

```
C = trial.suggest_loguniform('C', 1e-6, 1e6)
/tmp/ipykernel_522656/2806568885.py:19: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
gamma = trial.suggest_loguniform('gamma', 1e-6, 1e1)
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:22,164] Trial 17 finished with value: 0.83 and parameters: {'C': 0.9354354343737812, 'gamma': 0.0008694516888267686, 'tol': 0.005767049232438598}. Best is trial 11
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:23,052] Trial 18 finished with value: 0.84 and parameters: {'C': 5530.255083736429, 'gamma': 1.6690365150843632e-06, 'tol': 0.00021151954303985347}. Best is trial
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:23,933] Trial 19 finished with value: 0.848 and parameters: {'C': 113.11067084514434, 'gamma': 0.00011744281475339727, 'tol': 0.008462054901666408}. Best is trial
```

Hyperparameter Trials:

```
Trial 0: {'C': 8.531357054301406, 'gamma': 0.006213296913094322, 'tol': 4.06269504253865e-05} → Accuracy: 0.7660
Trial 1: {'C': 0.2670621357701803, 'gamma': 0.0003226564264501752, 'tol': 3.9972200491579986e-05} → Accuracy: 0.7760
Trial 2: {'C': 85638.42879602854, 'gamma': 0.08073783121317067, 'tol': 1.1873248601871263e-06} → Accuracy: 0.0990
Trial 3: {'C': 2796.1126823797526, 'gamma': 0.00025380985222900977, 'tol': 0.02609193668124631} → Accuracy: 0.8400
Trial 4: {'C': 23.121804722665587, 'gamma': 0.003321377592724783, 'tol': 0.023507394400831782} → Accuracy: 0.8310
Trial 5: {'C': 37437.19827098225, 'gamma': 0.56013083155556, 'tol': 0.006627719796272533} → Accuracy: 0.0950
Trial 6: {'C': 0.0028181742487822133, 'gamma': 2.84939022313369e-06, 'tol': 0.00020028636326180772} → Accuracy: 0.0950
Trial 7: {'C': 0.0003180109277447132, 'gamma': 0.0022520043816237445, 'tol': 3.188860448174315e-06} → Accuracy: 0.0950
Trial 8: {'C': 0.09593694759063544, 'gamma': 4.542539204424233, 'tol': 2.4002495332366313e-06} → Accuracy: 0.0950
Trial 9: {'C': 0.0008351815227036806, 'gamma': 0.2367865182794235, 'tol': 0.01919946705165631} → Accuracy: 0.0950
Trial 10: {'C': 1.5609509608546213e-06, 'gamma': 9.569430318771792e-06, 'tol': 0.002223013977946321} → Accuracy: 0.0950
Trial 11: {'C': 93.87331315720655, 'gamma': 0.00010599140488001372, 'tol': 0.07987225940164187} → Accuracy: 0.8460
Trial 12: {'C': 626.8353158450223, 'gamma': 6.355641557209152e-05, 'tol': 0.05090729052749544} → Accuracy: 0.8390
Trial 13: {'C': 913.4836048591974, 'gamma': 7.161809606565985e-05, 'tol': 0.09705235221385863} → Accuracy: 0.8330
Trial 14: {'C': 1150.2171742114895, 'gamma': 0.00028990935920420585, 'tol': 0.002873270768327189} → Accuracy: 0.8430
Trial 15: {'C': 806449.4881998164, 'gamma': 2.069365131834991e-05, 'tol': 0.0016585049890384088} → Accuracy: 0.8270
Trial 16: {'C': 49.863487549206575, 'gamma': 0.020764046187489584, 'tol': 0.0008160228790215523} → Accuracy: 0.5680
Trial 17: {'C': 0.9354354343737812, 'gamma': 0.0008694516888267686, 'tol': 0.005767049232438598} → Accuracy: 0.8300
Trial 18: {'C': 5530.255083736429, 'gamma': 1.6690365150843632e-06, 'tol': 0.00021151954303985347} → Accuracy: 0.8400
Trial 19: {'C': 113.11067084514434, 'gamma': 0.00011744281475339727, 'tol': 0.008462054901666408} → Accuracy: 0.8480
```

Best Hyperparameters Found: {'C': 113.11067084514434, 'gamma': 0.00011744281475339727, 'tol': 0.008462054901666408}

Best Validation Accuracy: 0.848

Final Test Accuracy with Tuned Hyperparameters: 0.8490

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[9] ✓ 57.7s Python

```
... [I 2025-03-23 00:27:27,197] A new study created in memory with name: no-name-7ea14bfc-112b-4cb6-a119-3dfd84eb08f8
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
C = trial.suggest_loguniform('C', 1e-6, 1e6)
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:27:30,062] Trial 0 finished with value: 0.766 and parameters: {'C': 8.531357054301406, 'gamma': 0.006213296913094322, 'tol': 4.06269504253865e-05}. Best is trial 0 wi
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:27:32,008] Trial 1 finished with value: 0.776 and parameters: {'C': 0.2670621357701803, 'gamma': 0.0003226564264501752, 'tol': 3.9972200491579986e-05}. Best is trial
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:27:37,643] Trial 2 finished with value: 0.099 and parameters: {'C': 85638.42879602854, 'gamma': 0.08073783121317067, 'tol': 1.1873248601871263e-06}. Best is trial 1 w
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:27:38,722] Trial 3 finished with value: 0.84 and parameters: {'C': 2796.1126823797526, 'gamma': 0.00025380985222900977, 'tol': 0.02609193668124631}. Best is trial 3 w
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:27:41,074] Trial 4 finished with value: 0.831 and parameters: {'C': 23.121804722665587, 'gamma': 0.003321377592724783, 'tol': 0.023507394400831782}. Best is trial 3 w
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:27:46,380] Trial 5 finished with value: 0.095 and parameters: {'C': 37437.19827098225, 'gamma': 0.56013083155556, 'tol': 0.006627719796272533}. Best is trial 3 with v
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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```


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```
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:11,904] Trial 11 finished with value: 0.846 and parameters: {'C': 93.87331315720655, 'gamma': 0.00010599140488001372, 'tol': 0.07987225940164187}. Best is trial 11
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:12,794] Trial 12 finished with value: 0.839 and parameters: {'C': 626.8353158450223, 'gamma': 6.355641557209152e-05, 'tol': 0.05090729052749544}. Best is trial 11
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:13,650] Trial 13 finished with value: 0.833 and parameters: {'C': 913.4836048591974, 'gamma': 7.161809606565985e-05, 'tol': 0.09705235221385863}. Best is trial 11
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:14,600] Trial 14 finished with value: 0.843 and parameters: {'C': 1150.2171742114895, 'gamma': 0.00028990935920420585, 'tol': 0.002873270768327189}. Best is trial 11
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:15,551] Trial 15 finished with value: 0.827 and parameters: {'C': 806449.4881998164, 'gamma': 2.069365131834991e-05, 'tol': 0.0016585049890384088}. Best is trial 11
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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tol = trial.suggest_loguniform('tol', 1e-6, 1e-1)
[I 2025-03-23 00:28:20,667] Trial 16 finished with value: 0.568 and parameters: {'C': 49.863487549206575, 'gamma': 0.020764046187489584, 'tol': 0.0008160228790215523}. Best is trial 11
/tmp/ipykernel_522656/2806568885.py:18: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/r
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[I 2025-03-23 00:28:22,164] Trial 17 finished with value: 0.83 and parameters: {'C': 0.9354354343737812, 'gamma': 0.0008694516888267686, 'tol': 0.005767049232438598}. Best is trial 11
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