

# CS 498- Data Visualization

## Assignment 1

**Muhammad Ahmed (mzahmed2)**

RRinc	Running Sum of Population
82	0.8525211
85	2.5007576
87	3.0197141
99	3.1777041
104	3.3669369
119	3.8287614
133	5.4769979
136	14.7501283
147	15.0417849
157	96.9589945
165	107.4922409
166	108.893336
167	114.019932
174	114.177922
177	115.0304431
178	127.7045271
180	129.3527636
185	139.3589956
196	153.806034
196	154.2678585
203	217.0785785
203	219.0346965
205	219.2239293
207	301.1411389
210	322.1003853
212	331.3735157
213	341.9067621
221	347.0333581
230	359.7074421
230	361.3556786
233	362.0463957
235	372.0526277
235	373.0318935
238	374.4329886

238	376.3891066
248	458.3063162
255	464.1635234
255	466.1196414
256	476.6528878
257	476.8108778
266	489.4849618
268	494.6115578
269	557.4222778
269	578.3815242
269	587.6546546
277	597.6608866
280	599.6170046
281	600.4695257
283	602.1177622
284	602.5795867
285	684.4967963
291	712.7425883
298	723.2758347
300	735.9499187
301	736.1391515
303	737.5402466
306	737.8752466
314	743.0018426
315	805.8125626
316	815.8187946
321	897.7360042
324	918.6952506
326	927.968381
326	929.924499
331	935.7817062
336	936.951138
337	949.625222
340	952.816547
340	963.3497934
343	965.0096934
343	970.5467462
344	971.8200871
346	973.4683236
352	973.6263136
355	983.6325456
357	1046.443266
360	1128.360475
361	1133.487071

364	1134.888166
375	1136.844284
377	1149.518368
381	1170.477615
387	1172.881138
387	1173.342963
388	1183.876209
390	1193.14934
392	1221.395132
395	1221.584364
398	1231.590596
402	1232.443118
403	1295.253838
404	1377.171047
410	1383.028254
414	1388.15485
414	1388.940612
423	1390.588849
425	1403.262933
425	1403.781889
427	1405.738007
428	1406.428724
428	1407.829819
439	1415.930829
440	1436.890075
440	1442.427128
444	1452.960375
447	1462.966607
453	1525.777327
455	1527.437227
460	1541.884265
461	1542.520612
464	1624.437822
465	1624.595812
466	1630.039184
470	1658.284976
471	1659.454407
474	1668.727538
477	1673.854134
487	1686.528218
492	1686.763858
492	1688.719976
493	1688.909209
497	1694.766416

498	1696.167511
500	1701.348585
506	1703.232513
508	1703.694338
508	1724.653584
513	1734.659816
514	1735.639082
514	1798.449802
520	1808.983048
531	1810.631285
533	1812.291185
539	1840.536977
541	1846.07403
545	1846.926551
557	1848.646557
562	1930.563767
562	1935.690363
578	1944.963493
581	1946.364589
585	1959.038673
588	1962.229998
588	1967.67337
590	1969.629488
591	1990.588734
592	1996.445941
592	1996.566064
594	2059.376784
601	2060.546215
602	2062.949739
604	2063.138972
605	2091.384764
605	2091.542754
609	2093.202654
615	2098.430504
622	2108.436736
624	2109.127453
627	2109.419109
641	2110.69245
648	2121.225697
650	2122.011459
656	2122.647806
656	2128.184858
660	2128.646683
674	2156.892475

691	2171.339513
691	2172.999413
694	2174.400508
702	2179.84388
703	2184.970476
705	2205.929723
706	2211.78693
712	2221.06006
716	2222.708297
720	2223.560818
723	2286.371538
729	2287.54097
732	2288.059926
737	2288.249159
746	2290.652683
751	2290.888323
753	2319.134115
764	2319.536478
765	2324.717552
783	2325.696818
783	2327.356718
787	2332.893771
789	2334.777698
791	2334.935688
809	2336.655695
810	2342.099067
823	2342.789784
835	2343.084584
835	2345.040702
846	2345.826464
852	2351.683671
853	2352.320018
855	2380.56581
858	2383.757135
864	2385.030476
864	2386.199908
865	2386.661733
881	2388.062828
886	2390.466351
895	2392.126251
898	2413.085498
918	2418.313348
919	2418.50258
922	2423.945952

