

Dimension reduction (high-D data visualization)

Input data:

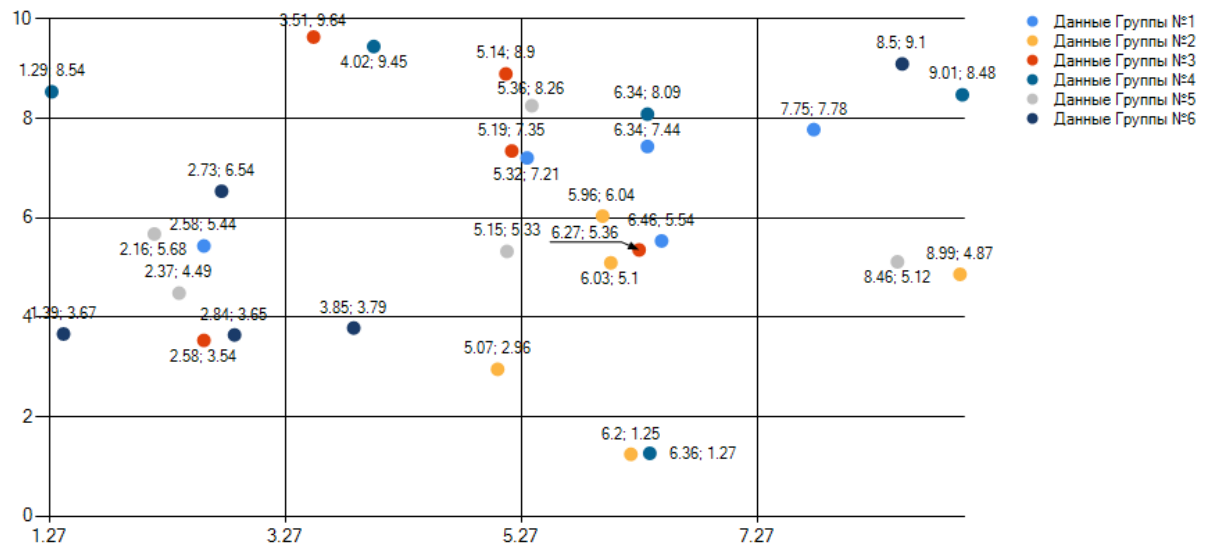
1.51588824, 12.87795, 3.43036, 1.40066, 73.282, 0.68931, 8.04468,
1.5176423, 12.9777, 3.53812, 1.21127, 73.002, 0.65205, 8.52888,
1.52212996, 14.20795, 3.82099, 0.46976, 71.77, 0.11178, 9.5726,
1.52222108, 13.21045, 3.7716, 0.79076, 71.9884, 0.13041, 10.2452,
1.51755118, 13.39, 3.65935, 1.1888, 72.7892, 0.57132, 8.27064
1.51645774, 13.40995, 3.55159, 1.24979, 72.8116, 0.6831, 8.09848,
1.51629828, 12.7117, 3.33158, 1.49054, 73.282, 0.67068, 8.23836
1.52725546, 13.8023, 3.15198, 0.65915, 70.5716, 0.08073, 11.63852
1.51891798, 13.46315, 3.82997, 1.25942, 72.5484, 0.57132, 8.20608
1.51871296, 12.93115, 3.65935, 1.56116, 72.5092, 0.57753, 8.5504,
1.5177562, 13.52965, 3.40791, 1.51943, 72.0388, 0.57753, 8.78712,
1.51609326, 13.33015, 3.52914, 1.33967, 72.6716, 0.5589, 8.3352
1.51663998, 13.1373, 3.44832, 1.76018, 72.4812, 0.60237, 8.37824,
1.52121876, 14.0284, 3.75813, 0.5789, 71.7924, 0.11178, 9.64792
1.51645774, 13.03755, 3.39893, 1.25942, 73.0076, 0.52164, 8.58268
1.5151365, 14.00845, 2.68053, 3.5, 69.8884, 1.68291, 5.87116,
1.51315464, 13.0176, 0, 3.04097, 70.482, 6.21, 6.95792,
1.52119598, 12.97105, 0.32777, 1.5098, 73.3884, 0.13041, 11.27268
1.5215149, 11.02925, 1.71069, 1.56116, 73.4388, 0.57753, 11.617
1.5132002, 12.99765, 0, 3.0185, 70.7004, 6.21, 6.92564,
1.5196925, 14.5604, 0, 0.55964, 73.478, 0, 11.21888
1.51115, 17.38, 0, 0.34136, 75.41, 0, 6.64588
1.51937358, 13.789, 2.41113, 1.1888, 72.7612, 0, 9.76628,
1.51828014, 14.46065, 2.24051, 1.61894, 72.3804, 0, 9.26056
1.51853072, 14.08825, 2.19112, 1.66067, 72.6716, 0, 9.32512
1.51652608, 11.94695, 0, 1.1888, 75.1804, 2.70135, 8.927,
1.52064926, 14.3609, 0, 2.02019, 73.422, 0, 8.4428
1.51130946, 13.68925, 3.20137, 1.81154, 72.8116, 1.75743, 5.43,
1.51556932, 13.8688, 0, 2.54021, 73.2316, 0.14283, 9.4112
1.5163894, 14.36755, 0, 2.73923, 72.8508, 0, 9.45424,

