Table 3: In-distribution optimization performances of baselines over *bbob-10D*, with gray box labeling the best. Due to the space limitation, results for 8 of 16 problem instances in *bbob-10D*'s testing set are presented here and complete results can be accessed at this online page.

	Buche_Rastrigin	Attractive_Sector	Step_Ellipsoidal	Rosenbrock_O	Rosenbrock_R	Ellipsoidal_HC	Discus	Bent_Cigar
RNNOPT(2017)	2.947E+03 ±0.000E+00	6.938E+04 ±0.000E+00	7.022E+01 ±0.000E+00	2.033E+04 ±0.000E+00	5.714E+01 ±0.000E+00	4.224E+06 ±0.000E+00	2.412E+05 ±0.000E+00	5.096E+07 ±7.451E-09
DEDDQN(2019)	3.082E+01 ±4.798E+00	2.204E+00 ±3.582E+00	**0.000E+00 ±0.000E+00**	4.324E+00 ±2.038E+00	4.729E+00 ±1.445E+00	**1.210E-06 ±1.641E-06**	5.897E-01 ±1.660E+00	**5.436E-02 ±1.141E-01**
DEDQN(2021)	2.879E+02 ±8.874E+01	1.130E+03 ±1.840E+03	1.101E+02 ±2.777E+01	1.301E+04 ±4.062E+03	1.333E+04 ±5.268E+03	2.907E+05 ±1.254E+05	1.199E+03 ±1.080E+03	2.782E+07 ±8.831E+06
LDE(2021)	2.626E+01 ±5.652E+00	3.054E-03 ±3.557E-03	3.257E-01 ±4.035E-01	3.958E+00 ±8.400E-01	6.429E+00 ±2.064E-01	2.004E+02 ±1.154E+02	6.355E+00 ±3.547E+00	6.818E-01 ±4.251E-01
RLPSO(2021)	1.499E+02 ±2.165E+01	3.835E+01 ±1.160E+01	7.138E+00 ±3.827E+00	1.360E+02 ±6.994E+01	3.461E+01 ±1.410E+01	1.571E+04 ±9.795E+03	4.915E+01 ±2.120E+01	1.461E+06 ±5.560E+05
RLEPSO(2022)	5.972E+01 ±2.415E+01	3.062E-03 ±2.971E-03	2.121E+00 ±2.660E+00	3.511E+00 ±2.098E+00	1.026E+01 ±1.930E+01	8.907E+02 ±5.948E+02	1.386E+01 ±6.198E+00	8.936E-01 ±7.455E-01
NRLPSO(2023)	8.003E+01 ±2.759E+01	2.525E+01 ±3.469E+01	6.924E+00 ±3.686E+00	6.961E+01 ±2.812E+01	6.841E+01 ±4.045E+01	6.802E+03 ±7.286E+03	3.173E+01 ±2.041E+01	5.454E+05 ±2.494E+05
LES(2023)	4.152E+02 ±1.225E+02	1.685E+04 ±1.162E+04	1.163E+02 ±2.532E+01	1.523E+04 ±5.534E+03	6.991E+03 ±5.307E+03	4.974E+05 ±2.440E+05	2.833E+03 ±3.660E+03	3.487E+07 ±1.102E+07
GLEET(2024)	4.076E+01 ±2.607E+01	1.389E-02 ±1.829E-02	8.666E-01 ±7.108E-01	4.927E+00 ±2.207E+00	5.442E+00 ±1.585E+00	2.780E+02 ±2.565E+02	5.355E+00 ±3.905E+00	1.007E+00 ±1.637E+00
GLHF(2024)	3.528E+02 ±1.042E+02	1.433E+04 ±9.867E+03	1.003E+02 ±2.150E+01	1.290E+04 ±4.698E+03	5.947E+03 ±4.494E+03	4.234E+05 ±2.006E+05	2.403E+03 ±3.115E+03	3.015E+07 ±9.041E+06
RLDAS(2024)	2.931E+01 ± 7.615E+00	8.111E-02 ±6.127E-02	3.367E-01 ±2.261E-01	**2.417E+00 ±1.235E+00**	4.245E+00 ±2.060E+00	2.177E+02 ±3.481E+02	4.458E+00 ±6.533E+00	4.442E+00 ±8.925E+00
SYMBOL(2024)	7.514E+01 ±3.529E+01	4.461E-01 ±3.417E-01	2.448E+00 ±1.423E+00	4.831E+00 ±3.109E+00	3.041E+01 ±2.875E+01	2.983E+03 ±1.258E+03	1.761E+01 ±1.281E+01	1.078E+02 ±1.857E+02
OPRO(2024)	2.952E+03 ± 1.226E+02	6.939E+04 ± 1.163E+04	1.253E+02 ± 2.796E+01	2.041E+04 ± 5.667E+03	1.344E+04 ± 5.517E+03	4.235E+06 ± 2.569E+05	2.521E+05 ± 4.119E+03	5.102E+07 ± 1.130E+07
