8102 Lab 3 Yue Lin

Assignment I

The plot of kernel estimation for Japanese pine saplings data with σ = 0.05 and σ = 0.1 is shown in Figure 1. The point pattern for Japanese black pine saplings is kind of random and is slightly clustered in the north-west. As the value of σ increases, the output trend tends to be smoother, and the overall estimated values decrease as well.

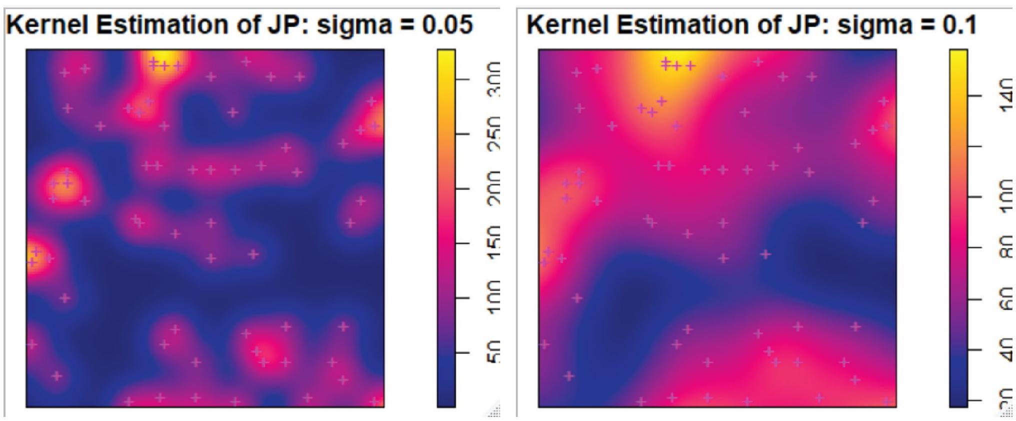

Figure 1. Plot of kernel estimation for Japanese pine saplings data with σ = 0.05 and σ = 0.1, respectively.

Assignment II

The plots of *Ghat*, *Fhat*, *Khat*, and *Lhat* for Japanese pine saplings data are shown in Figure 2 and Figure 3. The point pattern for Japanese pine saplings is random given the evidence that (1) both of the empirical distribution functions *G(r)* and *F(r)* are aligned with the theoretical ones that derived from a Poisson process, and (2) the empirical values of *K(r)* and *L(r)* are both below the theoretical values under CSR.

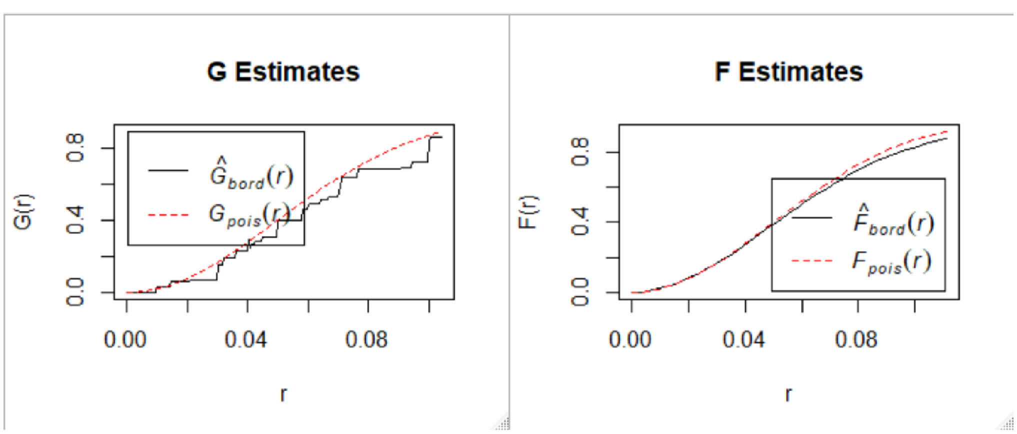

Figure 2. *Ghat* and *Fhat* for Japanese pine saplings data (without specifying *xlim* argument).