Distance matrix (30*30):

0.00	0.61	2.78	2.73	0.82	0.74	0.29	4.70	1.05	0.97	1.60	0.83	0.98	2.69	0.66	4.85	7.35	4.52	4.38	7.27	5.09	6.33	2.37	2.60	2.36	4.59	3.87	3.01	4.03	4.29
0.61	0.00	2.25	2.13	0.55	0.64	0.60	4.13	0.80	0.62	1.19	0.54	0.79	2.14	0.21	4.99	7.45	4.28	4.12	7.39	4.83	6.51	1.99	2.32	2.10	4.76	3.96	3.44	4.02	4.25
2.78	2.25	0.00	1.27	2.04	2.21	2.81	2.52	1.97	2.16	1.62	2.04	2.26	0.23	2.20	5.50	8.27	4.51	4.79	8.24	4.51	6.82	1.93	2.09	2.23	6.24	4.59	4.84	4.60	4.58
2.73	2.13	1.27	0.00	2.22	2.43	2.63	2.17	2.23	2.01	1.76	2.16	2.24	1.05	2.08	5.93	8.33	3.93	3.71	8.30	4.39	7.52	1.79	2.39	2.31	5.88	4.73	5.30	4.47	4.55
0.82	0.55	2.04	2.22	0.00	0.24	0.96	4.15	0.32	0.71	1.01	0.25	0.74	1.97	0.59	4.70	7.47	4.58	4.60	7.41	4.96	6.31	2.07	2.19	2.08	5.11	3.97	3.19	4.14	4.30
0.74	0.64	2.21	2.43	0.24	0.00	0.91	4.31	0.42	0.80	1.09	0.33	0.73	2.15	0.68	4.55	7.30	4.62	4.68	7.23	5.01	6.21	2.17	2.23	2.11	5.01	3.88	2.96	4.08	4.25
0.29	0.60	2.81	2.63	0.96	0.91	0.00	4.60	1.19	0.93	1.59	0.92	0.97	2.70	0.62	4.93	7.33	4.31	4.11	7.25	4.98	6.46	2.27	2.56	2.29	4.47	3.82	3.22	3.90	4.19
4.70	4.13	2.52	2.17	4.15	4.31	4.60	0.00	4.11	3.92	3.38	4.05	4.04	2.42	4.06	6.68	8.70	4.18	4.36	8.71	4.38	8.44	3.02	3.33	3.43	7.01	5.52	6.91	5.05	4.96
1.05	0.80	1.97	2.23	0.32	0.42	1.19	4.11	0.00	0.72	0.92	0.38	0.73	1.91	0.85	4.52	7.46	4.78	4.79	7.40	5.16	6.47	2.22	2.26	2.20	5.38	4.15	3.15	4.31	4.43
0.97	0.62	2.16	2.01	0.71	0.80	0.93	3.92	0.72	0.00	0.84	0.55	0.40	2.03	0.65	4.60	7.35	4.41	4.21	7.29	5.04	6.86	2.08	2.28	2.11	5.13	4.10	3.47	4.08	4.26
1.60	1.19	1.62	1.76	1.01	1.09	1.59	3.38	0.92	0.84	0.00	0.83	0.76	1.51	1.14	4.36	7.19	4.24	4.37	7.15	4.68	6.64	1.73	1.71	1.68	5.35	3.86	3.66	3.84	3.90
0.83	0.54	2.04	2.16	0.25	0.33	0.92	4.05	0.38	0.55	0.83	0.00	0.51	1.95	0.53	4.57	7.35	4.44	4.47	7.29	4.88	6.37	1.96	2.07	1.94	5.06	3.86	3.22	3.98	4.13
0.98	0.79	2.26	2.24	0.74	0.73	0.97	4.04	0.73	0.40	0.76	0.51	0.00	2.15	0.77	4.31	7.14	4.39	4.35	7.09	4.98	6.62	2.05	2.09	1.95	5.06	3.84	3.24	3.86	4.00
2.69	2.14	0.23	2.10	1.97	2.15	2.70	2.42	1.91	2.03	1.51	1.95	2.15	0.00	2.09	5.48	8.21	4.35	4.58	8.18	4.44	6.89	1.79	2.02	2.13	6.13	4.52	4.85	4.49	4.48
0.66	0.21	2.20	2.08	0.59	0.68	0.62	4.06	0.85	0.65	1.14	0.53	0.77	2.09	0.00	4.99	7.49	4.13	4.05	7.42	4.67	6.41	1.81	2.15	1.91	4.73	3.79	3.50	3.84	4.07