B2OPT(2025)	1.000E+02 ±2.238E+01	4.087E+01 ±1.469E+01	6.256E+00 ±4.385E-01	4.988E+01 ±1.781E+01	1.183E+01 ±2.975E+00	1.367E+04 ±8.925E+03	3.139E+01 ±1.812E+00	9.212E+05 ±2.701E+05
RLDEAFL(2025)	3.602E+01 ±1.845E+01	2.860E-02 ±2.570E-02	4.975E+00 ±2.919E+00	3.941E+00 ±1.280E+00	3.484E+00 ±1.756E+00	5.704E+02 ±9.830E+02	5.803E+00 ±5.537E+00	2.153E+00 ±2.156E+00
PSO(1995)	7.780E+01 ± 9.467E+00	2.694E+01 ± 1.557E+01	8.523E+00 ± 2.727E+00	1.526E+02 ± 5.441E+01	1.397E+02 ± 3.868E+01	1.042E+04 ± 3.858E+03	2.736E+01 ± 1.810E+01	8.109E+05 ± 2.567E+05
DE(1997)	3.524E+01 ± 4.575E+00	1.826E-03 ± 8.559E-04	1.769E-01 ± 1.642E-01	5.654E+00 ± 4.408E-01	6.929E+00 ± 4.288E-01	7.946E+03 ± 3.516E+03	4.398E+01 ± 1.391E+01	8.362E+00 ± 7.031E+00
SHADE(2013)	2.804E+01 ± 4.097E+00	**1.746E-03 ± 9.716E-04**	1.807E-02 ± 9.719E-03	3.934E+00 ± 1.399E-01	4.642E+00 ± 2.665E-01	2.094E+02 ± 1.359E+02	**2.785E-01 ± 1.278E-01**	7.654E+01 ± 6.485E+01
JDE21(2021)	3.227E+01 ± 1.310E+01	6.387E-02 ± 1.063E-01	4.519E-01 ± 3.332E-01	4.932E+00 ± 1.098E+00	4.941E+00 ± 2.612E+00	4.254E+02 ± 3.237E+02	8.589E+00 ± 5.373E+00	1.428E+00 ± 1.491E+00
MADDE(2021)	**2.419E+01 ± 3.594E+00**	1.889E-02 ± 1.105E-02	6.005E-01 ± 2.357E-01	3.039E+00 ± 6.242E-01	**2.072E+00 ± 6.011E-01**	7.921E+02 ± 5.807E+02	1.508E+01 ± 7.835E+00	5.590E+01 ± 4.327E+01
	Sharp_Ridge	Different_Powers	Schaffers_HC	Composite_GR	Schwefel	Gallagher_21	Katsuura	Lunacek_BR
RNNOPT(2017)	1.822E+03 ±0.000E+00	2.297E+01 ±0.000E+00	4.645E+01 ±0.000E+00	3.609E+00 ±0.000E+00	9.297E+03 ±1.819E-12	8.431E+01 ±0.000E+00	2.186E+00 ±0.000E+00	1.142E+02 ±0.000E+00
DEDDQN(2019)	**1.841E-03 ±1.841E-03**	**4.224E-09 ±4.069E-09**	**1.080E-02 ±7.097E-03**	2.480E+00 ±5.250E-01	1.720E+00 ±4.164E-01	1.574E+00 ±9.236E-01	1.344E+00 ±2.839E-01	4.039E+01 ±4.264E+00
DEDQN(2021)	9.538E+02 ±1.548E+02	1.115E+01 ±2.837E+00	2.709E+01 ±5.790E+00	1.268E+01 ±2.131E+00	4.880E+03 ±3.385E+03	5.711E+01 ±1.366E+01	3.286E+00 ±6.136E-01	1.591E+02 ±2.132E+01
LDE(2021)	5.955E-01 ±5.103E-01	5.159E-05 ±3.700E-05	2.156E-01 ±1.238E-01	2.024E+00 ±1.812E-01	1.071E+00 ±1.603E-01	**4.292E-01 ±7.059E-01**	1.306E+00 ±2.245E-01	3.616E+01 ±3.494E+00
RLPSO(2021)	2.769E+02 ±7.000E+01	1.481E+00 ±9.514E-01	1.429E+01 ±2.968E+00	3.629E+00 ±1.115E+00	2.722E+00 ±2.998E-01	1.597E+01 ±1.719E+01	2.225E+00 ±3.550E-01	6.525E+01 ±7.460E+00
RLEPSO(2022)	6.388E+00 ±6.093E+00	2.554E-04 ±1.396E-04	1.687E+00 ±7.471E-01	1.387E+00 ±4.516E-01	1.261E+00 ±2.497E-01	7.703E+00 ±1.223E+01	1.017E+00 ±2.993E-01	**2.413E+01 ±7.015E+00**
