The Random Cluster Model for Robust Geometric Fitting Supplementary Material

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1 Two view motion segmentation results.

Table 1 reports the full qualitative result on the motion segmentation datasets.

2 Multi-homography detection results.

Table 2 summaries the comparison results on the multi-homography estimation datasets.

Table 1: Summary statistics (median) and two sample t-tests (RCMSA versus others) over 50 repetitions on fundamental matrices detection. For each run, we record the lowest SE achieved within 1000 iterations/hypotheses and the time when the lowest SE was achieved (SE in percent, time in seconds). On each dataset, the lowest median SE and time among all methods are bolded; p-values smaller than 0.01 (significance level) are in bold and italic. Note that we test either our method is significantly better or worse than another. S = number of structures; I = number of inliers; and O = number of outliers.

Datasets			PEARL	QP-MF	FLOSS	AJCMC	RCMSA
Biscuitbookbox S=3, I=162, O=97	Segmentation error	Median	8.11	7.72	11.58	11.58	**7.72**
		p-value (ours is better)	1.88e-01	8.50e-01	***1.07e-11***	***3.45e-12***	x
		p-value (ours is worse)	8.12e-01	1.50e-01	1.00e+00	1.00e+00	x
	Running time	Median	2.51	5.59	3.76	0.4	**0.16**
		p-value (ours is better)	***2.42e-19***	***1.58e-28***	***1.73e-36***	***3.45e-04***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Boardgame S=3, I=166, O=113	Segmentation error	Median	16.85	17.2	17.92	19.35	**12.9**
		p-value (ours is better)	***2.70e-21***	***9.31e-18***	***3.31e-22***	***8.92e-29***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	3.16	5.74	5.91	1	**0.23**
		p-value (ours is better)	***2.27e-11***	***1.50e-19***	***2.35e-21***	***5.54e-05***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Breadcartoychips S=4, I=155, O=82	Segmentation error	Median	12.24	10.97	15.82	13.92	**9.92**
		p-value (ours is better)	***5.13e-06***	1.28e-01	***4.61e-18***	***1.03e-12***	x
		p-value (ours is worse)	1.00e+00	8.72e-01	1.00e+00	1.00e+00	x
	Running time	Median	2.84	6.51	5.29	1.35	**0.35**
		p-value (ours is better)	***1.98e-19***	***1.01e-23***	***7.07e-33***	***1.41e-09***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Breadcubechips S=3, I=149, O=81	Segmentation error	Median	9.57	**6.96**	11.74	10.43	9.78
		p-value (ours is better)	9.81e-01	1.00e+00	1.19e-02	2.13e-01	x
		p-value (ours is worse)	1.89e-02	***1.16e-06***	9.88e-01	7.87e-01	x
	Running time	Median	2.76	4.37	4.16	0.55	**0.18**
		p-value (ours is better)	***1.01e-28***	***1.71e-26***	***5.67e-37***	***2.01e-03***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	9.98e-01	x
Breadtoycar S=3, I=110, O=56	Segmentation error	Median	10.24	**8.73**	11.75	10.84	**8.73**
		p-value (ours is better)	***1.00e-06***	7.63e-01	***2.09e-10***	***1.93e-06***	x
		p-value (ours is worse)	1.00e+00	2.37e-01	1.00e+00	1.00e+00	x
	Running time	Median	1.94	4.93	3.54	0.85	**0.12**
		p-value (ours is better)	***1.40e-26***	***2.17e-21***	***1.04e-33***	***4.36e-10***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Carchipscube S=3, I=105, O=60	Segmentation error	Median	10.3	9.09	16.97	15.76	**4.85**
		p-value (ours is better)	***2.57e-35***	***2.51e-19***	***5.85e-30***	***1.55e-30***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	2.28	3.78	3.66	0.43	**0.24**
		p-value (ours is better)	***1.86e-12***	***5.45e-22***	***4.13e-14***	***7.00e-04***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	9.99e-01	x
Cubebreadtoychips S=4, I=239, O=88	Segmentation error	Median	9.02	**7.34**	11.31	9.94	8.87
		p-value (ours is better)	3.37e-01	1.00e+00	1.74e-05	1.91e-02	x
		p-value (ours is worse)	6.63e-01	***1.75e-04***	1.00e+00	9.81e-01	x
	Running time	Median	3.55	6.37	6.15	1.36	**0.25**
		p-value (ours is better)	***2.51e-15***	***7.54e-24***	***2.40e-31***	***9.08e-10***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Dinabooks S=3, I=205, O=155	Segmentation error	Median	19.17	17.78	20.28	20.56	**17.5**
		p-value (ours is better)	***9.72e-05***	1.86e-01	***5.71e-09***	***1.36e-08***	x
		p-value (ours is worse)	1.00e+00	8.14e-01	1.00e+00	1.00e+00	x
	Running time	Median	3.77	4.77	7.19	1.32	**0.38**
		p-value (ours is better)	2.***11e-18***	***3.23e-23***	***5.11e-17***	***8.47e-09***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Toycubecar S=3, I=128, O=72	Segmentation error	Median	12	**10.5**	13.75	13.5	11
		p-value (ours is better)	2.25e-01	9.63e-01	***1.69e-04***	***2.17e-03***	x
		p-value (ours is worse)	7.75e-01	3.75e-02	1.00e+00	9.98e-01	x
	Running time	Median	2.6	4.47	5.04	0.38	**0.13**
		p-value (ours is better)	***5.18e-15***	***1.33e-17***	***1.84e-16***	***2.01e-06***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x

Table 2: Summary statistics (median) and two sample t-tests (RCMSA versus others) over 50 repetitions on multi-homography detection. For each run, we record the lowest SE achieved within 1000 iterations/hypotheses and the time when the lowest SE was achieved (SE in percent, time in seconds). On each dataset, the lowest median SE and time among all methods are bolded; p-values smaller than 0.01 (significance level) are in bold and italic. Note that we test either our method is significantly better or worse than another. S = number of structures; I = number of inliers; and O = number of outliers.

