

Simulation with algorithm 2- different means and one nuisance granularity

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Simulation design

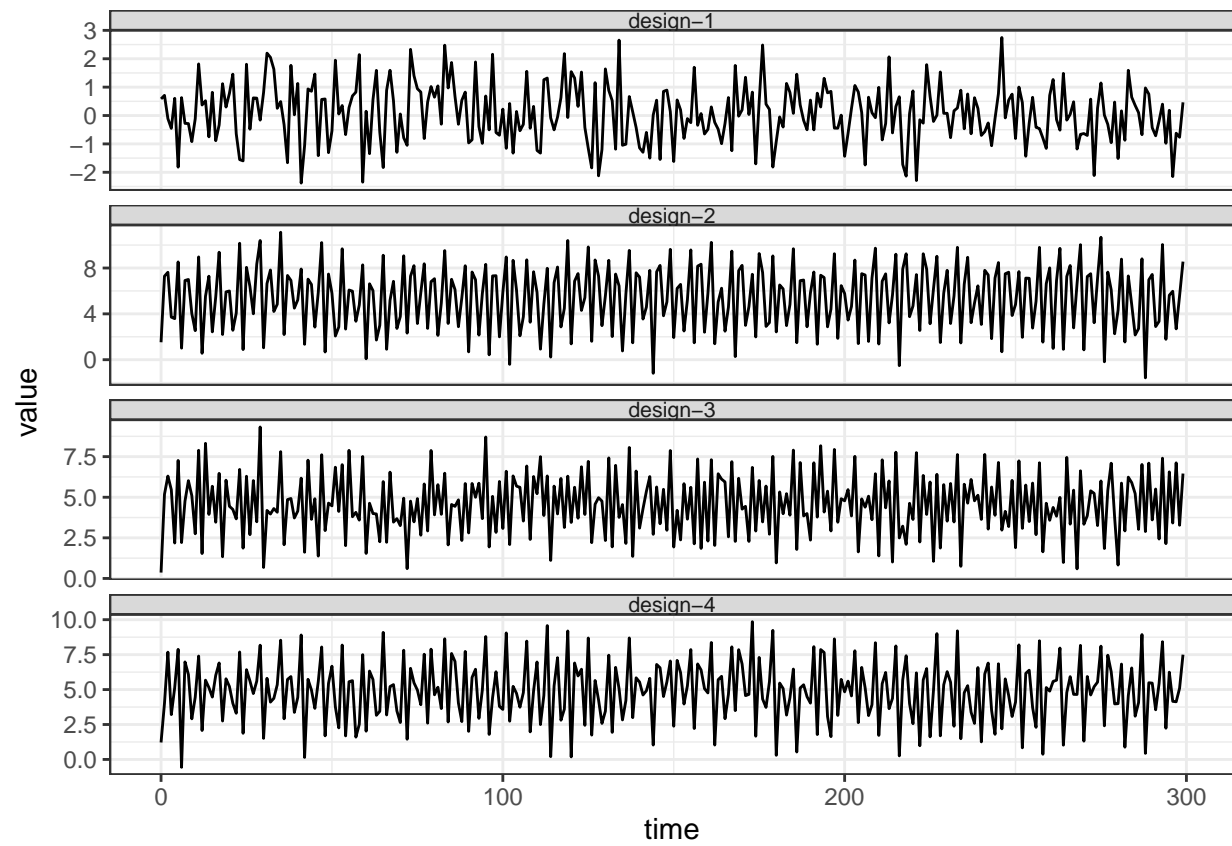
Three circular granularities g1, g2 and g3 are considered with levels 2, 3 and 4 respectively. Many time series with 600 observations are created using the four designs below, each of which is iterated five times. We anticipate to have four clusters, each with five time series conforming to the same design, once we execute the clustering.

