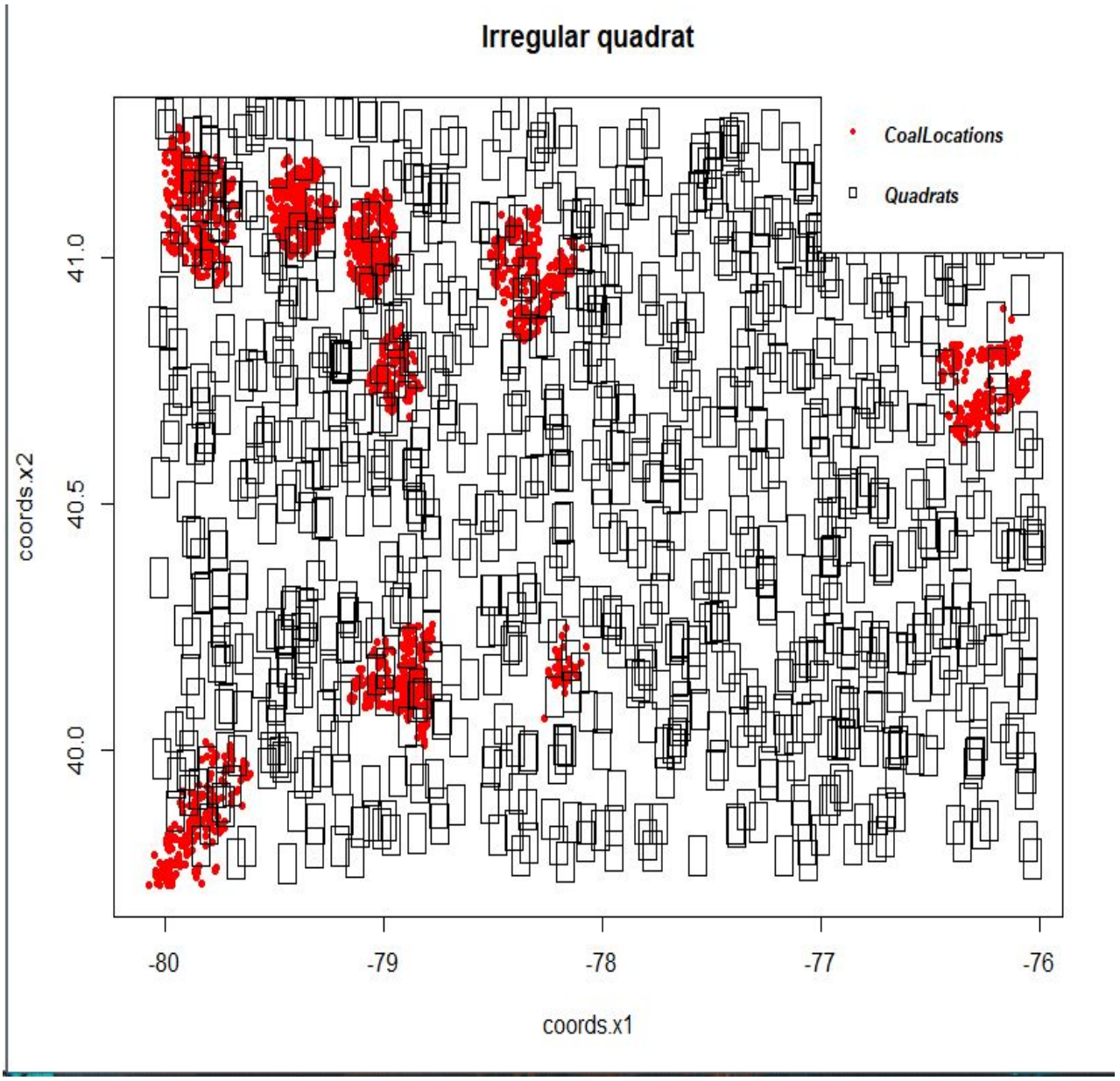
Tigmanshu Chaudhary
tic48

Part A: PA Coals

Conclusion: I obtained VMR value of 45.43 when choosing 50 quadrats across the x dimension and 19 dimensions across the y dimension. This value shows that there is significant clustering in the data.


