

Table 1: Performance Results for StyblinskiTang_5D Problem

Optimizer	Mean Final Value	Std Dev	Best Value	Worst Value	Mean Func Evals	Success Rate (%)	Mean Time (s)
QQN-GoldenSection	-1.90e2	9.30e0	-1.96e2	-1.68e2	330.5	70.0	0.005
L-BFGS-Conservative	-1.89e2	1.03e1	-1.95e2	-1.59e2	567.8	65.0	0.012
Adam-WeightDecay	-1.90e2	6.36e0	-1.95e2	-1.82e2	1865.5	65.0	0.041
Trust Region-Adaptive	-1.88e2	1.11e1	-1.95e2	-1.67e2	2249.5	65.0	0.014
GD-WeightDecay	-1.88e2	1.04e1	-1.96e2	-1.53e2	53.1	60.0	0.002
QQN-Bisection-2	-1.89e2	9.39e0	-1.96e2	-1.68e2	177.8	60.0	0.004
QQN-Bisection-1	-1.89e2	8.22e0	-1.96e2	-1.68e2	413.4	60.0	0.008
Adam-Fast	-1.86e2	1.14e1	-1.96e2	-1.62e2	65.0	55.0	0.001
Trust Region-Standard	-1.88e2	8.33e0	-1.96e2	-1.67e2	568.8	55.0	0.004
GD	-1.86e2	1.17e1	-1.95e2	-1.53e2	95.7	50.0	0.003
L-BFGS-MoreThuente	-1.89e2	6.99e0	-1.96e2	-1.82e2	209.2	50.0	0.004
L-BFGS-Limited	-1.89e2	6.97e0	-1.96e2	-1.82e2	839.9	50.0	0.011
QQN-CubicQuadraticInterpolation	-1.82e2	1.48e1	-1.96e2	-1.53e2	129.7	45.0	0.004
Trust Region-Aggressive	-1.90e2	1.11e1	-1.96e2	-1.53e2	144.5	45.0	0.001
QQN-StrongWolfe	-1.85e2	1.08e1	-1.96e2	-1.53e2	261.1	40.0	0.007
GD-Nesterov	-1.82e2	1.85e1	-1.96e2	-1.16e2	44.9	30.0	0.001
L-BFGS	-1.86e2	7.77e0	-1.96e2	-1.74e2	153.3	30.0	0.002
GD-Momentum	-1.64e2	3.72e1	-1.95e2	-7.54e1	57.8	15.0	0.002
GD-AdaptiveMomentum	-1.35e2	3.62e1	-1.95e2	-7.45e1	34.4	10.0	0.001
L-BFGS-Aggressive	-1.04e2	4.24e1	-1.83e2	-1.25e1	3847.9	0.0	0.028
Adam	-7.38e1	4.48e0	-8.30e1	-6.64e1	2502.0	0.0	0.055
Adam-AMSGrad	-7.50e1	4.47e0	-8.10e1	-6.56e1	2502.0	0.0	0.060
Trust Region-Precise	-6.28e1	7.02e-1	-6.40e1	-6.17e1	3002.0	0.0	0.020
Adam-Robust	-5.32e1	3.79e0	-6.12e1	-4.49e1	2502.0	0.0	0.058
Trust Region-Conservative	-1.05e1	7.12e-1	-1.22e1	-9.39e0	3002.0	0.0	0.019