Algorithm

Compute wpd for each granularity. The distance matrix is then computed with 20 time series as cases and three granularities as variables. Manhattan distances are computed and then hierarchical clustering is applied on them.

```
## # A tibble: 16 x 2
## # Groups:   design [4]
##   design      s
##   <chr>   <dbl>
## 1 1      0
## 2 2      1
## 3 2      7
## 4 2      3
## 5 2      5
## 6 2      9
## 7 3      2
## 8 3      6
## 9 3      4
## 10 3     5
## 11 3     3
## 12 3     7
## 13 4     2
## 14 4     6
## 15 4     4
## 16 4     8
```

Raw plots



Designs (Distribution of simulated data across different granularities)

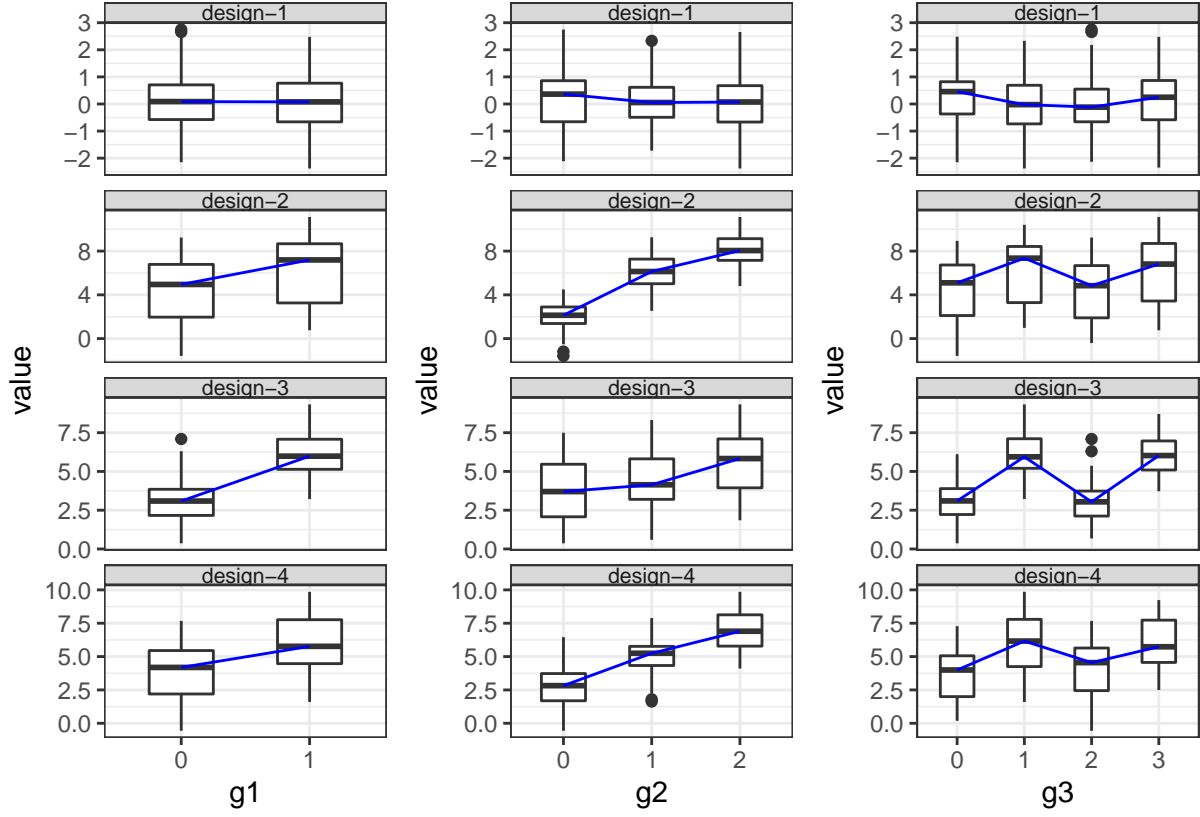


Table of wpd across designs and wpd

data_id	g2	g3	g1
design-1-1	30.389	28.841	12.378
design-1-10	26.289	28.690	10.804
design-1-11	17.878	31.150	18.032
design-1-12	28.701	27.446	16.874
design-1-13	17.265	32.101	14.378
design-1-14	30.252	31.106	15.857
design-1-15	21.591	25.222	16.442
design-1-16	17.632	28.989	11.935
design-1-17	21.566	32.709	18.575
design-1-18	20.221	27.126	7.862
design-1-19	26.006	33.643	19.398
design-1-2	38.853	29.915	12.071
design-1-20	21.215	26.797	16.769
design-1-21	25.087	43.298	20.531
design-1-22	24.997	30.242	12.652
design-1-23	25.741	32.241	6.146
design-1-24	24.177	28.271	12.104
design-1-25	24.258	25.602	14.150
design-1-26	34.781	26.763	13.975