Irregular quadrat
CoalLocations
Quadrats
coords.x2
41.0
40.5
40.0
-80
-79
-78
-77
-76
coords.x1

K	X	K-U	(K-μ)^2	X(K-μ)^2
1	14	1	9.6733404	9.357351e+01	93.573514
2	24	1	19.6733404	3.870403e+02	387.040321
3	89	1	84.6733404	7.169575e+03	7169.574567
4	76	1	71.6733404	5.137068e+03	5137.067718
5	7	1	2.6733404	7.146749e+00	7.146749
6	59	1	54.6733404	2.989174e+03	2989.174146
7	88	1	83.6733404	7.001228e+03	7001.227887
8	74	1	69.6733404	4.854374e+03	4854.374357
9	11	1	6.6733404	4.453347e+01	44.533472
10	54	1	49.6733404	2.467441e+03	2467.440742

11	17	1	12.6733404	1.606136e+02	160.613556
12	48	1	43.6733404	1.907361e+03	1907.360658
13	40	1	35.6733404	1.272587e+03	1272.587212
14	10	2	5.6733404	3.218679e+01	64.373582
15	29	2	24.6733404	6.087737e+02	1217.547449
16	35	1	30.6733404	9.408538e+02	940.853809
17	42	1	37.6733404	1.419281e+03	1419.280574
18	47	1	42.6733404	1.821014e+03	1821.013977
19	20	3	15.6733404	2.456536e+02	736.960794
20	25	2	20.6733404	4.273870e+02	854.774003
21	2	4	-2.3266596	5.413345e+00	21.653380
22	67	1	62.6733404	3.927948e+03	3927.947592

23	41	2	36.6733404	1.344934e+03	2689.867786
24	85	2	80.6733404	6.508188e+03	13016.375689
25	91	1	86.6733404	7.512268e+03	7512.267929
26	36	2	31.6733404	1.003200e+03	2006.400979
27	13	1	8.6733404	7.522683e+01	75.226833
28	31	2	26.6733404	7.114671e+02	1422.934172
29	60	1	55.6733404	3.099521e+03	3099.520827
30	55	3	50.6733404	2.567787e+03	7703.362269
31	32	1	27.6733404	7.658138e+02	765.813767
32	16	3	11.6733404	1.362669e+02	408.800625
33	79	1	74.6733404	5.576108e+03	5576.107760
34	27	4	22.6733404	5.140804e+02	2056.321452

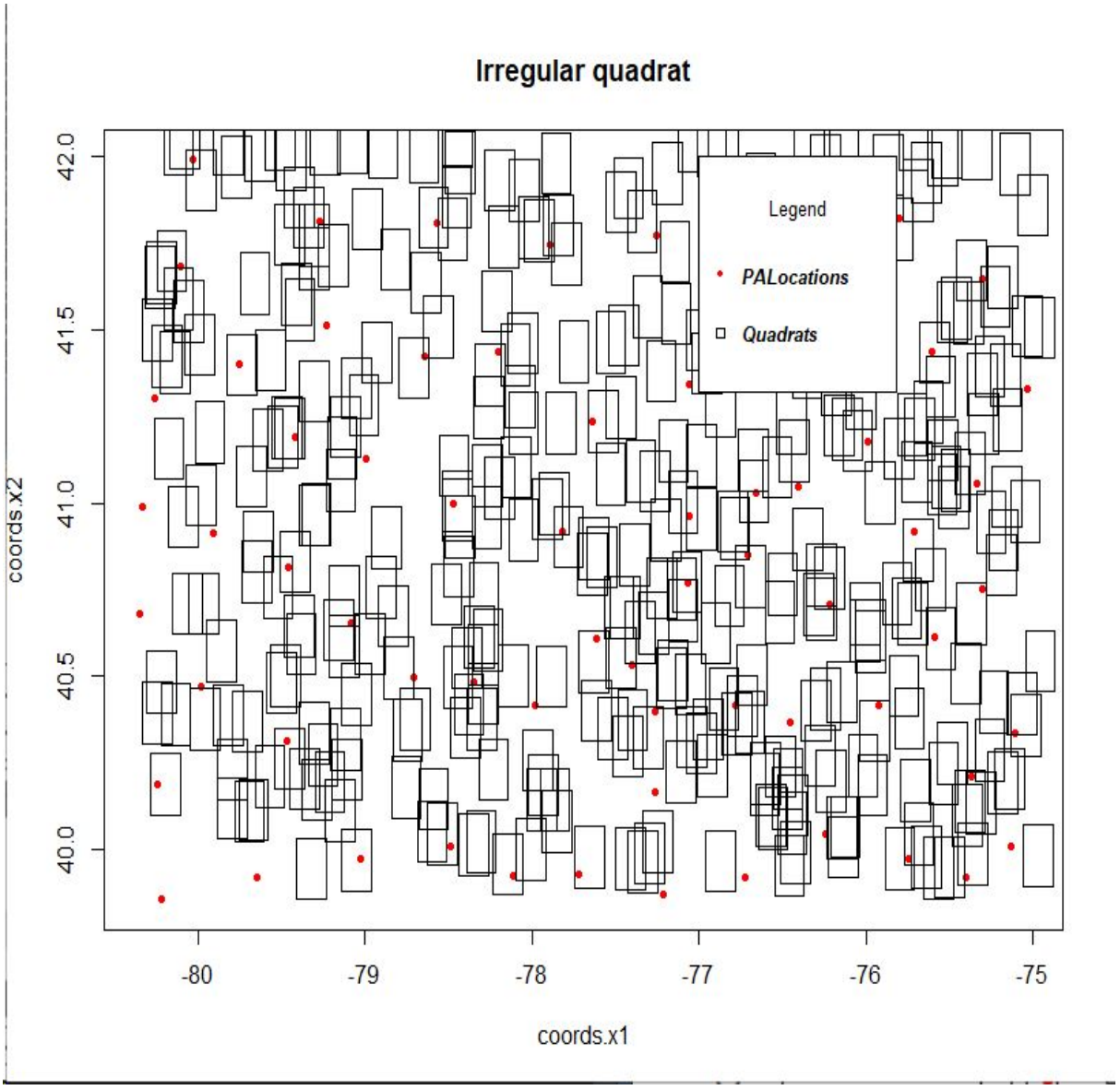
35	71	3	66.6733404	4.445334e+03	13336.002944
36	6	4	1.6733404	2.800068e+00	11.200272
37	72	2	67.6733404	4.579681e+03	9159.361990
38	15	3	10.6733404	1.139202e+02	341.760583
39	114	1	109.6733404	1.202824e+04	12028.241585
40	5	5	0.6733404	4.533872e-01	2.266936
41	21	3	16.6733404	2.780003e+02	834.000836
42	63	1	58.6733404	3.442561e+03	3442.560869
43	50	1	45.6733404	2.086054e+03	2086.054019
44	19	3	14.6733404	2.153069e+02	645.920752
45	98	1	93.6733404	8.774695e+03	8774.694694
46	1	3	-3.3266596	1.106666e+01	33.199993

47	56	2	51.6733404	2.670134e+03	5340.268208
48	39	2	34.6733404	1.202241e+03	2404.481063
49	52	1	47.6733404	2.272747e+03	2272.747381
50	4	2	-0.3266596	1.067065e-01	0.213413
51	37	3	32.6733404	1.067547e+03	3202.641511
52	26	1	21.6733404	4.697337e+02	469.733682
53	12	5	7.6733404	5.888015e+01	294.400761
54	8	5	3.6733404	1.349343e+01	67.467147
55	28	1	23.6733404	5.604270e+02	560.427044
56	49	3	44.6733404	1.995707e+03	5987.122016
57	22	4	17.6733404	3.123470e+02	1249.387838
58	18	4	13.6733404	1.869602e+02	747.840946

59	87	1	82.6733404	6.834881e+03	6834.881206
60	9	2	4.6733404	2.184011e+01	43.680220
61	0	831	-4.3266596	1.871998e+01	15556.306418

Part A: PA Locations

I obtained VMR value of 0.89 when choosing 30 quadrats across the x dimension and 12 dimensions across the y dimension. This value shows that data is evenly scattered across the study region.The less number of points(67) meant that no quadrat had more than one point within itself and consequently most of them were empty.

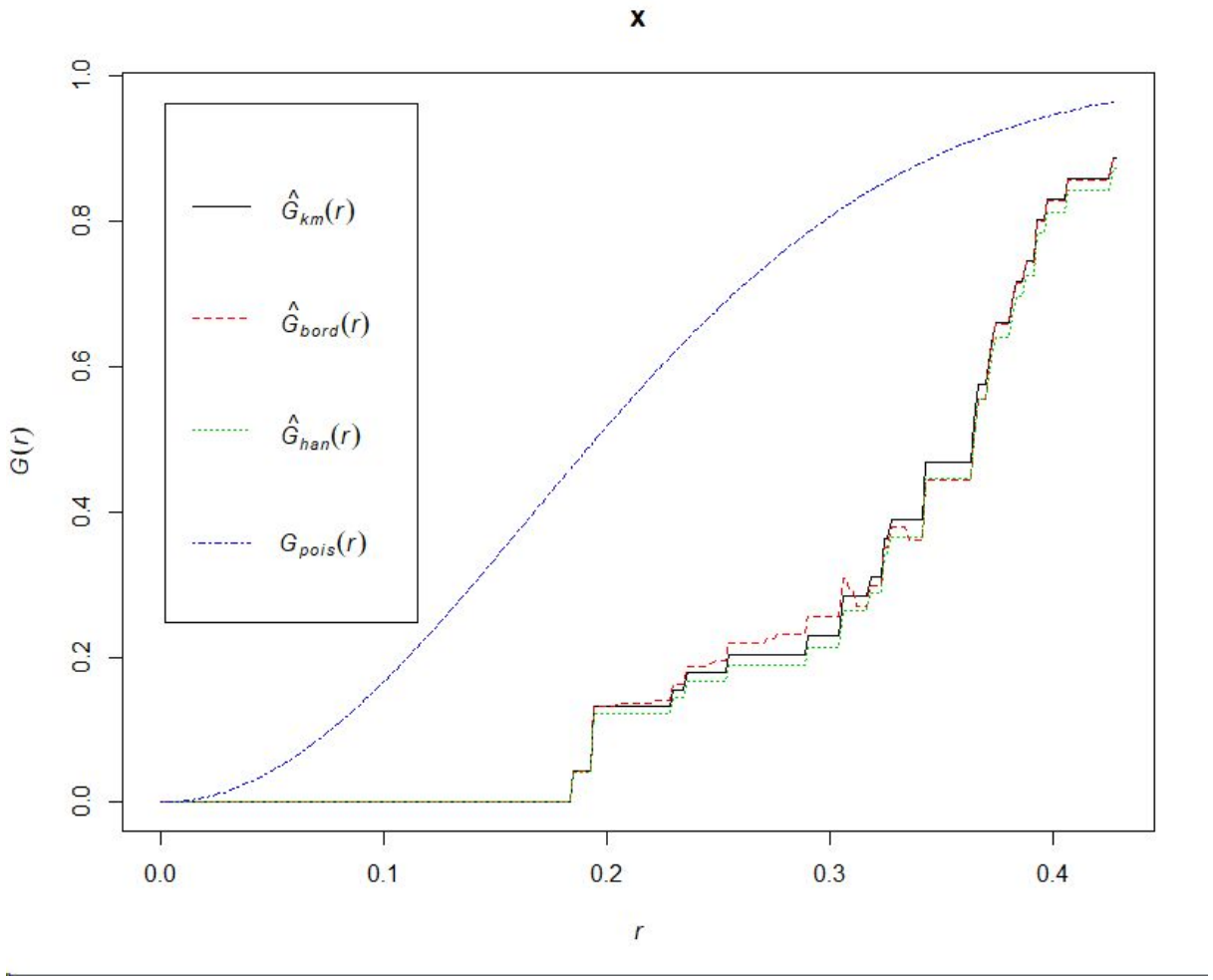


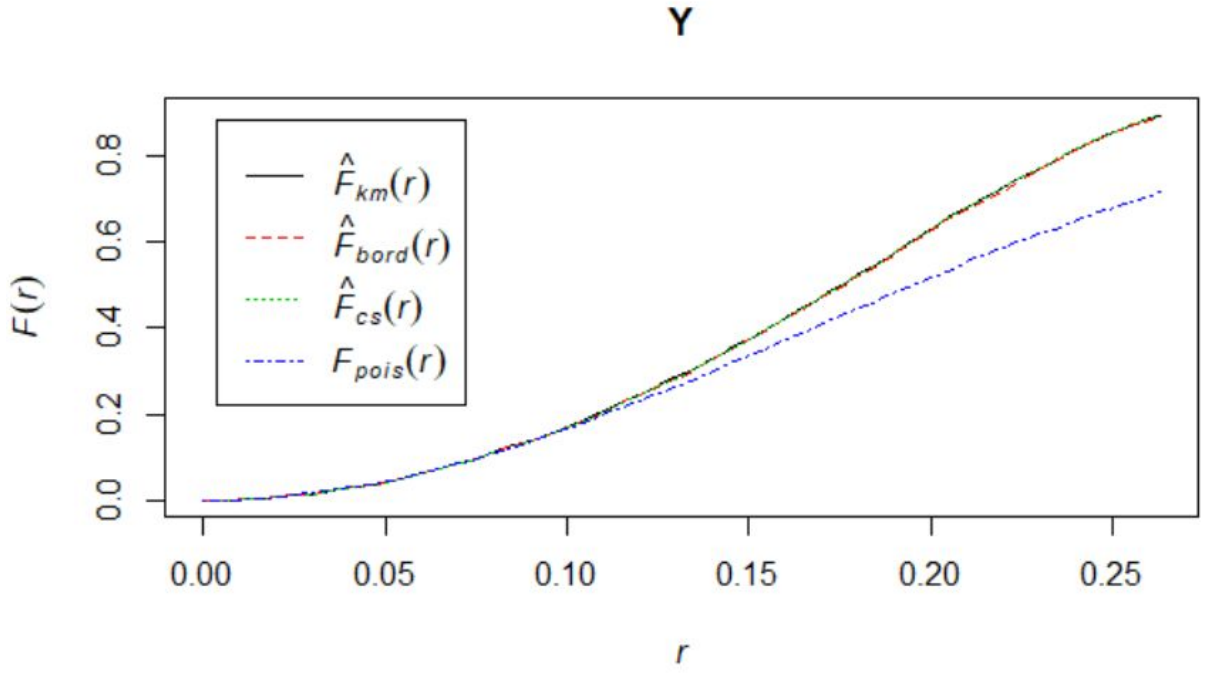
K	X	K-U	(K-μ)^2	X(K-μ)^2

1	1	76	0.8133705	0.66157153	50.279436
2	0	284	-0.1866295	0.03483058	9.891885

Part B: PA Locations

As the data contains evenly spaced points and most locations in Pattern are relatively close to an event, so that F rises quickly at low distances. However, as the events are relatively far from each other, so that G initially increases slowly and rises more quickly at longer distances and the same is evident from the figures below.

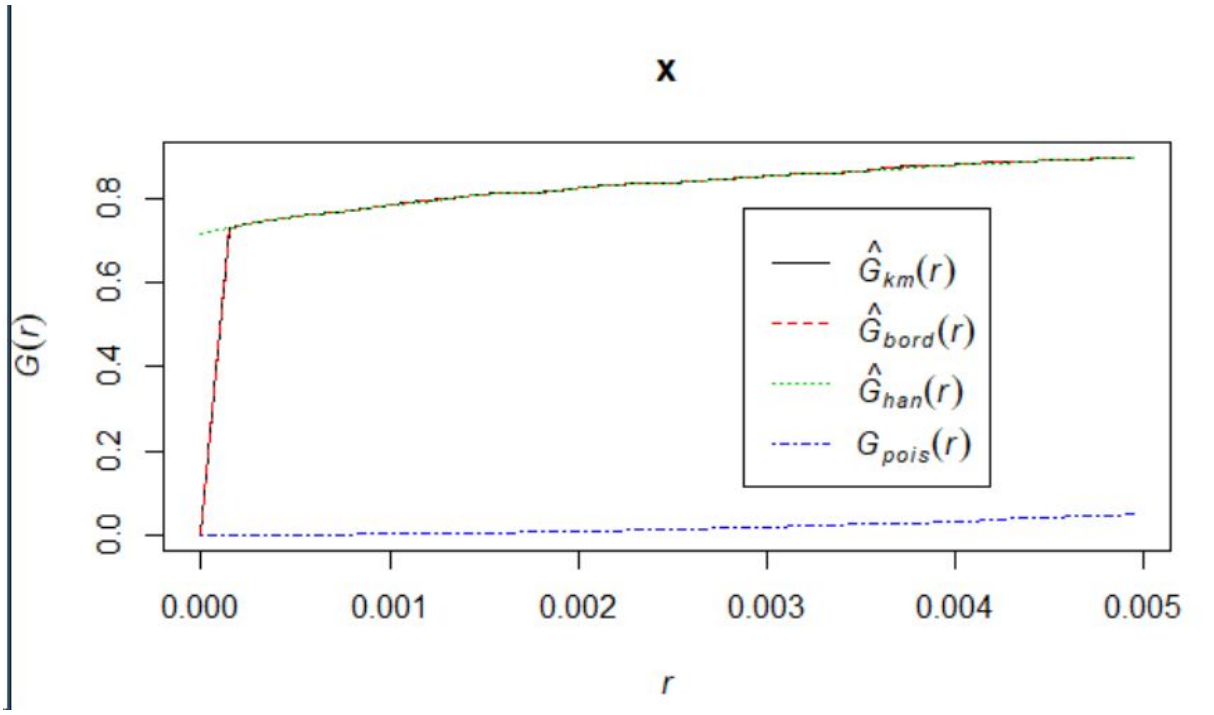

x
1.0
0.8
0.6
0.4
0.2
0.0
G(r)
$\hat{G}_{km}(r)$
$\hat{G}_{bord}(r)$
$\hat{G}_{han}(r)$
$G_{pois}(r)$
0.0
0.1
0.2
0.3
0.4
r

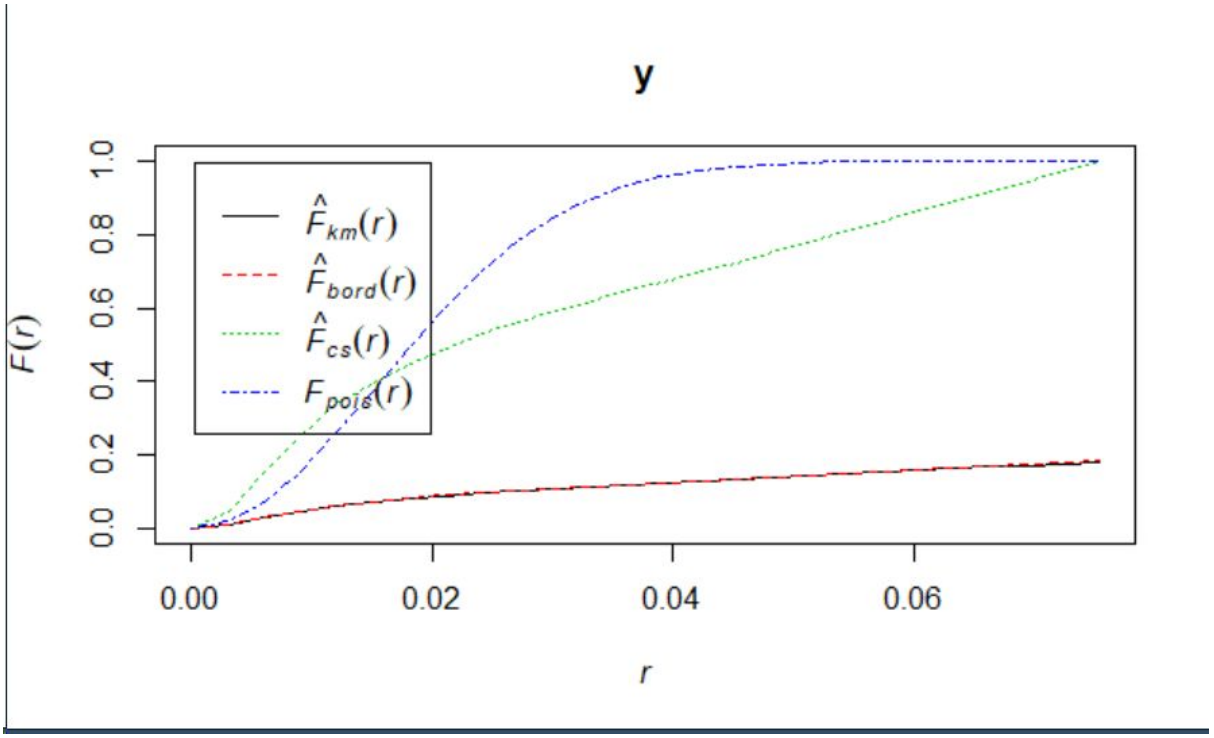


Part B: PA Coals

As the data is clustered the G function rises sharply at shorter distances because many events have a very close nearest neighbour whereas the F function rises slowly at first and more rapidly at larger distances.

(Note: As the funtion used for random quadrat method for both the files is the same , I am only attaching the R code for only one of the file for the sake of brevity)


x
G(r)
0.0
0.2
0.4
0.6
0.8
0.000
0.001
0.002
0.003
0.004
0.005
r
$\hat{G}_{km}(r)$
$\hat{G}_{bord}(r)$
$\hat{G}_{han}(r)$
$G_{pois}(r)$


y
F(r)
0.0
0.2
0.4
0.6
0.8
1.0
0.00
0.02
0.04
0.06
r
$\hat{F}_{km}(r)$
$\hat{F}_{bord}(r)$
$\hat{F}_{cs}(r)$
$F_{pois}(r)$