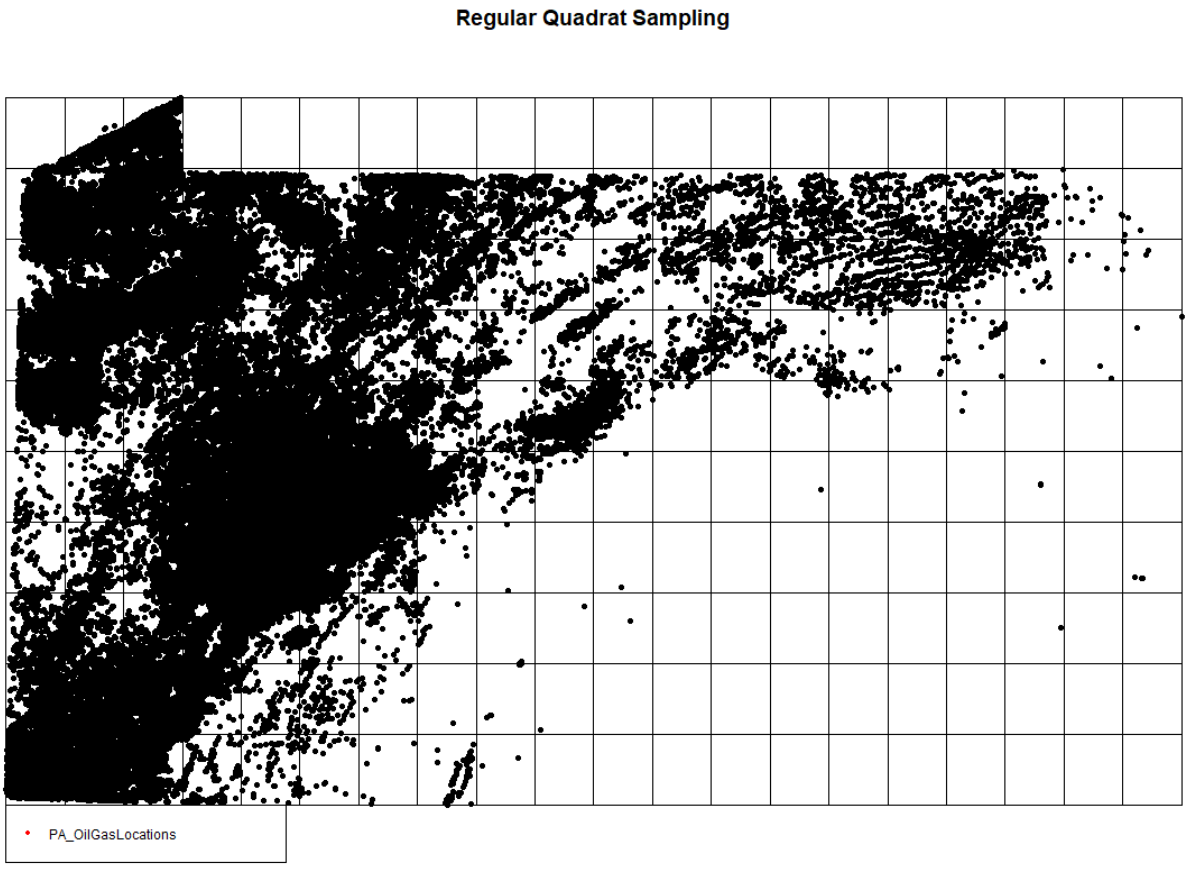
INFSCI 2809: Spatial Data Analytics- Project 2