data_id	g2	g3	g1
design-1-27	29.512	29.330	13.529
design-1-28	30.383	33.820	11.457
design-1-29	24.039	28.441	10.661
design-1-3	18.368	28.967	9.748
design-1-30	21.506	35.025	15.828
design-1-31	26.323	26.674	15.131
design-1-32	18.975	24.423	10.760
design-1-33	33.229	30.387	13.678
design-1-34	28.421	38.668	16.456
design-1-35	22.745	25.602	11.499
design-1-36	35.012	36.026	13.069
design-1-37	25.296	39.222	18.899
design-1-38	20.509	30.435	15.427
design-1-39	13.151	34.611	16.893
design-1-4	23.223	23.819	8.508
design-1-40	21.130	29.204	12.516
design-1-41	25.595	25.576	15.370
design-1-42	19.218	36.486	18.468
design-1-43	17.213	27.954	12.081
design-1-44	33.819	29.953	11.350
design-1-45	26.556	32.731	17.437
design-1-46	17.279	29.453	16.033
design-1-47	24.480	27.344	15.031
design-1-48	21.862	31.467	13.050
design-1-49	32.901	26.423	15.607
design-1-5	20.419	35.412	15.761
design-1-50	23.720	29.703	10.380
design-1-51	24.820	31.091	12.798
design-1-52	24.262	20.313	8.324
design-1-53	19.219	34.139	16.169
design-1-54	21.581	39.218	16.404
design-1-55	26.247	30.882	13.657
design-1-6	26.029	22.178	7.901
design-1-7	29.896	37.517	13.128
design-1-8	28.599	25.300	11.199
design-1-9	21.756	26.956	14.007
design-2-1	165.183	79.106	58.545
design-2-10	151.696	90.690	63.405
design-2-11	166.296	67.090	48.295
design-2-12	153.765	75.291	62.131
design-2-13	142.861	75.200	56.866
design-2-14	157.279	66.585	50.703
design-2-15	154.923	69.558	51.542
design-2-16	164.385	74.560	52.682
design-2-17	175.861	95.636	78.249
design-2-18	175.981	83.864	66.128
design-2-19	161.915	79.201	65.845
design-2-2	162.847	68.494	57.749
design-2-20	163.233	83.635	68.659
design-2-21	168.111	78.356	54.387
design-2-22	171.648	76.472	65.137
design-2-23	166.940	69.711	57.674

data_id	g2	g3	g1
design-2-24	164.295	85.505	56.696
design-2-25	166.663	76.626	62.135
design-2-26	170.903	78.371	62.496
design-2-27	156.275	71.860	62.777
design-2-28	152.077	67.076	51.830
design-2-29	168.533	72.932	62.299
design-2-3	149.126	68.856	61.088
design-2-30	175.919	67.721	60.492
design-2-31	159.355	74.601	59.574
design-2-32	180.240	72.065	64.263
design-2-33	175.268	69.939	65.502
design-2-34	167.505	78.230	63.107
design-2-35	162.032	78.354	70.421
design-2-36	161.990	75.180	61.863
design-2-37	161.110	75.813	55.855
design-2-38	142.140	78.054	55.773
design-2-39	151.517	66.344	57.851
design-2-4	161.103	74.417	60.519
design-2-40	166.069	75.143	61.491
design-2-41	179.792	77.950	70.059
design-2-42	153.544	70.623	60.783
design-2-43	170.531	89.838	66.569
design-2-44	164.201	69.088	53.473
design-2-45	158.364	81.251	65.150
design-2-46	157.758	75.416	63.385
design-2-47	165.269	60.388	47.900
design-2-48	158.980	70.161	61.728
design-2-49	167.351	78.072	55.608
design-2-5	145.588	88.309	68.016
design-2-50	160.335	75.679	57.550
design-2-51	149.701	63.360	52.688
design-2-52	156.061	78.229	61.302
design-2-53	150.657	87.485	69.754
design-2-54	174.632	80.074	58.457
design-2-55	168.438	72.234	56.094
design-2-6	150.123	71.208	52.897
design-2-7	167.321	80.019	64.528
design-2-8	155.366	65.288	55.065
design-2-9	173.992	85.189	72.506
design-3-1	46.014	141.748	135.580
design-3-10	31.242	153.202	137.125
design-3-11	45.176	146.558	130.982
design-3-12	41.748	136.116	130.920
design-3-13	37.604	148.830	129.833
design-3-14	47.501	151.091	137.404
design-3-15	40.727	152.985	137.105
design-3-16	36.802	154.463	140.557
design-3-17	50.917	149.658	133.864
design-3-18	37.140	149.239	137.012
design-3-19	35.276	148.794	137.046
design-3-2	44.297	136.392	124.753
design-3-20	55.680	152.321	136.296

data_id	g2	g3	g1
design-3-21	40.035	152.704	145.873
design-3-22	33.070	124.730	116.480
design-3-23	44.328	135.630	130.761
design-3-24	41.189	155.742	140.660
design-3-25	50.324	137.263	123.257
design-3-26	47.929	149.859	137.666
design-3-27	38.533	148.406	130.500
design-3-28	43.306	125.591	120.597
design-3-29	44.229	156.857	135.650
design-3-3	33.535	166.484	135.989
design-3-30	34.934	131.432	123.126
design-3-31	49.839	139.556	129.308
design-3-32	38.116	152.877	135.683
design-3-33	42.115	138.210	124.430
design-3-34	43.711	145.753	127.995
design-3-35	44.577	156.582	130.874
design-3-36	38.151	162.054	141.601
design-3-37	48.348	133.477	117.382
design-3-38	44.747	135.968	132.271
design-3-39	41.544	154.537	121.727
design-3-4	43.344	146.879	128.606
design-3-40	39.423	140.084	128.314
design-3-41	41.502	146.428	140.103
design-3-42	35.876	150.576	131.007
design-3-43	43.747	135.070	124.982
design-3-44	34.513	136.226	121.768
design-3-45	51.323	142.977	131.539
design-3-46	41.973	142.384	127.947
design-3-47	34.388	143.168	124.396
design-3-48	39.403	140.204	127.871
design-3-49	46.003	139.227	124.967
design-3-5	44.764	135.391	128.371
design-3-50	37.199	165.031	139.555
design-3-51	52.965	132.854	119.011
design-3-52	48.430	148.312	146.874
design-3-53	45.804	143.253	123.142
design-3-54	41.609	137.922	127.934
design-3-55	37.138	132.253	129.121
design-3-6	39.860	141.663	135.537
design-3-7	32.032	126.476	123.118
design-3-8	51.145	136.557	117.932
design-3-9	44.589	144.530	128.052
design-4-1	95.415	79.097	62.523
design-4-10	85.608	68.415	55.588
design-4-11	73.060	75.298	56.187
design-4-12	79.961	62.625	53.768
design-4-13	83.911	51.547	43.839
design-4-14	80.828	80.311	67.673
design-4-15	78.456	69.694	54.077
design-4-16	84.850	72.947	60.099
design-4-17	86.092	69.342	50.680
design-4-18	83.126	62.783	50.562