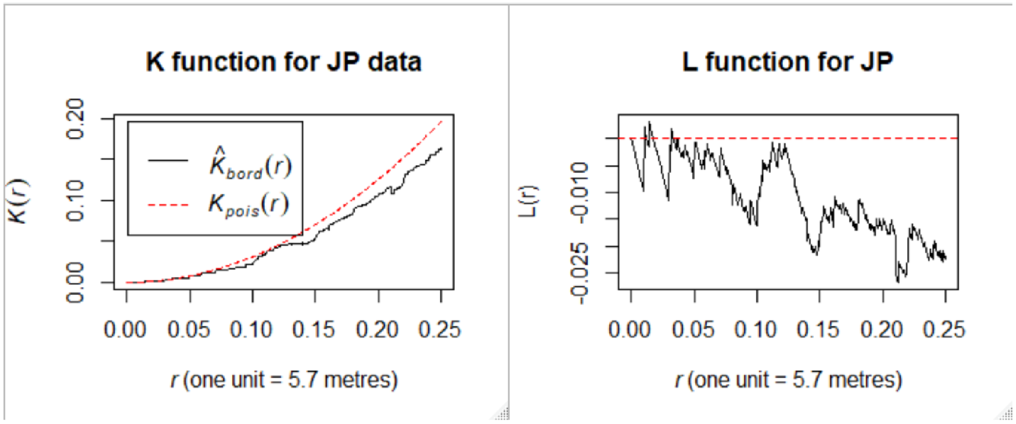

Figure 3. *Khat* and *Lhat* for Japanese pine saplings data (without specifying *xlim* argument).

Assignment III

The plot of *Ghat* and *Fhat* with simulating bounds for Japanese pine saplings data is shown in Figure 4. The empirical values for *G(r)* and *F(r)* both fall within the envelopes formed by the upper and lower bounds of simulation, and therefore the point pattern for Japanese pine saplings data is random.

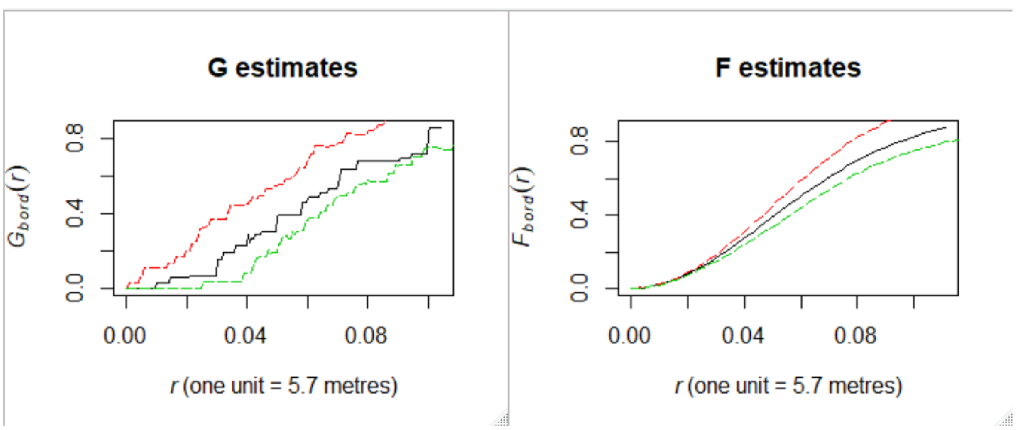

Figure 4. Plot of *Ghat* and *Fhat* with simulating bounds for Japanese pine saplings data.

Assignment IV

The plot of *Khat* with simulating bounds for Japanese pine saplings data is shown in Figure 5. The empirical values for *K(r)* fall within the envelopes formed by the upper and lower bounds of simulation, and therefore the point pattern for Japanese pine saplings data is random.

