Genetic regulatory networks inference : modeling, parameters estimation & model validation

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Appendix B: Details results of the different ES setting

The following tables [8.2 - 8.5] gives details on the different quality results of all the different settings. Different $(\mu, \lambda) - ES$ settings are used. In all cases, the number of selected individuals is $\mu = \lambda/5$ but with population size $\lambda = [200, 350, 500]$ and in the island-ES with 4 sub-populations, each sub-population is $\lambda = 500/4 = 125$. In all setting, 20 simulations were run using the same initial seed. In total, 240 circuits were obtained and 91 were selected for analysis, based on the final root mean score.

seed	λ = 200 N = 60000		
	-2.5	-3.5	F
2275993204	11.87 10.79	16.38 16.05	24.58 17.39
2153584241	12.22 11.61	12.82 12.10	12.93 9.94
1700014526	14.44 11.43	18.26 16.96	15.04 11.40
2870387055	16.23 14.10	19.38 19.38	16.17 15.81
3823097208	11.64 10.09	14.86 14.60	13.77 10.16
1475960556	12.91 12.59	21.55 20.93	12.50 10.35
1662297016	13.47 12.67	12.45 11.24	20.02 19.82
838205381	16.95 16.58	13.07 11.57	15.51 14.93
732852183	12.50 10.98	12.70 11.89	15.51 11.74
4294967295	13.55 13.09	11.83 11.19	14.89 13.88
549391978	13.45 13.43	12.87 11.86	13.81 11.31
3674121315	12.95 11.83	13.07 11.48	19.22 10.22
2306629477	16.56 16.13	21.65 21.06	23.25 16.85
3664690373	11.88 9.72	12.89 11.48	13.32 10.01
4222002465	19.89 19.36	13.67 11.86	14.71 14.01
410590545	11.56 9.47	11.46 10.76	17.39 15.65
335063216	17.67 10.87	16.64 15.89	13.77 11.92
3185899892	16.91 16.62	12.73 11.79	12.18 10.74
2015572368	17.35 16.39	13.50 12.43	11.80 10.22
543010084	18.00 17.22	12.83 11.24	13.39 10.11

Table 8.2: Results for the $(200, 40)$ – ES followed by DS. Twenty random seeds were generated and each of this configuration uses one of the initial seed. This results in 180 different simulations. In all simulation, γ = 0.85 and α = 0.2. The table header -2.5, -3.5 gives the promoter threshold value in the 62-dimensional case. F indicates a full search with 66 parameters to estimate. In each cell the first value stands for the RMS after ES and the second gives the RMS after DS.

seed	λ = 350 N = 30000		
	-2.5	-3.5	F
2275993204	15.83 14.96	11.36 10.21	17.23 15.87
2153584241	11.77 10.69	22.39 21.33	15.88 13.44
1700014526	16.69 10.04	16.99 15.79	13.44 10.39
2870387055	12.37 10.00	11.71 10.18	19.53 17.64
3823097208	13.41 12.29	12.42 12.07	15.82 15.26
1475960556	11.34 9.85	13.71 12.69	15.24 13.27
1662297016	17.32 12.93	17.58 13.41	14.40 10.40
838205381	15.79 12.82	13.72 12.18	17.10 11.05
732852183	11.50 9.85	17.93 16.61	23.43 12.30
4294967295	16.28 15.59	12.48 11.31	13.19 10.89
549391978	12.47 10.95	11.29 10.18	15.21 13.67
3674121315	12.23 11.15	11.50 10.11	27.19 26.33
2306629477	13.44 11.45	12.11 10.81	15.69 10.39
3664690373	12.21 11.40	13.82 12.03	17.58 14.03
4222002465	15.49 12.98	11.62 9.59	14.38 11.22
410590545	11.82 10.77	16.20 14.11	14.71 12.05
335063216	12.60 10.08	13.92 12.32	14.17 13.75
3185899892	12.23 10.64	12.78 12.39	16.01 13.54
2015572368	11.75 10.24	16.82 16.24	22.50 20.04
543010084	15.24 13.16	11.69 9.56	13.29 11.50