4.85	4.99	5.50	5.93	4.70	4.55	4.93	6.68	4.52	4.60	4.36	4.57	4.14	5.48	4.99	0.00	5.51	7.38	7.77	5.54	7.78	7.90	5.63	4.95	5.11	7.43	5.61	3.46	5.85	5.69
7.35	7.45	8.27	8.33	7.47	7.30	7.33	8.70	7.46	7.35	7.19	7.35	7.14	8.21	7.49	5.51	0.00	8.15	8.44	0.22	8.62	9.45	7.84	7.52	7.54	6.55	7.23	6.31	7.17	7.23
4.52	4.28	4.51	3.93	4.58	4.62	4.31	4.18	4.78	4.41	4.24	4.44	4.39	4.35	4.13	7.38	8.15	0.00	2.45	8.09	1.89	6.81	2.79	3.31	3.01	4.07	3.21	6.78	2.34	2.68
4.38	4.12	4.79	3.71	4.60	4.68	4.11	4.36	4.79	4.21	4.37	4.47	4.35	4.58	4.05	7.77	8.44	2.45	0.00	8.38	4.11	8.58	3.53	4.37	3.97	4.32	4.96	7.03	4.13	4.56
7.27	7.39	8.24	8.30	7.41	7.23	7.25	8.71	7.40	7.29	7.15	7.29	7.09	8.18	7.42	5.54	0.22	8.09	8.38	0.00	8.56	9.34	7.79	7.48	7.49	6.39	7.15	6.22	7.10	7.18
5.09	4.83	4.51	4.39	4.96	5.01	4.98	4.38	5.16	5.04	4.68	4.88	4.98	4.44	4.67	7.78	8.62	1.89	4.11	8.56	0.00	5.71	3.07	3.35	3.24	4.76	3.14	7.04	2.78	2.88
6.33	6.51	6.82	7.52	6.31	6.21	6.46	8.44	6.47	6.86	6.64	6.37	6.62	6.89	6.41	7.90	9.45	6.81	8.58	9.34	5.71	0.00	0.01	5.58	5.66	6.54	4.37	6.11	5.44	5.41
2.37	1.99	1.93	1.79	2.07	2.17	2.27	3.02	2.22	2.08	1.73	1.96	2.05	1.79	1.81	5.63	7.84	2.79	3.53	7.79	3.07	6.01	0.00	1.03	0.75	4.80	3.00	4.79	2.83	2.94
2.60	2.32	2.09	2.39	2.19	2.23	2.56	3.33	2.26	2.28	1.71	2.07	2.09	2.02	2.15	4.95	7.52	3.31	4.37	7.48	3.35	5.58	1.03	0.00	0.48	5.17	2.64	4.42	2.64	2.56
2.36	2.10	2.23	2.31	2.08	2.11	2.29	3.43	2.20	2.11	1.68	1.94	1.95	2.13	1.91	5.11	7.54	3.01	3.97	7.49	3.24	5.66	0.75	0.48	0.00	4.83	2.52	4.41	2.44	2.47
4.59	4.76	6.24	5.88	5.11	5.01	4.47	7.01	5.38	5.13	5.35	5.06	5.06	6.13	4.73	7.43	6.55	4.07	4.32	6.39	4.76	6.54	4.80	5.17	4.83	0.00	4.14	5.69	4.01	4.61
3.87	3.96	4.59	4.73	3.97	3.88	3.82	5.52	4.15	4.10	3.86	3.86	3.84	4.52	3.79	5.61	7.23	3.21	4.96	7.15	3.14	4.37	3.00	2.64	2.52	4.14	0.00	4.83	1.23	1.37
3.01	3.44	4.84	5.30	3.19	2.96	3.22	6.91	3.15	3.47	3.66	3.22	3.24	4.85	3.50	3.46	6.31	6.78	7.03	6.22	7.04	6.11	4.79	4.42	4.41	5.69	4.83	0.00	5.43	5.55
4.03	4.02	4.60	4.47	4.14	4.08	3.90	5.05	4.31	4.08	3.84	3.98	3.86	4.49	3.84	5.85	7.17	2.34	4.13	7.10	2.78	5.44	2.83	2.64	2.44	4.01	1.23	5.43	0.00	0.67
4.29	4.25	4.58	4.55	4.40	4.25	4.19	4.96	4.43	4.26	3.90	4.13	4.00	4.48	4.07	5.69	7.23	2.68	4.56	7.18	2.88	5.41	2.94	2.56	2.47	4.61	1.37	5.55	0.67	0.00