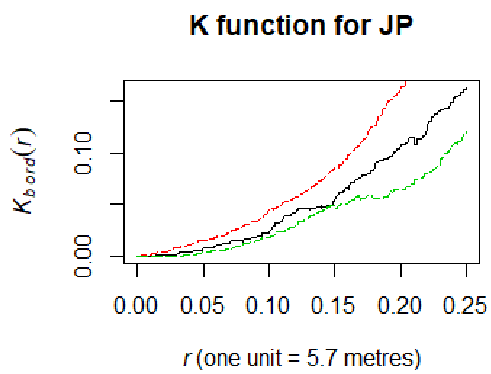

Figure 5. Plot of *Khat* with simulating bounds for Japanese pine saplings data.

Assignment V

The plot of kernel estimation for California redwood tree saplings data with σ = 0.05 and σ = 0.1 is shown in Figure 6. The California redwood tree saplings are clustered in the north-east and the mid-west of the region.

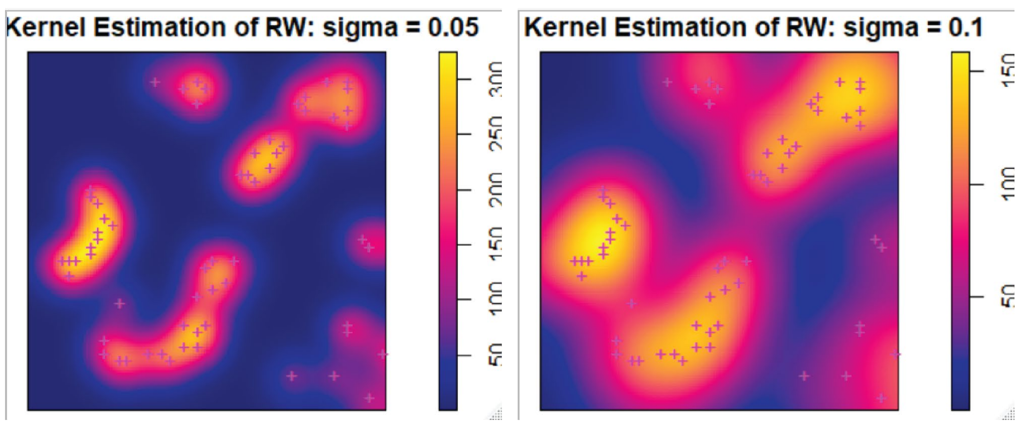

Figure 6. Plot of kernel estimation for California redwood tree saplings data with σ = 0.05 and σ = 0.1, respectively.

The plots of *Ghat*, *Fhat*, *Khat*, and *Lhat* for California redwood tree saplings data are shown in Figure 7 and Figure 8. The point pattern for California redwood tree saplings is clustered given the evidence that (1) the empirical distribution function *G(r)* is above the theoretical one that derived from a Poisson process, while the empirical distribution function *F(r)* is below the theoretical function, and (2) both the empirical function *K(r)* and *L(r)* are above the theoretical ones that derived from a Poisson process.

