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	50W-3L-9T	43W-7L-10T	44W-4L-14T	44W-3L-15T	46W-5L-11T
Adam-AMSGrad	52W-2L-8T	44W-6L-10T	47W-4L-11T	47W-3L-12T	48W-4L-10T
Adam-Fast	47W-4L-11T	42W-4L-14T	38W-5L-19T	43W-5L-14T	45W-3L-14T
Adam-Robust	50W-1L-11T	44W-1L-15T	44W-2L-16T	47W-1L-14T	48W-0L-14T
Adam-WeightDecay	41W-1L-20T	37W-3L-20T	35W-4L-23T	39W-1L-22T	38W-2L-22T
GD	41W-1L-20T	41W-3L-16T	39W-3L-20T	42W-2L-18T	43W-2L-17T
GD-AdaptiveMomentum	47W-1L-12T	46W-2L-10T	41W-3L-16T	45W-1L-14T	47W-0L-13T
GD-Momentum	51W-0L-11T	46W-0L-14T	47W-1L-14T	49W-1L-12T	51W-0L-11T
GD-Nesterov	44W-0L-18T	43W-2L-15T	40W-2L-20T	43W-2L-17T	44W-1L-17T
GD-WeightDecay	39W-1L-22T	37W-3L-20T	32W-3L-27T	36W-3L-23T	38W-2L-22T
L-BFGS	32W-1L-29T	32W-3L-25T	32W-3L-27T	31W-3L-28T	37W-3L-22T
L-BFGS-Aggressive	44W-2L-16T	43W-2L-15T	40W-3L-19T	41W-3L-18T	43W-2L-17T
L-BFGS-Conservative	30W-3L-29T	28W-7L-25T	24W-8L-30T	27W-6L-29T	24W-5L-33T
L-BFGS-Limited	23W-1L-38T	19W-4L-37T	19W-7L-36T	18W-6L-38T	26W-3L-33T
L-BFGS-MoreThuente	16W-4L-39T	16W-2L-39T	20W-5L-34T	15W-7L-37T	21W-3L-35T
Trust Region-Adaptive	48W-0L-14T	45W-1L-14T	42W-0L-20T	47W-0L-15T	47W-0L-15T
Trust Region-Aggressive	48W-0L-14T	46W-0L-14T	45W-0L-17T	46W-0L-16T	46W-0L-16T
Trust Region-Conservative	57W-0L-5T	53W-0L-7T	50W-2L-10T	53W-0L-9T	56W-0L-6T
Trust Region-Precise	53W-0L-9T	52W-1L-7T	46W-0L-16T	49W-0L-13T	52W-0L-10T
Trust Region-Standard	46W-0L-16T	44W-0L-16T	41W-0L-21T	43W-0L-19T	45W-0L-17T

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.

	50W-3L-9T	43W-7L-10T	44W-4L-14T	44W-3L-15T	46W-5L-11T
Adam					
Adam-AMSGrad	52W-2L-8T	44W-6L-10T	47W-4L-11T	47W-3L-12T	48W-4L-10T
Adam-Fast	47W-4L-11T	42W-4L-14T	38W-5L-19T	43W-5L-14T	45W-3L-14T