Table 12. MOCO

Methods	Bi-CVRP-20	Bi-CVRP-50	Bi-CVRP-100	Bi-KP-50	Bi-KP-100	Bi-KP-200	Bi-TSP-20	Bi-TSP-50	Bi-TSP-100	Bi-TSP-500	Tri-TSP-20	Tri-TSP-50	Tri-TSP-100
$\mathcal{D}$(best)	**5.37**	**5.11**	4.91	3.00	**3.45**	**4.71**	**5.05**	4.91	<u>4.55</u>	4.58	**11.88**	**9.82**	<u>9.36</u>
End-to-End	4.67 ± 0.00	4.86 ± 0.00	4.90 ± 0.01	2.98 ± 0.09	3.02 ± 0.00	3.20 ± 0.04	NaN	<u>4.85 ± 0.00</u>	**4.64 ± 0.00**	4.37 ± 0.07	NaN	6.02 ± 0.00	**9.50 ± 0.00**
End-to-End + GradNorm	4.71 ± 0.00	3.88 ± 0.00	3.89 ± 0.00	2.86 ± 0.20	2.67 ± 0.02	3.26 ± 0.00	3.48 ± 0.00	4.51 ± 0.00	4.13 ± 0.00	4.38 ± 0.03	6.09 ± 0.80	7.59 ± 1.30	8.72 ± 0.36
End-to-End + PcGrad	4.62 ± 0.00	4.23 ± 0.00	3.80 ± 0.00	2.59 ± 0.16	2.58 ± 0.22	3.25 ± 0.00	/	4.54 ± 0.00	4.33 ± 0.19	4.23 ± 0.21	<u>10.07 ± 0.68</u>	<u>8.38 ± 0.27</u>	9.09 ± 0.74
Multi-Head	3.87 ± 0.07	4.11 ± 0.18	4.75 ± 0.13	**3.17 ± 0.00**	2.43 ± 0.00	3.79 ± 0.65	3.36 ± 0.14	4.60 ± 0.09	3.98 ± 0.06	3.45 ± 0.13	5.90 ± 0.54	6.43 ± 0.42	8.60 ± 0.13
Multi-Head + GradNorm	4.20 ± 0.21	4.05 ± 0.24	4.22 ± 0.70	2.13 ± 0.00	2.46 ± 0.00	4.32 ± 0.07	3.69 ± 0.08	3.23 ± 0.01	3.27 ± 0.17	3.91 ± 0.32	5.96 ± 0.47	5.53 ± 0.30	6.73 ± 0.00
Multi-Head + PcGrad	4.08 ± 0.08	4.52 ± 0.16	3.60 ± 0.04	2.83 ± 0.00	2.23 ± 0.00	4.43 ± 0.01	<u>3.78 ± 1.21</u>	2.91 ± 0.15	3.26 ± 0.08	2.96 ± 1.20	6.93 ± 1.64	6.73 ± 0.27	8.67 ± 0.20
Multiple Models	4.90 ± 0.00	4.91 ± 0.00	<u>4.92 ± 0.00</u>	<u>3.03 ± 0.02</u>	3.19 ± 0.07	3.35 ± 0.06	3.60 ± 0.00	3.23 ± 0.00	4.04 ± 0.00	4.35 ± 0.12	/	/	/
Multiple Models + COMs	<u>5.28 ± 0.00</u>	4.41 ± 0.00	4.36 ± 0.23	2.66 ± 0.02	2.93 ± 0.13	<u>4.53 ± 0.02</u>	/	4.48 ± 0.00	4.23 ± 0.00	<u>4.47 ± 0.02</u>	/	/	/
Multiple Models + RoMA	4.57 ± 0.00	4.45 ± 0.00	3.82 ± 0.00	2.46 ± 0.08	2.69 ± 0.02	/	/	4.37 ± 0.00	/	/	/	/	/
Multiple Models + IOM	5.28 ± 0.00	<u>5.11 ± 0.00</u>	**4.93 ± 0.00**	/	/	/	/	/	/	3.77 ± 0.00	/	/	/
Multiple Models + ICT	4.36 ± 0.00	4.12 ± 0.00	3.88 ± 0.00	2.35 ± 0.16	2.44 ± 0.21	3.56 ± 0.09	/	/	/	3.48 ± 0.16	/	/	/
Multiple Models + Tri-Mentoring	4.28 ± 0.00	3.86 ± 0.00	3.97 ± 0.00	2.13 ± 0.09	2.39 ± 0.17	3.69 ± 0.11	/	/	/	3.87 ± 0.22	/	/	/
MOBO	3.38 ± 0.23	2.40 ± 0.09	1.58 ± 0.02	/	/	1.89 ± 0.06	2.42 ± 0.16	1.77 ± 0.01	1.56 ± 0.06	/	5.64 ± 0.04	3.36 ± 0.12	2.54 ± 0.03
MOBO-ParEGO	/	/	/	/	/	N/A	2.70 ± 0.09	/	1.75 ± 0.01	N/A	4.40 ± 0.14	/	2.38 ± 0.01