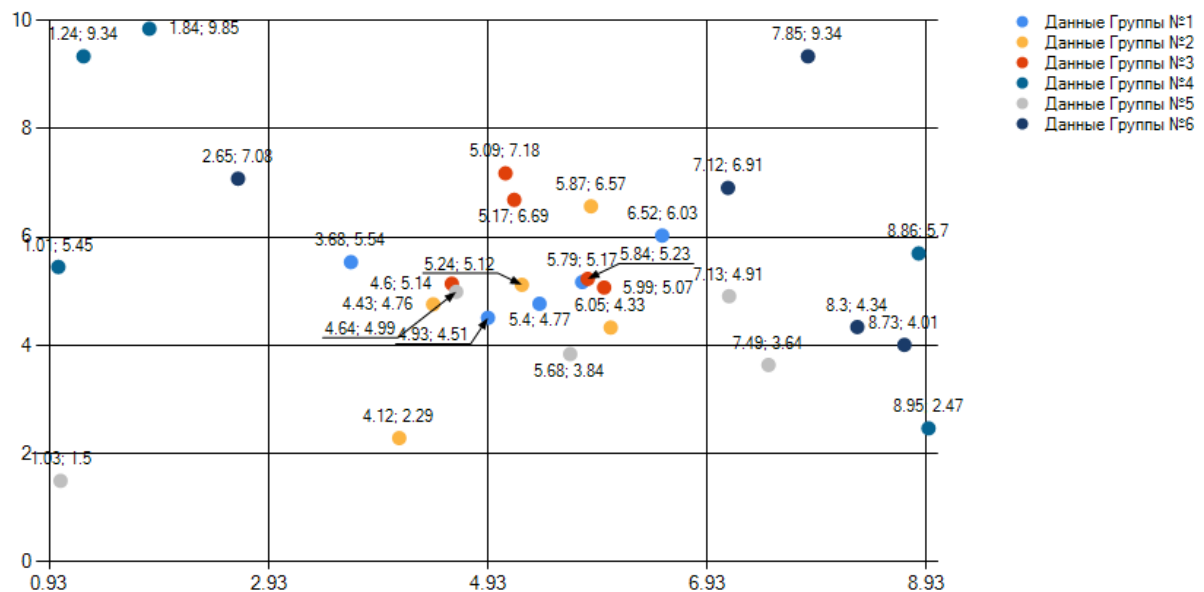
1st generation:

Best chromosome representing 30 points: (6.46, 5.54); (2.58, 5.44); (6.34, 7.44); (7.75, 7.78); (5.32, 7.21); (6.03, 5.1); (5.96, 6.04); (5.07, 2.96); (8.99, 4.87); (6.2, 1.25); (5.19, 7.35); (5.14, 8.9); (2.58, 3.54); (3.51, 9.64); (6.27, 5.36); (6.36, 1.27); (4.02, 9.45); (6.34, 8.09); (9.01, 8.48); (1.29, 8.54); (5.36, 8.26); (2.16, 5.68); (2.37, 4.49); (8.46, 5.12); (5.15, 5.33); (2.84, 3.65); (2.73, 6.54); (8.5, 9.1); (1.39, 3.67); (3.85, 3.79) Fitness function = 2906.19365660629



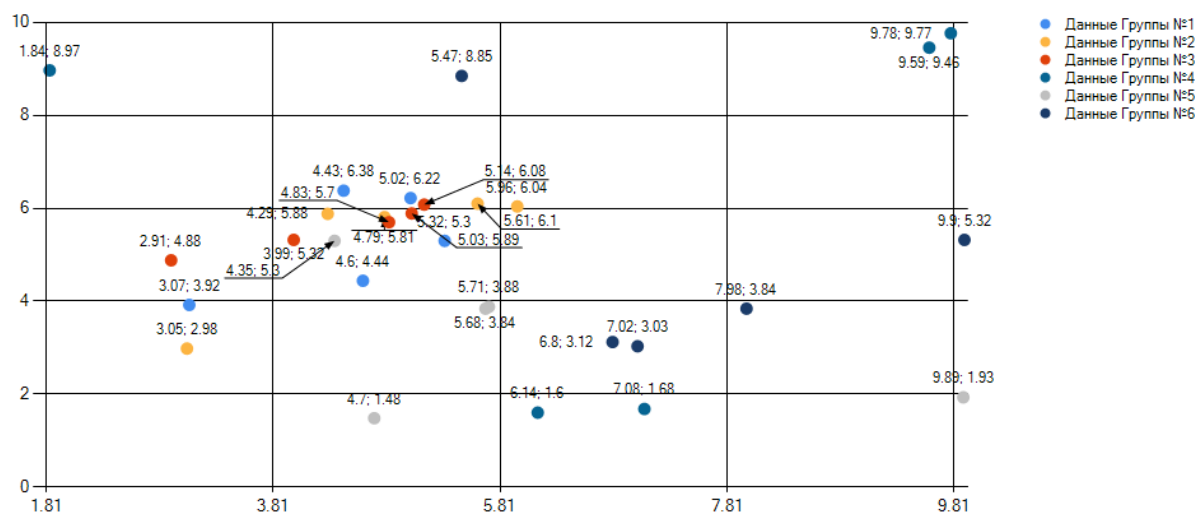
30th generation:

Best chromosome representing 30 points: (6.52, 6.03); (5.4, 4.77); (5.79, 5.17); (4.93, 4.51); (3.68, 5.54); (4.43, 4.76); (5.24, 5.12); (4.12, 2.29); (6.05, 4.33); (5.87, 6.57); (5.09, 7.18); (5.17, 6.69); (5.99, 5.07); (4.6, 5.14); (5.84, 5.23); (1.01, 5.45); (1.24, 9.34); (8.86, 5.7); (8.95, 2.47); (1.84, 9.85); (7.49, 3.64); (1.03, 1.5); (7.13, 4.91); (4.64, 4.99); (5.68, 3.84); (7.85, 9.34); (7.12, 6.91); (2.65, 7.08); (8.73, 4.01); (8.3, 4.34) Fitness function = 775.393971537402