data_id	g2	g3	g1
design-4-19	84.702	73.712	54.540
design-4-2	88.820	72.601	59.802
design-4-20	94.928	64.087	53.276
design-4-21	80.117	84.266	60.294
design-4-22	95.324	67.197	53.171
design-4-23	77.097	74.405	57.157
design-4-24	79.123	80.348	59.645
design-4-25	75.499	74.590	62.272
design-4-26	95.781	68.312	56.219
design-4-27	81.526	64.517	59.042
design-4-28	86.924	63.196	52.046
design-4-29	84.368	63.465	51.456
design-4-3	82.902	65.201	58.027
design-4-30	84.201	74.502	57.575
design-4-31	79.453	70.420	54.704
design-4-32	94.428	61.066	42.910
design-4-33	85.797	72.697	53.008
design-4-34	91.601	78.053	50.067
design-4-35	88.681	67.739	53.994
design-4-36	82.385	75.033	62.692
design-4-37	98.599	82.473	55.048
design-4-38	70.223	71.984	59.692
design-4-39	89.990	75.699	58.287
design-4-4	81.355	76.031	49.899
design-4-40	82.539	68.235	55.338
design-4-41	91.179	85.904	64.631
design-4-42	84.142	64.462	51.246
design-4-43	81.406	66.288	52.396
design-4-44	70.094	75.914	63.860
design-4-45	85.844	72.389	57.666
design-4-46	85.037	56.207	40.164
design-4-47	84.421	67.946	55.091
design-4-48	86.878	73.305	60.560
design-4-49	89.746	66.352	48.851
design-4-5	102.693	61.661	47.631
design-4-50	92.317	75.043	67.221
design-4-51	99.155	73.189	63.067
design-4-52	89.427	63.274	51.219
design-4-53	96.009	60.689	48.778
design-4-54	93.729	69.157	55.216
design-4-55	76.807	68.165	56.705
design-4-6	69.327	78.138	63.655
design-4-7	82.363	63.890	50.194
design-4-8	79.823	66.050	52.104
design-4-9	92.886	88.720	61.376