Table 8.3: Results for the $(350, 70)$ – ES followed by DS. Twenty random seeds were generated and each of this configuration uses one of the initial seed. This results in 180 different simulations. In all simulation, γ = 0.85 and α = 0.2. The table header -2.5, -3.5 gives the promoter threshold value in the 62-dimensional case. F indicates a full search with 66 parameters to estimate. In each cell the first value stands for the RMS after ES and the second gives the RMS after DS.

seed	λ = 500 N = 15000		
	-2.5	-3.5	F
2275993204	13.22 12.37	15.35 13.93	14.32 10.3
2153584241	12.69 11.08	13.22 11.90	13.05 10.33
1700014526	12.78 10.90	11.99 9.79	18.92 11.30
2870387055	12.42 9.73	11.45 9.56	16.52 14.6
3823097208	12.21 10.06	13.04 11.85	23.76 23.48
1475960556	12.08 10.66	16.98 16.37	16.75 14.54
1662297016	14.98 11.56	16.38 13.73	17.16 15.29
838205381	14.04 12.00	14.88 14.06	14.49 12.89
732852183	12.27 10.51	11.93 10.89	18.47 17.13
4294967295	22.80 12.98	11.79 10.47	16.75 16.16
549391978	16.63 16.06	14.72 11.61	13.36 10.26
3674121315	11.45 10.17	14.97 12.76	15.49 13.36
2306629477	13.27 10.61	13.37 12.90	20.85 20.27
3664690373	12.23 11.51	14.25 13.99	14.63 11.52
4222002465	13.76 10.43	16.51 16.14	16.14 11.66
410590545	13.01 11.11	17.35 13.76	19.36 14.80
335063216	13.11 11.14	17.43 17.02	15.95 11.57
3185899892	22.08 17.81	14.44 12.44	15.45 12.11
2015572368	15.16 13.99	13.03 12.22	18.97 15.66
543010084	13.19 12.78	16.65 15.87	15.81 14.15

Table 8.4: Results for the $(500, 100)$ – ES followed by DS. Twenty random seeds were generated and each of this configuration uses one of the initial seed. This results in 60 different simulations. In all simulation, γ = 0.85 and α = 0.2. The table header -2.5, -3.5 gives the promoter threshold value in the 62-dimensional case. F indicates a full search with 66 parameters to estimate. In each cell the first value stands for the RMS after ES and the second gives the RMS after DS.

seed	P = 4, λ = 4 $*$ 125, N = 15000		
	-2.5	-3.5	F
2275993204	18.67 10.17	13.49 12.18	15.21 12.15
2153584241	15.90 13.53	13.32 10.56	14.94 13.14
1700014526	15.58 12.25	14.26 12.69	12.61 10.70
2870387055	12.31 10.66	12.86 10.08	16.30 11.47
3823097208	17.63 17.16	11.76 10.22	14.25 11.02
1475960556	12.47 9.68	12.95 10.50	16.83 16.09
1662297016	11.60 10.09	11.77 10.10	14.23 12.53
838205381	13.59 10.90	14.01 11.80	16.18 15.67
732852183	13.02 11.67	14.66 11.52	17.57 12.97
4294967295	13.65 12.64	13.16 12.02	15.80 11.24
549391978	16.74 16.10	12.88 11.16	15.38 12.08
3674121315	12.99 10.32	11.70 10.96	18.28 10.33
2306629477	12.89 11.09	13.69 12.03	13.59 10.95
3664690373	13.51 11.49	13.42 11.29	17.72 16.80
4222002465	16.88 16.35	16.47 10.35	16.98 11.82
410590545	12.14 10.75	13.34 11.73	16.57 15.84
335063216	13.36 11.01	11.41 9.95	16.42 15.41
3185899892	12.35 9.57	12.63 10.40	18.28 12.85
2015572368	13.45 10.96	13.64 12.24	13.49 12.47
543010084	12.50 10.57	12.45 11.31	14.72 10.98

Table 8.5: Results for the ES-island based with P = 4 sub-populations followed by DS. The same twenty random seed defined in the serial ES were used. This leads to 60 different simulations. In all simulations, μ = $\lambda/5$ γ = 0.85 and α = 0.2. The migration interval is after every 500 generations and only the best individual of each sub-population is migrated to another random sub-population. The header -2.5, -3.5 indicates the promoter threshold value in the 62-dimensional case. F stands for full search with 66 parameters to estimates. In each cell the first value represents the RMS after island ES and the second gives the RMS after DS.