924	2433.219083
944	2438.756136
945	2453.203174
956	2454.055695
959	2454.347352
968	2454.467474
973	2454.774291
986	2467.448375
999	2467.684015
1014	2468.853447
1015	2497.099239
1025	2497.618195
1028	2502.799269
1036	2505.202793
1037	2505.89351
1044	2506.679272
1047	2512.122644
1047	2513.782544
1056	2519.639751
1060	2601.556961
1060	2602.536227
1064	2602.694217
1068	2603.330564
1072	2605.05057
1091	2615.056802
1098	2615.351602
1105	2616.624943
1107	2619.797856
1107	2621.681784
1149	2627.218837
1150	2630.410162
1151	2635.638012
1169	2636.099836
1189	2636.452331
1196	2637.621763
1196	2643.065135
1205	2645.468659
1221	2645.657892
1230	2646.060254
1243	2647.119903
1248	2647.355543
1252	2647.6472
1257	2652.773796
1258	2663.307042

1261	2677.75408
1262	2678.539842
1285	2679.230559
1293	2680.890459
1295	2686.071534
1298	2694.172543
1302	2695.025065
1305	2695.661412
1311	2758.472132
1332	2758.991088
1337	2759.11121
1352	2760.090476
1354	2761.810483
1361	2762.105283
1384	2763.378624
1392	2768.606474
1399	2774.049846
1414	2779.907053
1419	2782.310577
1443	2783.480009
1443	2789.017061
1482	2790.900989
1484	2794.092314
1487	2795.740551
1493	2823.986343
1510	2824.772105
1514	2825.007745
1541	2826.067393
1562	2826.225383
1564	2835.498514
1572	2835.79017
1581	2840.971245
1585	2841.607592
1591	2842.298309
1614	2842.742509
1626	2844.143604
1627	2844.438404
1627	2846.051487
1635	2846.45385
1637	2847.46785
1657	2852.6957
1670	2854.415707
1670	2854.934663
1684	2858.717112

1684	2859.023929
1688	2860.003194
1708	2862.406718
1713	2876.853756
1716	2879.159523
1719	2879.279645
1722	2880.281606
1723	2880.647111
1727	2881.108935
1737	2882.382276
1738	2887.825648
1781	2908.784895
1793	2909.844543
1803	2917.945553
1810	2918.731315
1815	2918.966955
1842	2922.139868
1858	2923.3093
1866	2929.002132
1891	2932.193457
1914	2937.374532
1917	2937.669332
1935	2938.521853
1937	2939.1582
1942	2941.042128
1947	2941.333784
1963	2941.736147
1968	2946.963997
1970	2952.50105
1977	2956.69855
1989	2960.570135
2014	2961.260852
2024	2962.320501
2048	2964.040507
2072	2964.559464
2101	2965.53873
2136	2965.658852
2155	2967.271935
2183	2967.507575
2188	2967.663765
2194	2982.110804
2195	2984.514327
2204	2985.528327
2207	2986.314089



2225	2986.387742
2231	2994.488752
2239	2995.762093
2246	2996.056893
2250	2997.116541
2257	2997.518904
2258	2997.825721
2278	3001.60817
2279	3007.271098
2303	3007.636603
2320	3012.817678
2339	3013.006911
2357	3018.234761
2384	3018.526417
2387	3018.878912
2412	3022.070237
2420	3024.376003
2430	3025.01235
2437	3030.779243
2489	3031.223443
2496	3032.283092
2507	3033.942992
2516	3035.82692
2526	3037.546927
2560	3038.560927
2565	3041.73384
2569	3042.735801
2595	3044.348884
2611	3044.469006
2616	3044.987963
2627	3053.088972
2634	3054.092671
2636	3078.542572
2652	3080.018581
2656	3080.313381
2673	3080.678886
2674	3081.658152
2688	3081.893792
2732	3085.67624
2741	3086.366958
2762	3086.566477
2778	3087.626126
2788	3087.932942
2803	3088.458002

2829	3089.356147
2839	3090.141909
2848	3090.544271
2884	3096.401479
2886	3101.582553
2889	3102.596553
2889	3102.931553
2890	3104.584773
2899	3109.812623
2916	3112.118389
2997	3112.410046
3000	3112.762541
3002	3114.375624
3006	3122.476633
3016	3122.632823
3020	3122.998328
3030	3124.271669
3065	3124.345322
3113	3125.38085
3117	3126.382811
3126	3130.16526
3137	3144.612298
3137	3145.056498
3154	3146.116147
3158	3149.307472
3196	3149.427594
3206	3151.147601
3214	3151.442401
3222	3152.456401
3222	3156.653901
3236	3162.097273
3265	3162.362616
3279	3162.998963
3280	3163.401326
3290	3165.285254
3307	3168.458167
3320	3172.329752
3328	3174.635518
3367	3175.001023
3374	3183.102033
3376	3183.627092
3386	3184.796524
3393	3185.103341
3406	3186.716424