Clustering of designs

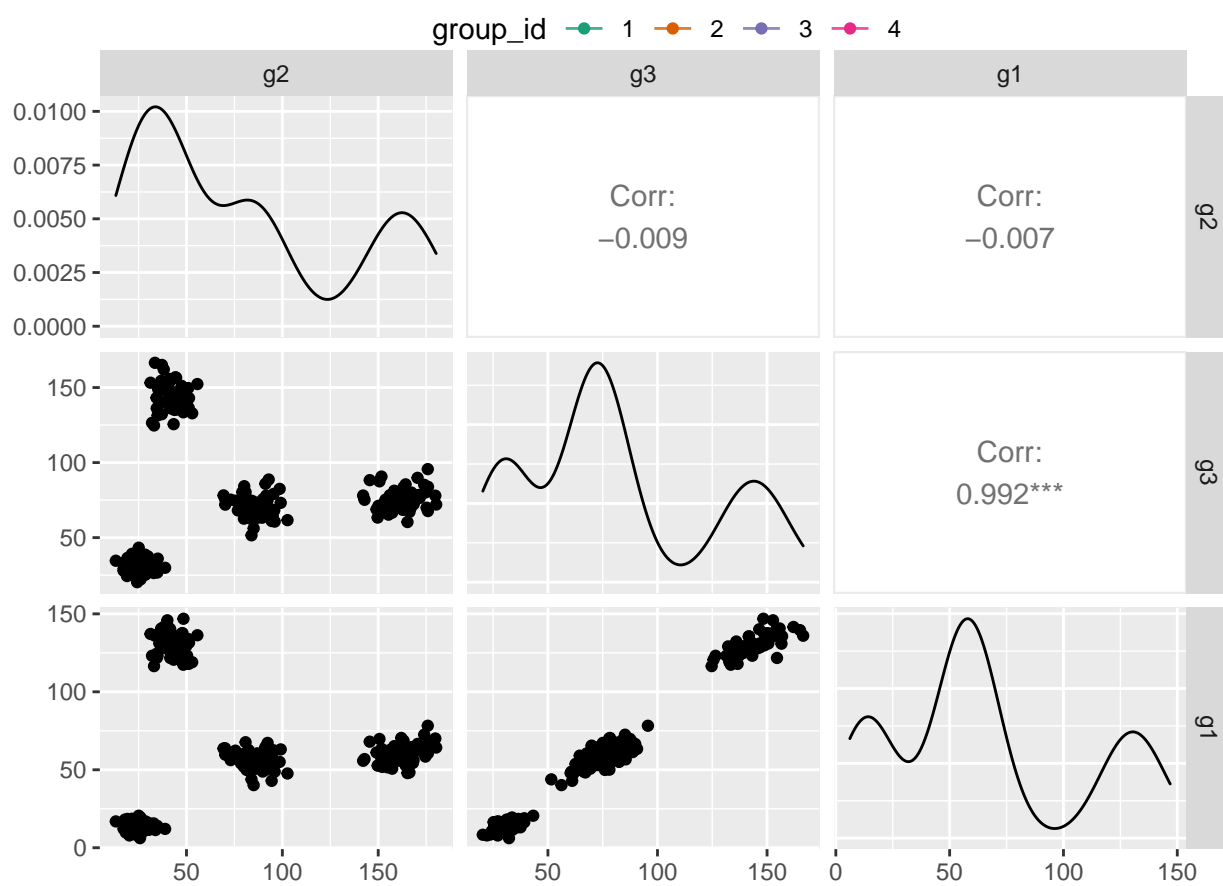
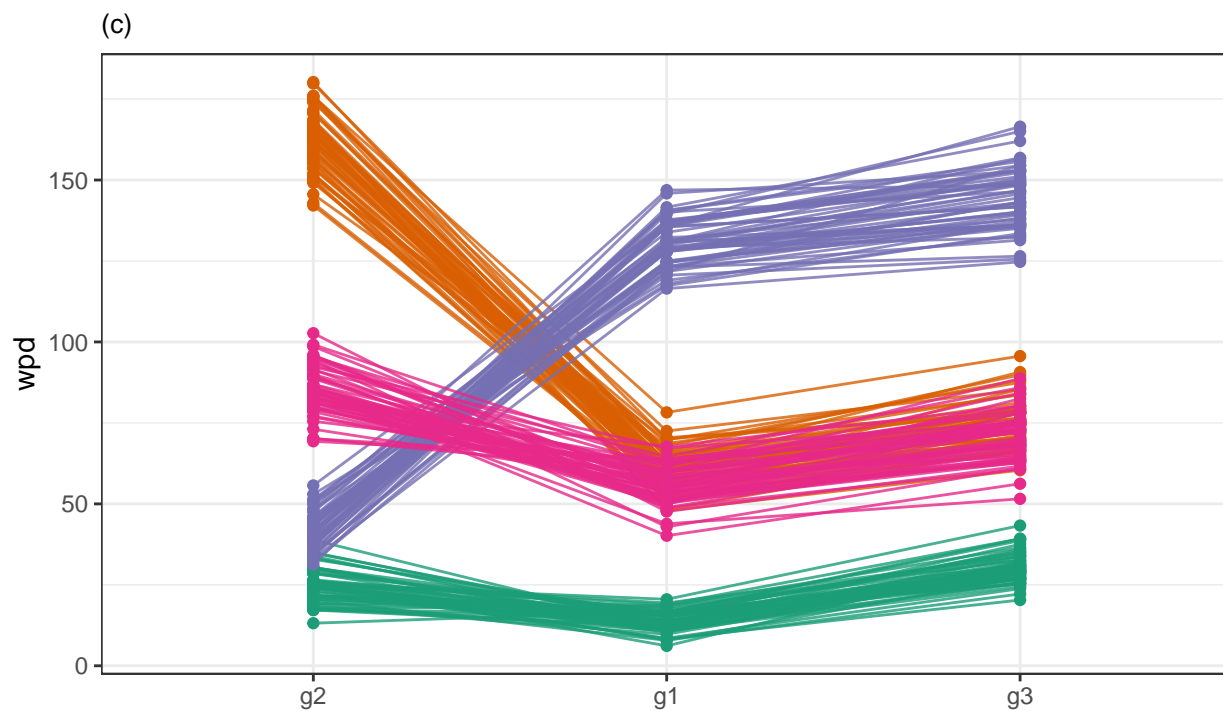
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PCA based clustering