Submitted By-Vaishnavi Deshpande

Regular Quadrat Sampling

Quadrat Dimensions: 20*10 = 200 quadrats



μ=750.36

Variance=1993257

VMR =2656.401

No. of Events (K)	Number of Quadrants (X)	$K - \mu$	$(K - \mu)2$	$X(K - \mu)2$
0	66	-750.36	563040.1	37160649
1	9	-749.36	561540.4	5053864
2	7	-748.36	560042.7	3920299
3	1	-747.36	558547	558547
4	2	-746.36	557053.2	1114106
5	1	-745.36	555561.5	555561.5
6	1	-744.36	554071.8	554071.8
7	1	-743.36	552584.1	552584.1
9	1	-741.36	549614.6	549614.6
13	1	-737.36	543699.8	543699.8
14	1	-736.36	542226	542226
17	1	-733.36	537816.9	537816.9
19	1	-731.36	534887.4	534887.4
21	1	-729.36	531966	531966
29	1	-721.36	520360.2	520360.2
36	1	-714.36	510310.2	510310.2
37	1	-713.36	508882.5	508882.5
39	1	-711.36	506033	506033
40	1	-710.36	504611.3	504611.3
41	1	-709.36	503191.6	503191.6
43	1	-707.36	500358.2	500358.2
70	1	-680.36	462889.7	462889.7
88	2	-662.36	438720.8	877441.5
90	1	-660.36	436075.3	436075.3
99	1	-651.36	424269.8	424269.8
106	1	-644.36	415199.8	415199.8
108	1	-642.36	412626.4	412626.4
130	1	-620.36	384846.5	384846.5
158	1	-592.36	350890.4	350890.4
160	1	-590.36	348524.9	348524.9
169	1	-581.36	337979.4	337979.4
188	1	-562.36	316248.8	316248.8
189	1	-561.36	315125	315125
207	1	-543.36	295240.1	295240.1
220	1	-530.36	281281.7	281281.7
235	1	-515.36	265595.9	265595.9
242	1	-508.36	258429.9	258429.9
244	1	-506.36	256400.4	256400.4
250	1	-500.36	250360.1	250360.1
302	1	-448.36	201026.7	201026.7

339	1	-411.36	169217	169217
341	1	-409.36	167575.6	167575.6
368	1	-382.36	146199.2	146199.2
378	1	-372.36	138652	138652
381	1	-369.36	136426.8	136426.8
389	1	-361.36	130581	130581
410	1	-340.36	115844.9	115844.9
419	1	-331.36	109799.4	109799.4
433	1	-317.36	100717.4	100717.4
468	1	-282.36	79727.17	79727.17
475	1	-275.36	75823.13	75823.13
476	1	-274.36	75273.41	75273.41
482	1	-268.36	72017.09	72017.09
489	1	-261.36	68309.05	68309.05
551	1	-199.36	39744.41	39744.41
556	2	-194.36	37775.81	75551.62
558	1	-192.36	37002.37	37002.37
563	1	-187.36	35103.77	35103.77
584	1	-166.36	27675.65	27675.65
601	1	-149.36	22308.41	22308.41
655	1	-95.36	9093.53	9093.53
703	1	-47.36	2242.97	2242.97
721	1	-29.36	862.0096	862.0096
731	1	-19.36	374.8096	374.8096
820	1	69.64	4849.73	4849.73
838	1	87.64	7680.77	7680.77
914	1	163.64	26778.05	26778.05
947	1	196.64	38667.29	38667.29
963	1	212.64	45215.77	45215.77
985	1	234.64	55055.93	55055.93
989	1	238.64	56949.05	56949.05
1006	1	255.64	65351.81	65351.81
1023	1	272.64	74332.57	74332.57
1059	1	308.64	95258.65	95258.65
1065	1	314.64	98998.33	98998.33
1066	1	315.64	99628.61	99628.61
1122	1	371.64	138116.3	138116.3
1123	1	372.64	138860.6	138860.6
1129	1	378.64	143368.2	143368.2
1131	1	380.64	144886.8	144886.8
1218	1	467.64	218687.2	218687.2
1300	1	549.64	302104.1	302104.1
1306	1	555.64	308735.8	308735.8
1333	1	582.64	339469.4	339469.4