3502	3190.498873
3529	3191.017829
3552	3191.253469
3574	3192.267469
3584	3192.423659
3623	3192.776154
3640	3198.439083
3642	3198.638602
3651	3199.617868
3654	3200.516013
3667	3201.517974
3679	3201.591627
3707	3203.897393
3733	3204.262898
3745	3212.363908
3753	3213.354074
3758	3214.413723
3817	3219.641573
3820	3220.166632
3823	3221.20216
3832	3223.89166
3834	3225.504743
3853	3230.685817
3858	3231.130017
3896	3234.912466
3966	3235.926466
3975	3240.123966
4005	3240.244089
4024	3240.75704
4055	3241.048697
4088	3242.052395
4090	3245.92398
4093	3246.230797
4094	3249.40371
4095	3249.898358
4095	3252.204124
4121	3252.360314
4133	3260.461323
4141	3260.826828
4145	3260.984818
4158	3261.279618
4178	3266.972451
4218	3267.497511
4224	3267.571164

4247	3268.573125
4281	3268.772644
4292	3269.670789
4306	3270.073152
4330	3271.686235
4332	3272.03873
4338	3275.821179
4362	3276.856706
4378	3277.12205
4401	3278.842057
4438	3279.856057
4458	3281.739984
4492	3284.931309
4504	3290.594238
4519	3296.131291
4524	3298.437057
4605	3298.962117
4621	3307.063126
4629	3307.428631
4647	3307.584821
4672	3308.029021
4672	3312.226521
4708	3313.499862
4768	3317.371447
4791	3318.847456
4819	3318.921109
4829	3319.120629
4831	3320.156157
4851	3321.054301
4884	3322.056262
4916	3325.838711
4920	3326.145528
4941	3328.549051
4953	3330.162134
4995	3330.514629
4996	3333.687542
4997	3334.212602
5012	3348.65964
5036	3354.426534
5061	3356.7323
5097	3357.7463
5105	3358.749998
5114	3366.56446
5117	3366.829803

5210	3366.985993
5271	3368.021521
5284	3369.674741
5305	3375.367573
5307	3375.733078
5345	3375.932598
5347	3380.130098
5358	3380.25022
5384	3381.148365
5398	3386.811294
5457	3387.336353
5470	3388.32652
5501	3388.788344
5507	3388.861997
5521	3389.306197
5534	3393.177782
5571	3393.963544
5626	3394.816065
5637	3395.818026
5675	3396.220389
5696	3397.696398
5729	3398.191046
5734	3399.226574
5770	3423.676475
5806	3424.736124
5806	3425.001467
5809	3425.157657
5813	3425.510152
5825	3429.292601
5881	3429.49212
5886	3431.797886
5909	3433.41097
5929	3445.67227
5942	3446.570414
6040	3447.095474
6069	3447.40229
6077	3448.405989
6091	3449.096706
6100	3453.294206
6116	3456.467119
6137	3457.225651
6156	3457.560651
6205	3463.253483
6206	3469.020377

6221	3474.683305
6245	3475.718833
6312	3476.35518
6373	3476.428833
6382	3480.300418
6405	3481.290584
6477	3481.490104
6486	3481.755447
6507	3481.911637
6575	3482.809782
6589	3484.463002
6591	3486.34693
6619	3487.822939
6622	3488.8249
6629	3489.319548
6645	3489.763748
6751	3492.453248
6901	3493.488776
6922	3494.492474
6944	3495.017534
6951	3495.370029
7030	3496.384029
7043	3500.581529
7211	3506.274361
7211	3506.539705
7233	3506.90521
7252	3507.418161
7257	3507.937118
7258	3508.136637
7273	3513.799566
7332	3514.789733
7340	3518.661317
7389	3524.428211
7400	3525.326355
7408	3525.821003
7424	3525.977193
7446	3533.791655
7473	3533.865308
7473	3534.160108
7498	3535.636117
7621	3547.897417
7645	3551.07033
7676	3551.40533
7711	3553.05855

7733	3553.29419
7904	3554.329718
7990	3554.636535
8002	3556.942301
8017	3557.207644
8023	3557.651844
8075	3558.655542
8095	3558.947199
8150	3564.128273
8168	3564.622922
8168	3566.236005
8180	3590.685906
8237	3591.676072
8302	3595.873572
8324	3601.566405
8333	3602.324936
8364	3603.326897
8443	3608.989826
8489	3609.189346
8503	3611.878846
8542	3617.645739
8559	3618.158691
8566	3622.030275
8612	3634.291575
8668	3638.074024
8678	3638.972169
8691	3640.448178
8744	3648.26264
8778	3649.241906
8864	3649.594401
8904	3651.247621
8953	3651.742269
8968	3652.007612
9132	3652.997778
9155	3658.225628
9305	3658.299282
9347	3659.30298
9365	3659.828039
9507	3672.089339
9557	3677.782172
9591	3677.938362
9656	3678.451314
9790	3679.209846
9790	3684.976739

9841	3685.311739
9878	3690.974668
9909	3691.469316
9914	3691.589438
9973	3694.278938
10021	3695.754947
10086	3703.569409
10152	3704.013609
10195	3705.003775
10216	3709.201275
10250	3709.466619
10280	3712.639532
10312	3737.089433
10335	3738.809439
10449	3739.844967
10469	3741.498187
10495	3753.759487
10586	3757.631072
10604	3758.033435
10751	3758.546386
11059	3759.304918
11112	3759.799566
11164	3760.803264
11236	3766.570158
11239	3772.26299
11417	3774.95249
11444	3782.766952
11476	3785.958277
11596	3786.948443
11684	3799.209743
11893	3800.685753
11967	3801.198704
12109	3806.861633
12244	3807.196633
12331	3807.955165
12345	3809.608385
12424	3810.506529
12441	3834.95643
12548	3835.15595
12873	3835.650598
13011	3843.46506
13101	3846.15456
13175	3858.41586
13195	3864.182753



13336	3865.456094
13387	3865.969045
13674	3871.661878
13689	3872.42041
13712	3872.685753
13755	3873.67592
13798	3874.679618
14080	3875.681579
14321	3876.016579
14686	3883.83104
14849	3885.48426
14861	3909.934161
15075	3922.195461
15075	3923.671471
15081	3938.118509
15204	3938.877041
15205	3939.389992
15207	3942.079492
15540	3942.153145
15603	3942.50564
15618	3944.389568
16242	3944.696385
16274	3950.463278
16920	3950.907478
16942	3951.242478
16973	3959.05694
17063	3959.815471
17723	3963.687056
17806	3964.181704
17860	3988.631605
17907	3989.144557
18078	4001.405857
18087	4004.095357
18784	4005.748577
19432	4009.946077
19638	4010.704608
19681	4016.367537
20268	4024.181999
20652	4025.172165
20687	4025.507165
21485	4049.957066
22020	4053.129979
22217	4058.822812
22462	4061.512312

22806	4062.988321
23636	4063.992019
26635	4069.758913
26920	4082.020213
27285	4106.470113
27312	4107.228645
27387	4107.741597
28953	4109.394817
29393	4109.729817
31358	4117.544278
34682	4120.233778
43279	4144.683679

## Stage 2

Quntile Index (i)	Quintile Bin	Quintile's Average RRinc
0	0% to 5%	162.4494323
1	5% to 10%	210.3486619
2	10% to 15%	260.7334063
3	15% to 20%	298.4824489
4	20% to 25%	328.3451968
5	25% to 30%	369.984562
6	30% to 35%	411.9645243
7	35% to 40%	457.9487878
8	40% to 45%	507.0586037
9	45% to 50%	579.2152749
10	50% to 55%	664.6734561
11	55% to 60%	826.4100727
12	60% to 65%	1105.55843
13	65% to 70%	1465.961098
14	70% to 75%	2273.975568
15	75% to 80%	3741.98051
16	80% to 85%	5829.283526
17	85% to 90%	8672.403662
18	90% to 95%	12507.94446
19	95% to 100%	21423.93127

# Stage 3

Quintile Index (i)	Quntile Bin	Quintile's Growth
0	0% to 5%	9%
1	5% to 10%	42%
2	10% to 15%	42%
3	15% to 20%	45%
4	20% to 25%	53%
5	25% to 30%	56%
6	30% to 35%	60%
7	35% to 40%	62%
8	40% to 45%	67%
9	45% to 50%	67%
10	50% to 55%	82%
11	55% to 60%	80%
12	60% to 65%	62%
13	65% to 70%	56%
14	70% to 75%	30%
15	75% to 80%	0%
16	80% to 85%	3%
17	85% to 90%	8%
18	90% to 95%	19%
19	95% to 100%	51%

# Stage 4

Elephant Chart

