Table 1: QQN vs Non-QQN Optimizer Comparison Matrix

Non-QQN Optimizer	QQN-Bisection-1	QQN-Bisection-2	QQN-CubicQuadraticInterpolation	QQN-GoldenSection	QQN-StrongWolfe
Adam	47W-3L-9T	40W-7L-10T	41W-4L-14T	41W-3L-15T	43W-5L-11T
Adam-AMSGrad	49W-2L-8T	41W-6L-10T	44W-4L-11T	44W-3L-12T	45W-4L-10T
Adam-Fast	45W-4L-10T	40W-4L-13T	35W-5L-19T	40W-5L-14T	42W-3L-14T
Adam-Robust	47W-1L-11T	41W-1L-15T	41W-2L-16T	44W-1L-14T	45W-0L-14T
Adam-WeightDecay	39W-1L-19T	34W-3L-20T	33W-4L-22T	36W-1L-22T	35W-2L-22T
GD	38W-1L-20T	38W-3L-16T	38W-3L-18T	39W-2L-18T	40W-2L-17T
GD-AdaptiveMomentum	46W-1L-12T	45W-2L-10T	40W-3L-16T	44W-1L-14T	46W-0L-13T
GD-Momentum	48W-0L-11T	43W-0L-14T	44W-1L-14T	46W-1L-12T	48W-0L-11T
GD-Nesterov	41W-0L-18T	40W-2L-15T	37W-2L-20T	40W-2L-17T	41W-1L-17T
GD-WeightDecay	36W-1L-22T	34W-3L-20T	29W-3L-27T	33W-3L-23T	35W-2L-22T
L-BFGS	32W-1L-26T	32W-3L-22T	32W-3L-24T	31W-3L-25T	37W-3L-19T
L-BFGS-Aggressive	43W-2L-14T	42W-2L-13T	40W-3L-16T	41W-3L-15T	43W-1L-15T
L-BFGS-Conservative	28W-3L-28T	26W-7L-24T	23W-8L-28T	25W-6L-28T	22W-5L-32T
L-BFGS-Limited	20W-1L-38T	16W-4L-37T	18W-7L-34T	16W-6L-37T	23W-3L-33T
L-BFGS-MoreThuente	16W-4L-39T	16W-2L-39T	20W-5L-34T	15W-7L-37T	21W-3L-35T
Trust Region-Adaptive	45W-0L-14T	42W-1L-14T	39W-0L-20T	44W-0L-15T	44W-0L-15T
Trust Region-Aggressive	45W-0L-14T	43W-0L-14T	42W-0L-17T	43W-0L-16T	43W-0L-16T
Trust Region-Conservative	54W-0L-5T	50W-0L-7T	47W-2L-10T	50W-0L-9T	53W-0L-6T
Trust Region-Precise	51W-0L-8T	50W-1L-6T	44W-0L-15T	47W-0L-12T	50W-0L-9T
Trust Region-Standard	44W-0L-15T	42W-0L-15T	39W-0L-20T	41W-0L-18T	43W-0L-16T

Legend: W = Wins (statistically significant better performance), L = Losses (statistically significant worse performance), T = Ties (no significant difference). Green indicates QQN variant dominance, red indicates non-QQN dominance.

	QQN-Bisection-1	QQN-Bisection-2	QQN-CubicQuadraticInterpolation	QQN-GoldenSection	QQN-StrongWolfe
Adam	47W-3L-9T	40W-7L-10T	41W-4L-14T	41W-3L-15T	43W-5L-11T
Adam-AMSGrad	49W-2L-8T	41W-6L-10T	44W-4L-11T	44W-3L-12T	45W-4L-10T
Adam-Fast	45W-4L-10T	40W-4L-13T	35W-5L-19T	40W-5L-14T	42W-3L-14T