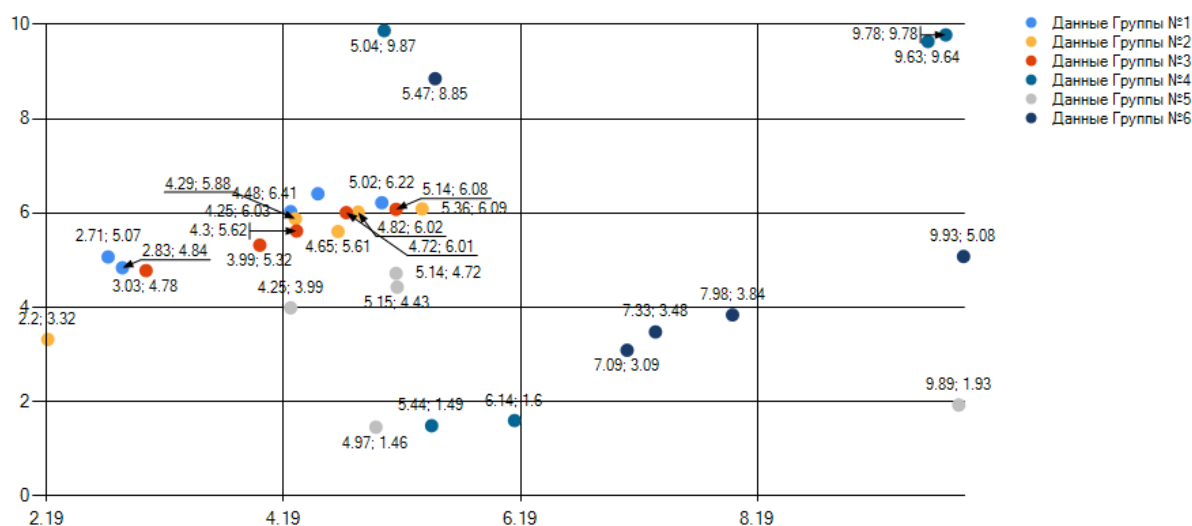
50th generation:

Best chromosome representing 30 points: (5.02, 6.22); (5.32, 5.3); (4.6, 4.44); (3.07, 3.92); (4.43, 6.38); (4.79, 5.81); (5.96, 6.04); (3.05, 2.98); (5.61, 6.1); (4.29, 5.88); (3.99, 5.32); (4.83, 5.7); (5.14, 6.08); (2.91, 4.88); (5.03, 5.89); (1.84, 8.97); (9.59, 9.46); (7.08, 1.68); (6.14, 1.6); (9.78, 9.77); (4.7, 1.48); (9.89, 1.93); (5.71, 3.88); (4.35, 5.3); (5.68, 3.84); (9.9, 5.32); (7.98, 3.84); (5.47, 8.85); (7.02, 3.03); (6.8, 3.12) Fitness function = 380.286726046334



200th generation:

Best chromosome representing 30 points: (5.02, 6.22); (4.48, 6.41); (2.71, 5.07); (2.83, 4.84); (4.25, 6.03); (4.82, 6.02); (5.36, 6.09); (2.2, 3.32); (4.65, 5.61); (4.29, 5.88); (3.99, 5.32); (4.72, 6.01); (5.14, 6.08); (3.03, 4.78); (4.3, 5.62); (5.04, 9.87); (9.63, 9.64); (5.44, 1.49); (6.14, 1.6); (9.78, 9.78); (4.97, 1.46); (9.89, 1.93); (4.25, 3.99); (5.14, 4.72); (5.15, 4.43); (9.93, 5.08); (7.98, 3.84); (5.47, 8.85); (7.33, 3.48); (7.09, 3.09) Fitness function = 245.225695131593



Fitness function:

