

Table 1: Performance Results for Rastrigin_10D Problem

Optimizer	Mean Final Value	Std Dev	Best Value	Worst Value	Mean Func Evals	Success Rate (%)	Mean Time (s)
L-BFGS-Aggressive	1.63e2	1.31e1	1.40e2	1.87e2	3852.0	0.0	0.031
Trust Region-Conservative	1.57e2	1.05e1	1.28e2	1.71e2	3002.0	0.0	0.021
Trust Region-Precise	9.70e1	1.03e1	6.33e1	1.13e2	3002.0	0.0	0.021
L-BFGS-Conservative	4.68e1	8.45e0	4.06e1	7.77e1	2037.2	20.0	0.020
Adam-AMSGrad	4.48e1	4.03e0	4.17e1	5.47e1	718.0	55.0	0.018
Adam	4.65e1	4.42e0	4.16e1	5.97e1	731.5	30.0	0.016
Trust Region-Adaptive	4.39e1	2.92e0	4.16e1	4.98e1	1397.8	40.0	0.010
GD-Nesterov	4.50e1	4.13e0	4.02e1	5.49e1	249.0	25.0	0.008
Adam-WeightDecay	4.52e1	3.97e0	4.15e1	5.48e1	253.8	35.0	0.006
L-BFGS-MoreThuente	4.11e1	7.33e0	2.56e1	6.07e1	291.6	65.0	0.006
QQN-Bisection-1	5.11e1	1.61e1	3.88e1	8.86e1	216.4	45.0	0.005
QQN-GoldenSection	4.53e1	1.18e1	2.11e1	7.26e1	275.4	50.0	0.005
QQN-CubicQuadraticInterpolation	4.52e1	7.84e0	3.21e1	5.87e1	102.5	60.0	0.003
QQN-StrongWolfe	5.16e1	1.59e1	3.24e1	9.55e1	118.5	40.0	0.003
Adam-Robust	4.44e1	4.07e0	4.13e1	5.48e1	127.9	30.0	0.003
Trust Region-Standard	4.59e1	6.59e0	4.10e1	7.11e1	346.6	25.0	0.002
GD-WeightDecay	4.39e1	3.41e0	3.60e1	4.98e1	61.3	45.0	0.002
Adam-Fast	4.51e1	4.26e0	3.98e1	5.44e1	71.9	30.0	0.002
L-BFGS-Limited	4.36e1	4.97e0	3.39e1	5.47e1	122.0	50.0	0.002
L-BFGS	1.85e2	3.27e1	1.42e2	2.59e2	102.0	0.0	0.001
QQN-Bisection-2	5.38e1	1.81e1	2.52e1	8.86e1	50.6	15.0	0.001
GD-Momentum	6.15e1	1.25e1	4.06e1	8.46e1	30.6	10.0	0.001
GD-AdaptiveMomentum	4.85e1	8.54e0	3.80e1	6.99e1	23.2	40.0	0.001
Trust Region-Aggressive	4.36e1	3.69e0	3.87e1	5.26e1	93.5	45.0	0.001
GD	4.47e1	4.34e0	3.89e1	5.49e1	19.4	35.0	0.001