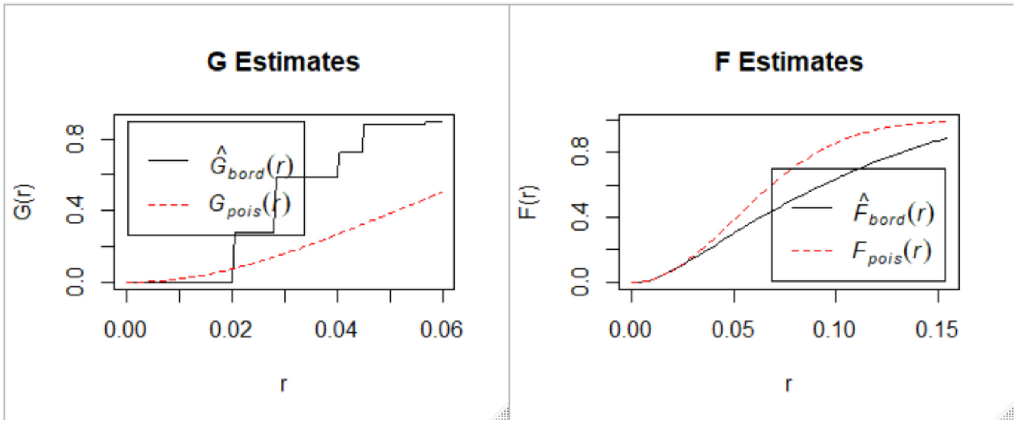

Figure 7. *Ghat* and *Fhat* for California redwood tree saplings data (without specifying *xlim* argument).

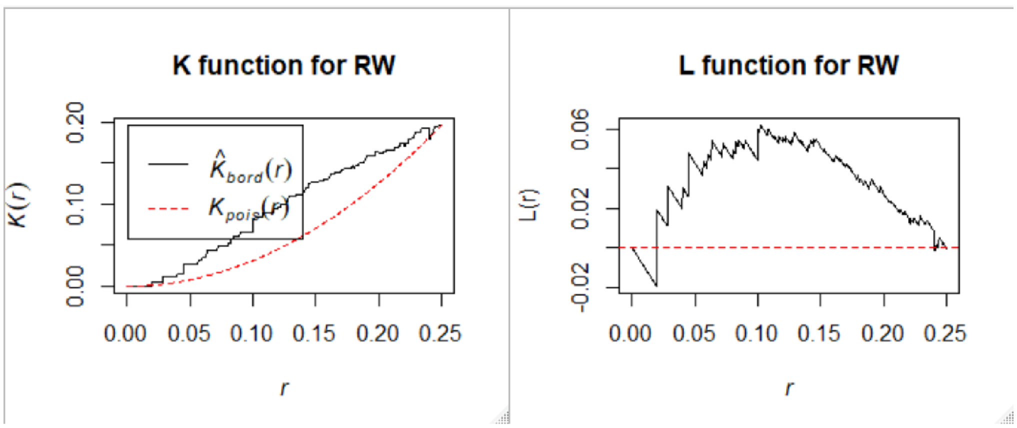

Figure 8. *Khat* and *Lhat* for California redwood tree saplings data (without specifying *xlim* argument).

The plot of *Fhat* and *Khat* with simulating bounds for California redwood tree saplings data is shown in Figure 9. The empirical values for *F(r)* fall below the envelope formed by the upper and lower bounds of simulation, while those for *K(r)* fall above the envelop; therefore, the point pattern for California redwood tree saplings data is clustered.

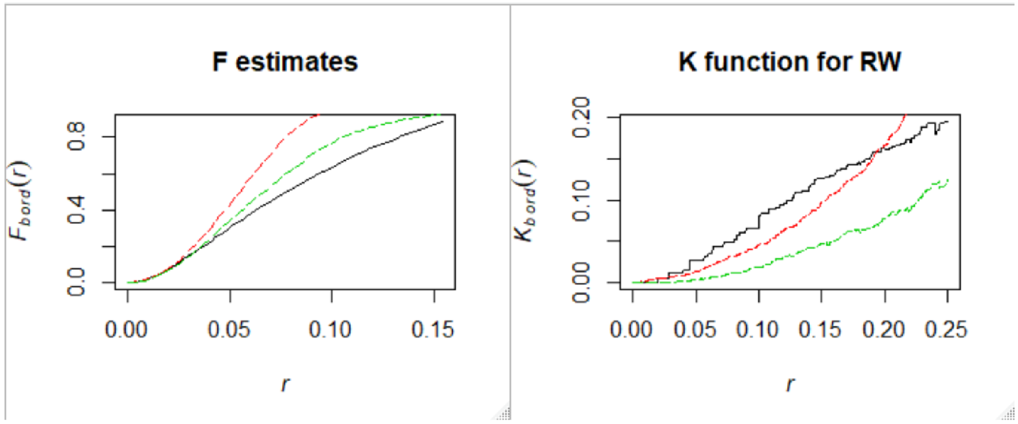

Figure 9. Plot of *Fhat* and *Khat* with simulating bounds for California redwood tree saplings data.

The plot of kernel estimation for regular point pattern with σ = 0.05 and σ = 0.1 is shown in Figure 10. The distribution of points is regular, without any clusters. As the σ increases, the edge effect tends to be more obvious.

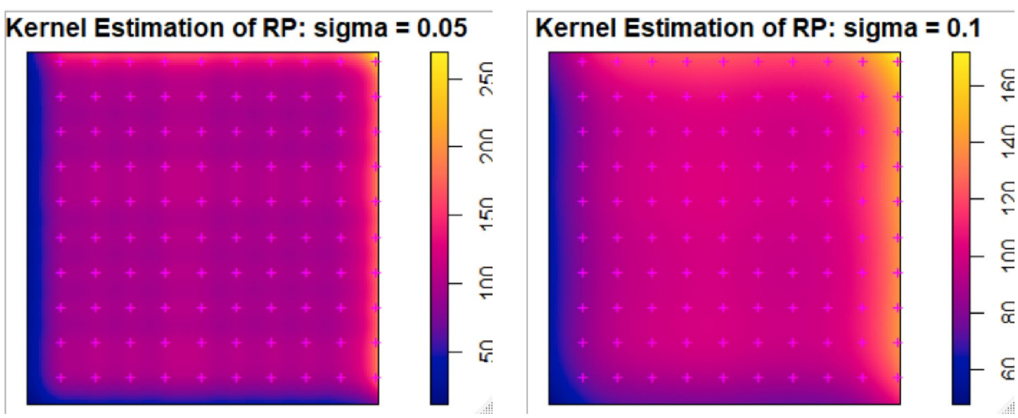

Figure 10. Plot of kernel estimation for regular point pattern with σ = 0.05 and σ = 0.1, respectively.

The plots of *Ghat*, *Fhat*, *Khat*, and *Lhat* for Japanese pine saplings data are shown in Figure 11 and Figure 12. The point pattern is regular given the evidence that (1) the empirical distribution function *G(r)* is below the theoretical one that derived from a Poisson process, while the empirical distribution function *F(r)* is above the theoretical function, and (2) the empirical values of *K(r)* and *L(r)* are randomly distributed along the theoretical values under CSR.

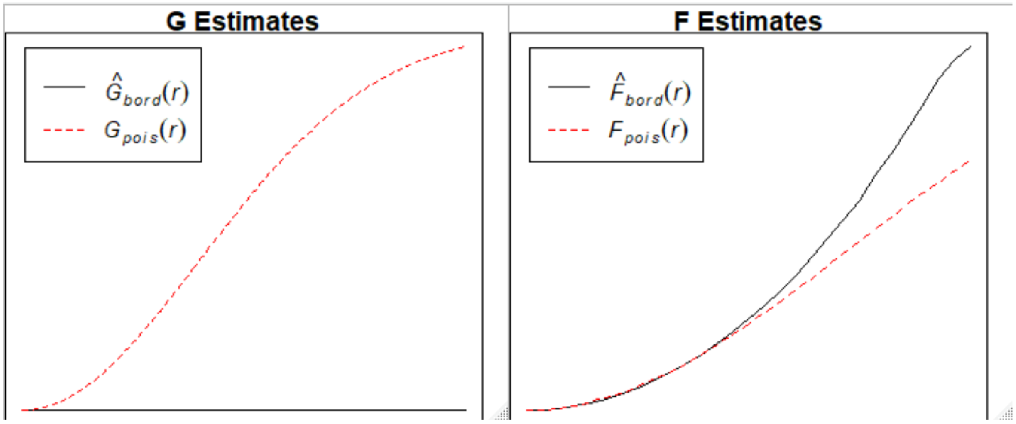

Figure 11. *Ghat* and *Fhat* for regular point pattern (without specifying *xlim* argument).

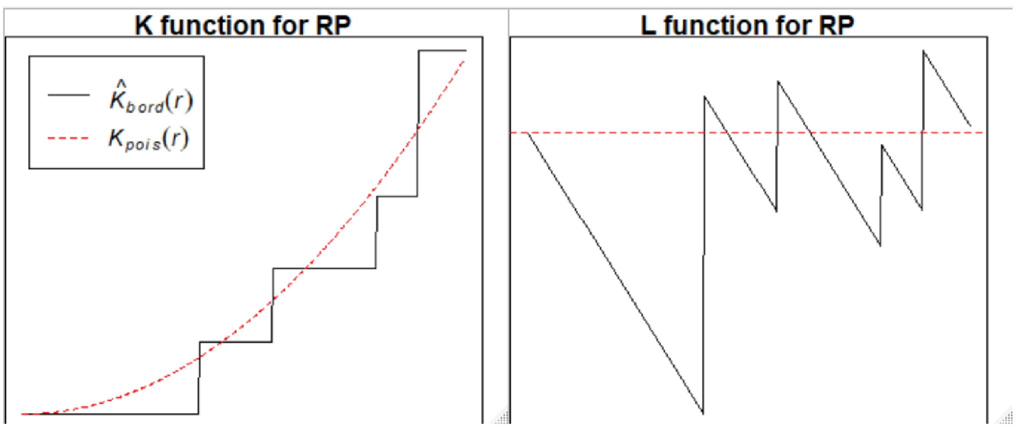

Figure 12. *Khat* and *Lhat* for regular point pattern (without specifying *xlim* argument).

The plot of *Fhat* and *Khat* with simulating bounds for regular point pattern is shown in Figure 13. The empirical values for *F(r)* fall above the envelope formed by the upper and lower bounds of simulation, , while those for *K(r)* fall somewhat below the envelop; therefore, the point pattern is regular.

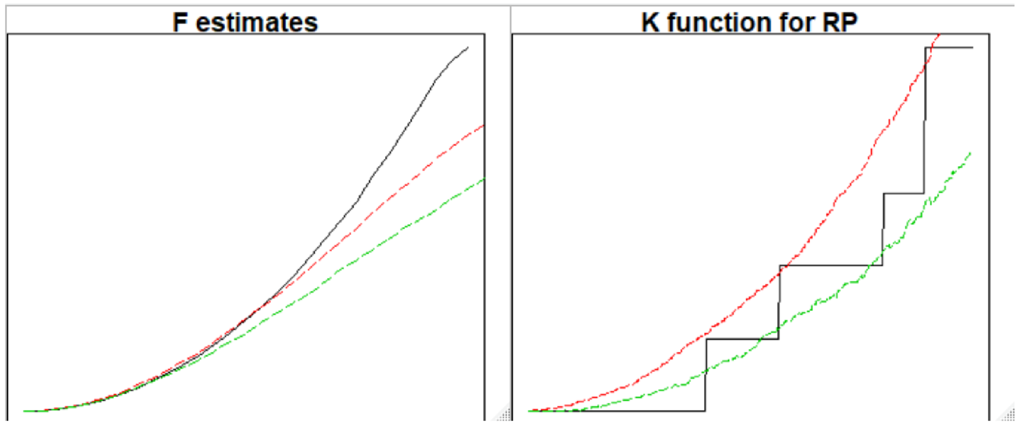

Figure 13. Plot of *Fhat* and *Khat* with simulating bounds for regular point pattern.