1358	1	607.64	369226.4	369226.4
1364	1	613.64	376554	376554
1427	1	676.64	457841.7	457841.7
1648	1	897.64	805757.6	805757.6
1743	1	992.64	985334.2	985334.2
1778	1	1027.64	1056044	1056044
1813	1	1062.64	1129204	1129204
1819	1	1068.64	1141991	1141991
1903	1	1152.64	1328579	1328579
2128	2	1377.64	1897892	3795784
2161	1	1410.64	1989905	1989905
2168	1	1417.64	2009703	2009703
2179	1	1428.64	2041012	2041012
2336	1	1585.64	2514254	2514254
2569	1	1818.64	3307451	3307451
2599	1	1848.64	3417470	3417470
2761	1	2010.64	4042673	4042673
2934	1	2183.64	4768284	4768284
3001	1	2250.64	5065380	5065380
3292	1	2541.64	6459934	6459934
3446	1	2695.64	7266475	7266475
3688	1	2937.64	8629729	8629729
3887	1	3136.64	9838510	9838510
4050	1	3299.64	10887624	10887624
4643	1	3892.64	15152646	15152646
4943	1	4192.64	17578230	17578230
5113	1	4362.64	19032628	19032628
5140	1	4389.64	19268939	19268939
5345	1	4594.64	21110717	21110717
5591	1	4840.64	23431796	23431796
5670	1	4919.64	24202858	24202858
6354	1	5603.64	31400781	31400781
9376	1	8625.64	74401665	74401665

Analysis of the results:

The VMR value of 2656.401 which is greater than 1 indicates that there is strong clustering in the dataset.

I cross verified by giving different dimensions (quadrat sizes) to see how VMR varies.

Using 40x20=800 total quadrats the VMR = 896.9433

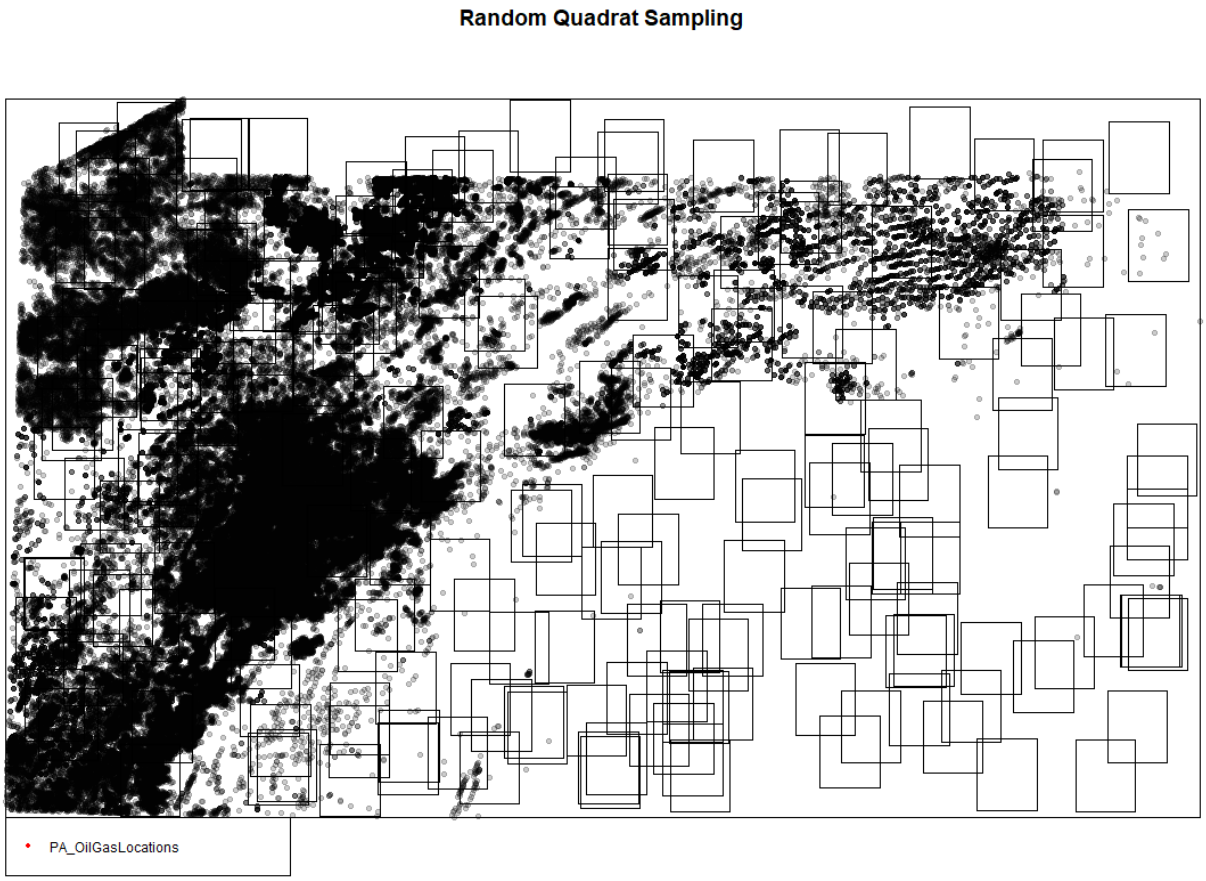
Using 400x200=80,000 total quadrats the VMR= 21.35458