Datasets			PEARL	QP-MF	FLOSS	AJCMC	RCMSA
Bonython Hall S=6, I=1002, O=66	Segmentation error	Median	18.63	14.42	15.68	13.34	**8.8**
		p-value (ours is better)	***1.18e-18***	***4.19e-15***	***2.83e-19***	***3.12e-10***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	18.3	42.52	31.81	5.6	**2**
		p-value (ours is better)	***2.19e-17***	***6.58e-16***	***6.95e-25***	***4.47e-13***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Jonhsona S=4, I=295, O=78	Segmentation error	Median	5.63	23.19	6.17	4.02	**2.14**
		p-value (ours is better)	***6.78e-36***	***5.29e-32***	***8.19e-31***	***1.87e-09***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	7.61	19.6	13.71	2.38	**0.87**
		p-value (ours is better)	***8.39e-22***	***2.30e-11***	***6.82e-22***	***6.69e-08***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Johnsonb S=7, I=571, O=78	Segmentation error	Median	18.64	23.73	15.49	15.18	**14.79**
		p-value (ours is better)	***5.73e-05***	***8.72e-17***	1.94e-01	7.09e-01	x
		p-value (ours is worse)	1.00e+00	1.00e+00	8.06e-01	2.91e-01	x
	Running time	Median	9.86	20.76	29.79	**2.94**	3.37
		p-value (ours is better)	***6.98e-10***	***7.13e-14***	***8.67e-20***	9.37e-01	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	6.33e-02	x
Ladysymon S=3, I=160, O=77	Segmentation error	Median	7.59	18.78	7.59	**2.53**	3.38
		p-value (ours is better)	***7.50e-68***	***2.63e-34***	***1.60e-67***	9.78e-01	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	2.18e-02	x
	Running time	Median	3.92	19.41	6.55	1.54	**0.44**
		p-value (ours is better)	***3.03e-20***	***6.65e-12***	***3.81e-20***	***7.93e-12***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Merton Colleges 1 S=5, I=1503, O=437	Segmentation error	Median	8.12	7.09	7.96	5.85	**3.35**
		p-value (ours is better)	***6.90e-37***	***3.44e-15***	***1.33e-24***	***2.59e-17***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	32.12	43.48	59.55	7.27	**2.75**
		p-value (ours is better)	***3.62e-17***	***2.92e-21***	***3.26e-28***	***3.25e-09***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Merton Colleges 3 S=6, I=1707, O=275	Segmentation error	Median	6.53	8.65	5.95	4.39	**3.58**
		p-value (ours is better)	***3.70e-17***	***1.38e-21***	***2.57e-11***	***1.59e-05***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	27.59	80.93	72.07	13.63	**3.77**
		p-value (ours is better)	***3.68e-14***	***3.89e-15***	***8.56e-38***	***2.68e-20***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Neem S=3, I=153, O=88	Segmentation error	Median	13.49	28.01	13.28	**1.66**	2.07
		p-value (ours is better)	***3.44e-68***	***1.39e-38***	***3.25e-73***	1.00e+00	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	***4.85e-08***	x
	Running time	Median	4.02	7.89	8.07	2.2	**0.88**
		p-value (ours is better)	***4.77e-20***	***1.88e-18***	***9.11e-23***	***2.90e-14***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Oldclassicswing S=3, I=256, O=123	Segmentation error	Median	3.96	5.01	3.96	**1.32**	**1.32**
		p-value (ours is better)	***2.78e-28***	***1.02e-26***	***3.67e-49***	***4.51e-03***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	9.95e-01	x
	Running time	Median	5.06	15.18	6.53	1.2	**0.19**
		p-value (ours is better)	***3.98e-19***	***1.02e-14***	***1.11e-21***	***1.74e-11***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
Raglan Castle S=11, I=2420, O=214	Segmentation error	Median	22.89	29.82	19.17	22.63	**1.06**
		p-value (ours is better)	***2.67e-37***	***1.04e-27***	***2.40e-38***	***2.57e-24***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x
	Running time	Median	29.3	49.65	112.19	8.17	**8.61**
		p-value (ours is better)	***8.69e-11***	***7.50e-15***	***1.85e-69***	7.24e-01	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	2.76e-01	x
Sene S=3, I=132, O=118	Segmentation error	Median	6.8	7.6	6.8	**0.4**	**0.4**
		p-value (ours is better)	***2.99e-43***	***2.22e-49***	***6.49e-42***	9.81e-01	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.94e-02	x
	Running time	Median	2.43	20.29	4.73	**0.41**	0.43
		p-value (ours is better)	***3.67e-13***	***1.50e-17***	***6.86e-16***	2.29e-02	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	9.77e-01	x
Unionhouse S=5, I=1739, O=345	Segmentation error	Median	5.18	4.75	4.56	7.2	**3.79**
		p-value (ours is better)	***8.39e-21***	***1.37e-19***	1.99e-02	***2.55e-17***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	9.80e-01	1.00e+00	x
	Running time	Median	22.47	62.89	83.01	15.73	**5.39**
		p-value (ours is better)	***4.39e-14***	***9.10e-25***	***3.44e-37***	***1.27e-49***	x
		p-value (ours is worse)	1.00e+00	1.00e+00	1.00e+00	1.00e+00	x