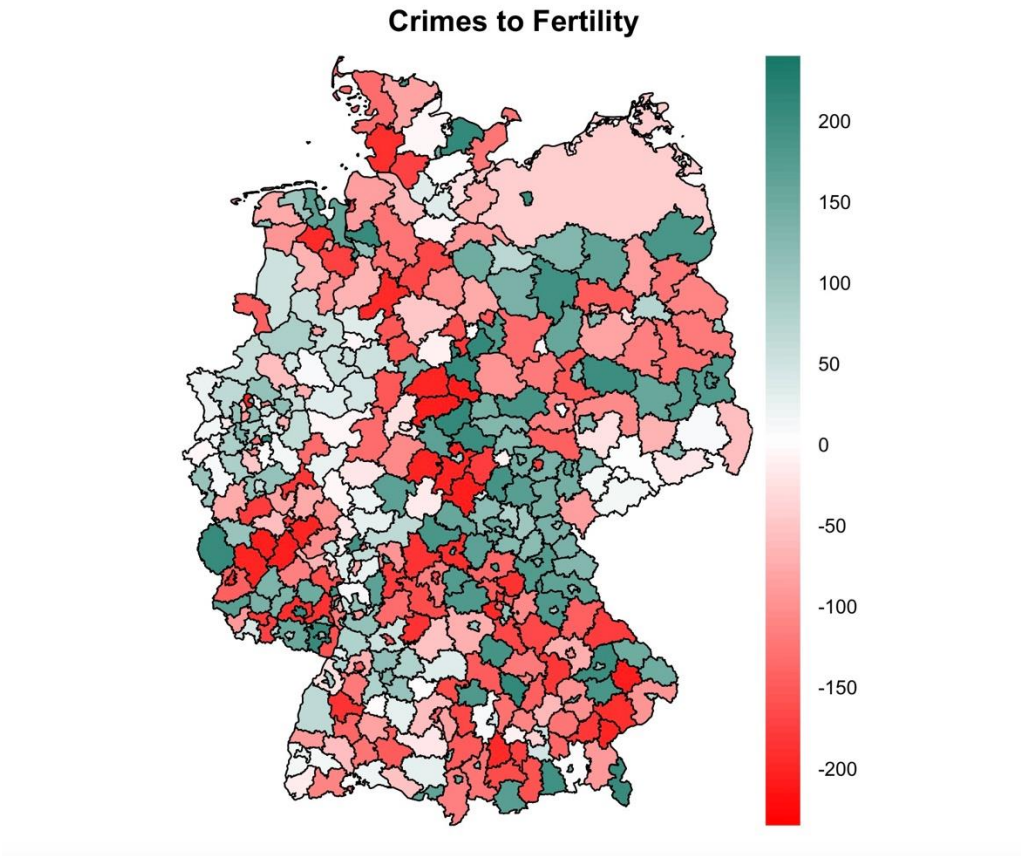
1) Visual assesment



Zones under 0 indicate regions where observed values are lower than estimated. It means that in these regions there are some factors that reduce the actual value of variable compare to estimated.

Zones higher 0 indicate regions where observed values are higher than estimated. It means that there are some factors which contribute to fertility.

Zones near 0 indicate regions where estimated values are almost equal to observed.

Plot shows that there is positive autocorrelation between some regions.

