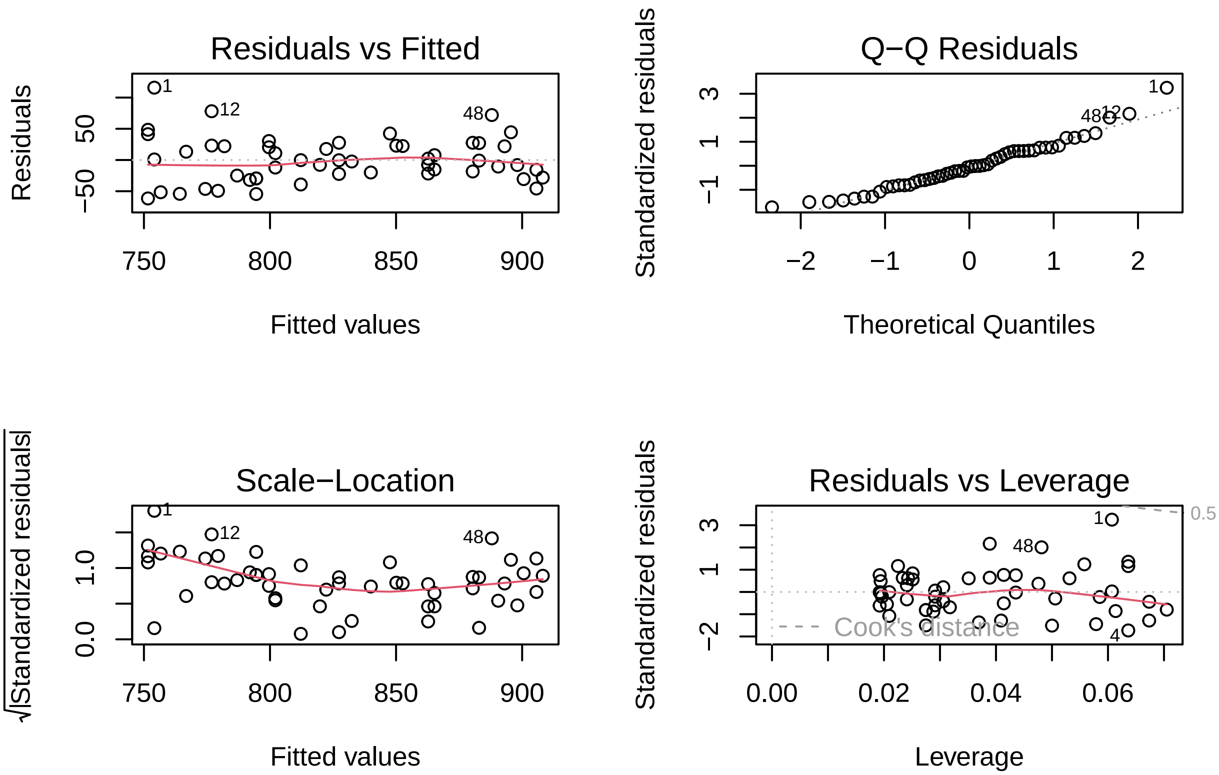





```r
summary(fit)
```

```
##
## Call:
## lm(formula = elevation$data ~ elevation$coords)
##
## Residuals:
##      Min       1Q  Median      3Q     Max
## -61.137 -27.156  -1.883  24.070 110.744
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        913.800     13.424  68.070  < 2e-16 ***
## elevation$coordsx   -1.695      2.762  -0.614    0.542
## elevation$coordsy  -25.252      2.611  -9.672 6.01e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 37.03 on 49 degrees of freedom
## Multiple R-squared:  0.6573, Adjusted R-squared:  0.6433
## F-statistic: 46.98 on 2 and 49 DF,  p-value: 4.04e-12
```

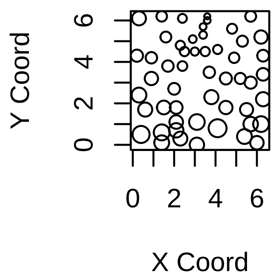
```r
fit2 <- lm(elevation$data ~ elevation$coords[,2])
par(mfrow = c(2,2))
fit2 |> plot()
```




```r
summary(fit2)
```

```
##
## Call:
## lm(formula = elevation$data ~ elevation$coords[, 2])
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -61.599 -25.766  -1.676  22.506 115.876
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            908.189      9.770  92.953  < 2e-16 ***
## elevation$coords[, 2]  -25.257      2.594  -9.735 3.94e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 36.8 on 50 degrees of freedom
## Multiple R-squared:  0.6546, Adjusted R-squared:  0.6477
## F-statistic: 94.77 on 1 and 50 DF,  p-value: 3.936e-13
```

```r
points(elevation )
```


Y Coord
0
2
4
6
0
2
4
6
X Coord