NRLPSO(2023)	1.968E+02 ±8.105E+01	6.449E-01 ±3.607E-01	5.710E+00 ±2.194E+00	3.367E+00 ±1.081E+00	2.631E+00 ±4.837E-01	7.478E+00 ±5.155E+00	1.599E+00 ±4.433E-01	7.007E+01 ±1.466E+01
LES(2023)	1.099E+03 ±1.516E+02	1.273E+01 ±2.222E+00	3.812E+01 ±6.523E+00	1.215E+01 ±2.095E+00	8.044E+03 ±4.741E+03	5.777E+01 ±2.074E+01	4.099E+00 ±9.875E-01	1.793E+02 ±2.481E+01
GLEET(2024)	4.464E+00 ±7.370E+00	1.130E-04 ±8.072E-05	2.137E+00 ±1.618E+00	**8.624E-01 ±3.202E-01**	1.481E+00 ±1.765E-01	8.632E+00 ±1.209E+01	**4.839E-01 ±2.181E-01**	2.717E+01 ±8.473E+00
GLHF(2024)	9.652E+02 ±1.286E+02	1.074E+01 ±1.796E+00	3.163E+01 ±5.541E+00	1.027E+01 ±1.857E+00	6.827E+03 ±4.036E+03	4.923E+01 ±1.678E+01	3.527E+00 ±9.244E-01	1.582E+02 ±2.103E+01
RLDAS(2024)	1.627E+00 ±1.073E+00	3.740E-04 ±2.542E-04	9.798E-01 ±5.450E-01	1.650E+00 ±4.859E-01	**5.505E-01 ±3.074E-01**	4.698E-01 ±7.563E-01	1.296E+00 ±2.623E-01	3.630E+01 ±1.035E+01
SYMBOL(2024)	1.344E+01 ±9.453E+00	5.332E-03 ±2.537E-03	4.256E+00 ±2.238E+00	1.383E+00 ±4.880E-01	1.732E+00 ±2.436E-01	5.611E+00 ±4.981E+00	6.371E-01 ±3.070E-01	3.188E+01 ±1.164E+01
OPRO(2024)	2.003E+03 ± 1.562E+02	3.007E+01 ± 3.326E+00	5.099E+01 ± 9.258E+00	1.434E+01 ± 6.317E+00	9.299E+03 ± 4.804E+03	9.031E+01 ± 2.184E+01	6.113E+00 ± 2.771E+00	1.812E+02 ± 2.562E+01
B2OPT(2025)	2.581E+02 ±3.724E+01	2.510E+00 ±3.641E-01	6.057E+00 ±1.696E+00	8.728E-01 ±2.494E-01	2.543E+00 ±1.547E-01	1.130E+01 ±7.585E+00	1.575E+00 ±2.701E-01	5.814E+01 ±6.917E+00
RLDEAFL(2025)	1.136E+01 ±1.345E+01	1.487E-04 ±9.165E-05	4.166E+00 ±2.214E+00	2.535E+00 ±1.036E+00	1.397E+00 ±3.326E-01	5.452E+00 ±6.106E+00	1.199E+00 ±6.034E-01	3.231E+01 ±7.111E+00
PSO(1995)	1.905E+02 ± 2.156E+01	6.802E-01 ± 1.760E-01	5.600E+00 ± 1.368E+00	3.290E+00 ± 5.796E-01	2.560E+00 ± 3.067E-01	6.803E+00 ± 6.472E+00	1.272E+00 ± 2.933E-01	6.139E+01 ± 5.747E+00
DE(1997)	8.588E-01 ± 1.054E+00	8.180E-04 ± 2.537E-04	9.454E-02 ± 6.483E-02	2.577E+00 ± 4.860E-01	9.156E-01 ± 3.039E-01	3.393E+00 ± 4.999E+00	1.467E+00 ± 2.734E-01	4.210E+01 ± 3.043E+00
SHADE(2013)	1.442E+00 ± 4.321E-01	2.721E-04 ± 4.192E-05	2.649E-01 ± 6.818E-02	2.238E+00 ± 3.476E-01	1.338E+00 ± 1.957E-01	1.155E+00 ± 9.320E-01	1.553E+00 ± 3.454E-01	4.248E+01 ± 4.209E+00
JDE21(2021)	3.476E+00 ± 6.350E+00	4.398E-04 ± 3.807E-04	4.496E-01 ± 3.700E-01	2.542E+00 ± 6.355E-01	5.777E-01 ± 2.246E-01	1.604E+00 ± 1.641E+00	1.416E+00 ± 3.359E-01	4.059E+01 ± 7.940E+00
MADDE(2021)	1.736E+00 ± 3.300E-01	5.830E-04 ± 2.318E-04	9.538E-01 ± 2.897E-01	1.077E+00 ± 3.709E-01	8.049E-01 ± 1.997E-01	5.458E-01 ± 7.264E-01	1.350E+00 ± 2.395E-01	4.308E+01 ± 4.974E+00
Rank	1:LDE, 2:DEDDQN, 3:RLDAS, 4:SHADE, 5:MADDE, 6:GLEET, 7:RLEPSO, 8:RLDEAFL, 9:JDE21,10:DE, 11:SYMBOL, 12:PSO, 13:B2OPT, 14:NRLPSO, 15:RLPSO, 16:GLHF, 16:DEDQN, 18:RNNOPT, 19:LES, 20:OPRO							