**8102 Lab 5** Yue Lin

**Assignment Ⅰ**

The bar plot linking the number of neighbors and the number of cases is presented in Figure 1. The census tracts in Columbus are well-connected, because there are no census tracts without any neighbors, and most of the census tracts have three to six neighbors.

A screenshot of a cell phone

Description automatically generated

Figure 1. The bar plot linking the number of neighbors and the number of cases.

**Assignment Ⅱ**

The plot for k nearest neighbors is presented in Figure 2. To interpret the plots, we can examine how many links are reaching out from one census tract to another.

A close up of a logo

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Figure 2. The plot for k nearest neighbors (k = 1, 2).

**Assignment Ⅲ**

The plot for distance-based neighbors is presented in Figure 3. To interpret the plots, we can examine the distance between two census tracts when there is a link between them.

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Figure 3. The plot for distance-based neighbors (band width = 0.5, 0.8).

**Assignment Ⅳ**

The Moran’s I scatterplot is presented in Figure 4. Based on the Moran’s I value (0.637), the crime rate shows spatial autocorrelation.

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Figure 4. The Moran’s I scatterplot.

**Assignment V**

The LISA cluster map is presented in Figure 5. The high-high clusters are located in the center of Columbus, while the low-low clusters are in the southeast and the southwest.

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Figure 5. The LISA cluster map.

**Assignment VI**

The Gi and Gi\* cluster maps are presented in Figure 6. Similar to the LISA map, the high-high clusters are located in the center of Columbus, while the low-low clusters are in the southeast and the southwest. Twos small differences are that the high-high clusters in both the Gi and Gi\* cluster maps cover a larger area than those in the LISA map, and the low-low clusters in the Gi\* cluster map cover a larger area than those in the LISA map.

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Figure 6. The Gi and Gi\* cluster maps.

**Assignment VII**

The residual plot is presented in Figure 7. The map of residuals indicates moderate spatial dependence and thus suggests dependent errors. The results of the Moran’s I test indicate a significant Moran’s I of 0.3131, which reject the hypothesis of independence in the residuals. The Moran’s I and p-value of the residuals are both lower than those of the variable CRIME itself.

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Figure 7. The residual plot.

**Assignment VIII**

The fitted results for SAR and CAR models are presented in Figure 8 and Figure 9. In comparison with the CAR model, the SAR model reports a lower value of AIC, which suggests a higher quality of the model.

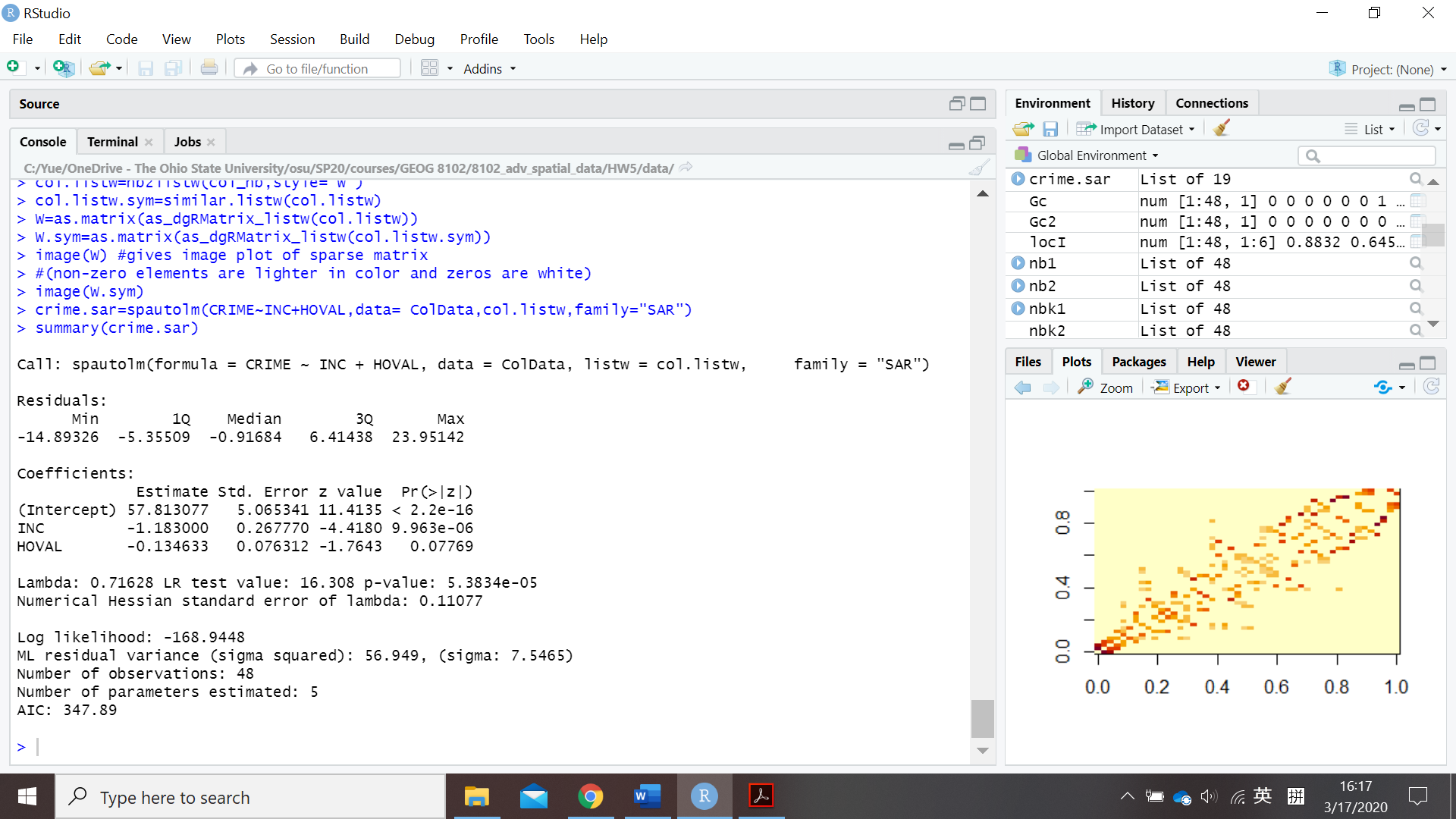


Figure 8. The fitted results for SAR model.

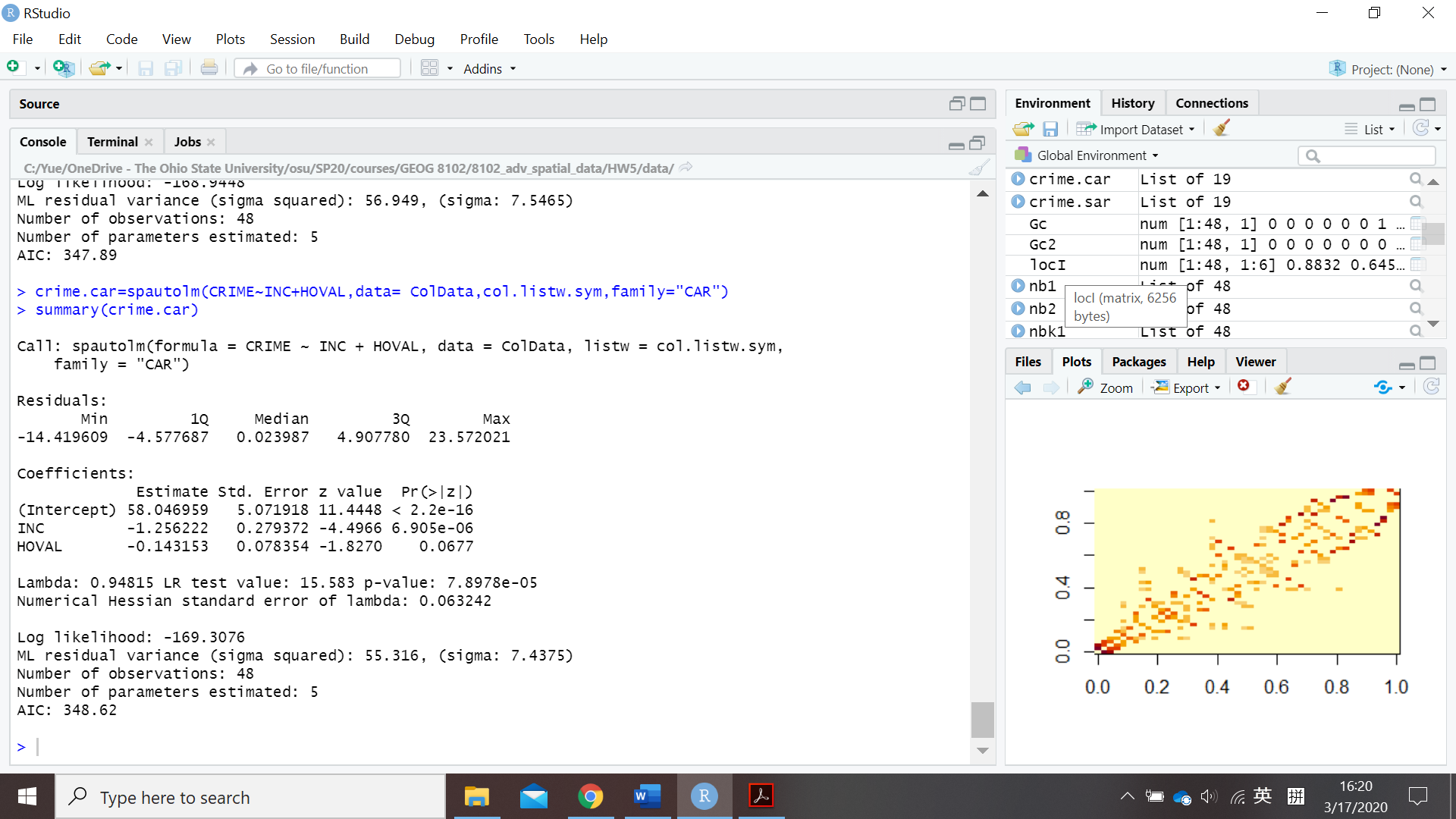


Figure 9. The fitted results for CAR model.