

Supplementary Material

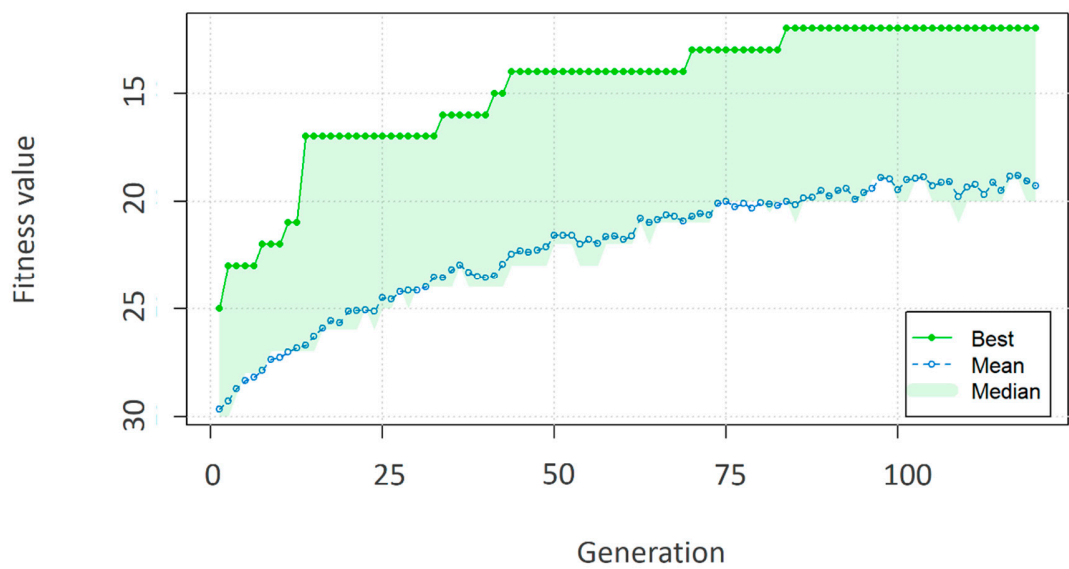


Figure S1. Fitness Value Vs generation plot for genetic algorithm.

Table S1. Setting parameters of genetic algorithm used in the optimization of process

Setting parameters	Values
Population size	50
Crossover function	Constraint dependent
Mutation function	Constraint dependent
Plot function	Best fitness
Migration	Direction (forward), fraction (0.2), Interval (20)
Scaling function	Rank
Selection function	Stochastic uniform
Elite count	0.05* population size
Nonlinear constraint algorithm	Augmented Lagrangian

Table S2. Eigenanalysis of the Correlation Matrix from Principal Component Analysis

Principal Component Analysis:											
Eigenanalysis of the Correlation Matrix											
Eigenvalue	10.201	4.582	1.323	0.327	0.266	0.183	0.058	0.025	0.018	0.009	0.004
Proportion	0.600	0.270	0.078	0.019	0.016	0.011	0.003	0.001	0.001	0.001	0.000
Cumulative	0.600	0.870	0.947	0.967	0.982	0.993	0.996	0.998	0.999	0.999	1.000
Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	
R1	-0.167	-0.342	0.308	-0.045	-0.290	-0.381	0.198	-0.113	-0.228	-0.536	
R2	0.199	-0.315	-0.228	-0.251	-0.370	-0.183	0.363	-0.064	-0.115	0.216	
R3	-0.297	-0.015	-0.154	0.045	-0.469	-0.035	-0.258	-0.288	0.386	-0.083	
R4	0.192	-0.285	-0.267	0.473	0.168	-0.627	-0.196	0.228	0.198	0.085	
R5	0.290	-0.159	-0.109	0.018	0.014	0.004	0.169	-0.422	-0.045	0.465	
R6	-0.153	-0.188	0.654	0.241	-0.135	0.074	0.294	0.189	0.276	0.426	
R7	-0.041	0.445	-0.022	0.338	-0.335	-0.104	0.004	-0.382	0.193	0.063	
R8	0.061	-0.424	-0.058	0.463	-0.181	0.522	-0.248	0.124	-0.091	-0.134	
R9	-0.041	0.446	-0.024	0.354	-0.260	-0.146	0.150	0.315	-0.551	0.109	
R10	0.298	-0.087	-0.089	0.290	-0.065	0.258	0.186	-0.269	-0.226	-0.183	
R11	0.285	0.092	-0.232	-0.186	-0.376	0.141	0.189	0.480	0.336	-0.133	
R12	0.294	0.132	0.130	0.092	0.128	-0.088	0.190	-0.061	0.195	-0.305	
R13	0.300	0.108	0.132	0.047	0.045	0.023	0.101	-0.051	0.160	-0.136	
R14	0.299	0.083	0.174	-0.092	-0.216	-0.019	-0.189	0.194	0.104	0.012	
R15	0.299	0.111	0.130	0.084	0.118	0.039	0.135	-0.130	0.103	-0.174	
R16	0.281	0.028	0.367	-0.028	0.007	-0.132	-0.333	-0.095	-0.036	-0.021	
R17	0.297	-0.006	0.191	-0.227	-0.275	-0.053	-0.494	-0.032	-0.262	0.166	