Using 800x400=320,000 total quadrats the VMR= 7.721811

This clearly indicates that for any given dimension (quadrat size) the VMR value is still greater than 1. And VMR values are highly influenced by what quadrat size we choose. As total quadrats grew, VMR values got smaller.

Random Quadrat Sampling

Quadrat Dimensions: 20*10 = 200 quadrats



μ=801.71

Variance=2205291

VMR =2750.734

No. of Events (K)	Number of Quadrants (X)	$K-\mu$	$(K-\mu)2$	$X(K-\mu)2$

0	59	-801.71	642738.9	37921597
1	11	-800.71	641136.5	7052502
2	2	-799.71	639536.1	1279072
3	3	-798.71	637937.7	1913813
4	2	-797.71	636341.2	1272682
5	1	-796.71	634746.8	634746.8
6	1	-795.71	633154.4	633154.4
8	1	-793.71	629975.6	629975.6
9	1	-792.71	628389.1	628389.1
10	1	-791.71	626804.7	626804.7
12	1	-789.71	623641.9	623641.9
16	1	-785.71	617340.2	617340.2
18	1	-783.71	614201.4	614201.4
22	1	-779.71	607947.7	607947.7
26	1	-775.71	601726	601726
28	1	-773.71	598627.2	598627.2
45	1	-756.71	572610	572610
47	1	-754.71	569587.2	569587.2
53	1	-748.71	560566.7	560566.7
54	1	-747.71	559070.2	559070.2
60	1	-741.71	550133.7	550133.7
83	1	-718.71	516544.1	516544.1
93	1	-708.71	502269.9	502269.9
97	1	-704.71	496616.2	496616.2
98	1	-703.71	495207.8	495207.8
100	1	-701.71	492396.9	492396.9
105	1	-696.71	485404.8	485404.8
113	1	-688.71	474321.5	474321.5
116	1	-685.71	470198.2	470198.2
122	1	-679.71	462005.7	462005.7
137	1	-664.71	441839.4	441839.4
147	1	-654.71	428645.2	428645.2
151	1	-650.71	423423.5	423423.5
155	1	-646.71	418233.8	418233.8
169	1	-632.71	400321.9	400321.9
172	1	-629.71	396534.7	396534.7
174	1	-627.71	394019.8	394019.8
181	1	-620.71	385280.9	385280.9
183	1	-618.71	382802.1	382802.1
192	1	-609.71	371746.3	371746.3
196	1	-605.71	366884.6	366884.6
199	1	-602.71	363259.3	363259.3
207	1	-594.71	353680	353680
212	1	-589.71	347757.9	347757.9

221	1	-580.71	337224.1	337224.1
241	1	-560.71	314395.7	314395.7
244	1	-557.71	311040.4	311040.4
269	1	-532.71	283779.9	283779.9
315	1	-486.71	236886.6	236886.6
328	1	-473.71	224401.2	224401.2
329	1	-472.71	223454.7	223454.7
330	1	-471.71	222510.3	222510.3
362	1	-439.71	193344.9	193344.9
375	1	-426.71	182081.4	182081.4
387	1	-414.71	171984.4	171984.4
390	1	-411.71	169505.1	169505.1
393	1	-408.71	167043.9	167043.9
401	1	-400.71	160568.5	160568.5
465	1	-336.71	113373.6	113373.6
483	1	-318.71	101576.1	101576.1
491	1	-310.71	96540.7	96540.7
527	1	-274.71	75465.58	75465.58
564	1	-237.71	56506.04	56506.04
567	1	-234.71	55088.78	55088.78
612	1	-189.71	35989.88	35989.88
681	1	-120.71	14570.9	14570.9
694	1	-107.71	11601.44	11601.44
703	1	-98.71	9743.664	9743.664
719	1	-82.71	6840.944	6840.944
741	1	-60.71	3685.704	3685.704
744	1	-57.71	3330.444	3330.444
769	1	-32.71	1069.944	1069.944
800	1	-1.71	2.9241	2.9241
823	1	21.29	453.2641	453.2641
824	1	22.29	496.8441	496.8441
929	1	127.29	16202.74	16202.74
1034	1	232.29	53958.64	53958.64
1036	1	234.29	54891.8	54891.8
1060	1	258.29	66713.72	66713.72
1074	1	272.29	74141.84	74141.84
1125	1	323.29	104516.4	104516.4
1141	1	339.29	115117.7	115117.7
1162	1	360.29	129808.9	129808.9
1196	1	394.29	155464.6	155464.6
1220	1	418.29	174966.5	174966.5
1232	1	430.29	185149.5	185149.5
1235	1	433.29	187740.2	187740.2
1258	1	456.29	208200.6	208200.6

1298	1	496.29	246303.8	246303.8
1300	1	498.29	248292.9	248292.9
1305	1	503.29	253300.8	253300.8
1371	1	569.29	324091.1	324091.1
1395	1	593.29	351993	351993
1402	1	600.29	360348.1	360348.1
1444	1	642.29	412536.4	412536.4
1458	1	656.29	430716.6	430716.6
1650	1	848.29	719595.9	719595.9
1654	1	852.29	726398.2	726398.2
1677	1	875.29	766132.6	766132.6
1797	1	995.29	990602.2	990602.2
1820	1	1018.29	1036915	1036915
1876	1	1074.29	1154099	1154099
1882	1	1080.29	1167026	1167026
2019	1	1217.29	1481795	1481795
2263	1	1461.29	2135368	2135368
2301	1	1499.29	2247871	2247871
2441	1	1639.29	2687272	2687272
2611	1	1809.29	3273530	3273530
2679	1	1877.29	3524218	3524218
2764	1	1962.29	3850582	3850582
2794	1	1992.29	3969219	3969219
3120	1	2318.29	5374469	5374469
3188	1	2386.29	5694380	5694380
3362	1	2560.29	6555085	6555085
3370	1	2568.29	6596114	6596114
3458	1	2656.29	7055877	7055877
3652	1	2850.29	8124153	8124153
3807	1	3005.29	9031768	9031768
4023	1	3221.29	10376709	10376709
4167	1	3365.29	11325177	11325177
4307	1	3505.29	12287058	12287058
5395	1	4593.29	21098313	21098313
5789	1	4987.29	24873062	24873062
5812	1	5010.29	25103006	25103006
5904	1	5102.29	26033363	26033363
6028	1	5226.29	27314107	27314107
8233	1	7431.29	55224071	55224071
9179	1	8377.29	70178988	70178988

Analysis of the results:

Like the regular quadrat sampling method, VMR of 2750.734 calculated using this method also shows us that there is strong clustering in the data set. The VMR value is greater than 1.

I cross verified by giving different dimensions (quadrat sizes) to see how VMR varies.

Using 40x20=800 total quadrats the VMR = 957.5713

This value is also close to VMR (regular) 896.9433

VMR values using each of the quadrat methods are almost close to each other for quadrat size of 200,800 total quadrats as shown above.

VMR(Regular) ~ VMR(Random).

Thus, to conclude VMR values for each of the method are solely based on different quadrat dimensions.