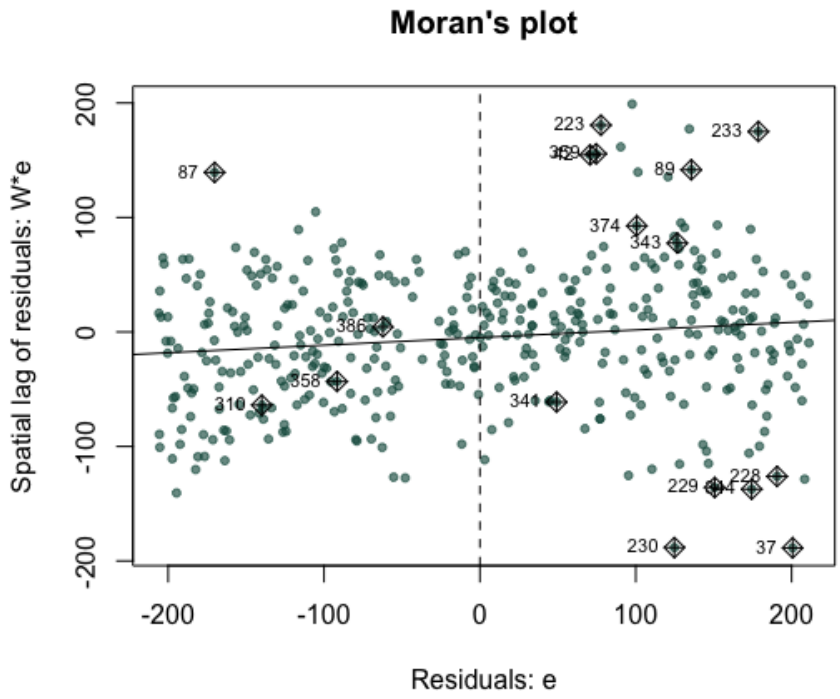
2) Moran's test
Global:

```
        Global Moran I for regression residuals

data:
model: lm(formula = spatial_data$Fertlty ~ spatial_data$Crimes)
weights: W1_list

Moran I statistic standard deviate = 2.4295, p-value = 0.007561
alternative hypothesis: greater
sample estimates:
Observed Moran I      Expectation         Variance
    0.0659769269    -0.0023077057     0.0007899982
```

considering that p-value = 0.007 we reject null hypothesis and accept alternative one: there are spatial efects.

Local:

	Ii	E.Ii	Var.Ii	Z.Ii	Pr(z > 0)
0	-0.0159187493	-0.002427184	0.008335355	-0.147774766	1.0000000000
1	0.9134244943	-0.002427184	0.097642894	2.930925809	0.0185874415
2	0.3720862732	-0.002427184	0.122659764	1.069341361	1.0000000000
3	-0.1385821865	-0.002427184	0.122659764	-0.388760863	1.0000000000
4	-0.1457159408	-0.002427184	0.998250244	-0.143414281	1.0000000000
5	-0.0373973232	-0.002427184	0.247744119	-0.070257983	1.0000000000
6	-0.0928825992	-0.002427184	0.088545850	-0.303983817	1.0000000000
7	0.0444167364	-0.002427184	0.108761503	0.142041627	1.0000000000
8	-0.4493875824	-0.002427184	0.497912827	-0.633420898	1.0000000000
9	0.0288045855	-0.002427184	0.108761503	0.094701967	1.0000000000
10	0.2048635418	-0.002427184	0.108761503	0.628553535	1.0000000000
11	0.1368379657	-0.002427184	0.080964980	0.489433674	1.0000000000
12	0.8240479644	-0.002427184	0.497912827	1.171259542	0.3622417025
13	0.1024227726	-0.002427184	0.019329211	0.754156005	1.0000000000
14	0.7983505661	-0.002427184	0.247744119	1.608830612	0.2691334630
15	0.1435585657	-0.002427184	0.140528958	0.389428340	1.0000000000



This moran's plot indicates that there is only a small autocorrelation between regions because dots distributed on the whole plot

3) Geary's test

```
        Geary C test under randomisation

data:  res
weights: W1_list

Geary C statistic standard deviate = 3.4725, p-value = 0.0002579
alternative hypothesis: Expectation greater than statistic
sample estimates:
Geary C statistic       Expectation          Variance
      0.873905500       1.000000000       0.001318617
```

Considering that Geary's C test has the same set of hypothesis as Moran's test we reject null hypothesis because p-value = 0.0002579 and accept alternative one: there are spatial efects. Value of Geary C statistic tells about positive autocorrelation.

4) Join count test

```
        Join count test under nonfree sampling

data:  as.factor(res > 0)
weights: W1_list

Std. deviate for FALSE = 2.1535, p-value = 0.01564
alternative hypothesis: greater
sample estimates:
Same colour statistic           Expectation              Variance
             56.56709              49.88564               9.62601


        Join count test under nonfree sampling

data:  as.factor(res > 0)
weights: W1_list

Std. deviate for TRUE = -0.36011, p-value = 0.6406
alternative hypothesis: greater
sample estimates:
Same colour statistic           Expectation              Variance
             52.24675              53.39416              10.15220
```

- in case where residuals < 0 we observe presence of positive autocorrelation (clustering) because the number of same colour statistic is significantly higher than what we would expect by chance
- in case where residuals > 0 we observe null spatial autocorrelation (random pattern) because the number of same colour statistic is approximately the same as what we would expect by chance