

Minimal Solutions to Relative Pose Estimation From Two Views Sharing a Common Direction With Unknown Focal Length: Supplementary Material

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1. Synthetic Experiments

In this section we show some more results from the synthetic experiments. **Shared and unknown focal length:** Figure 1 shows the rotation and translation error under forward motion. Figure 2 reports the results under sideways motion. **Different and unknown focal length:** Figure 3 shows the rotation and translation error under forward motion. Figure 4 reports the results under sideways motion.

2. Real Experiments

The results for Seq. 2-8 of the paper are given in Table 1-7. We used SURF [1] feature detector for these sequences.

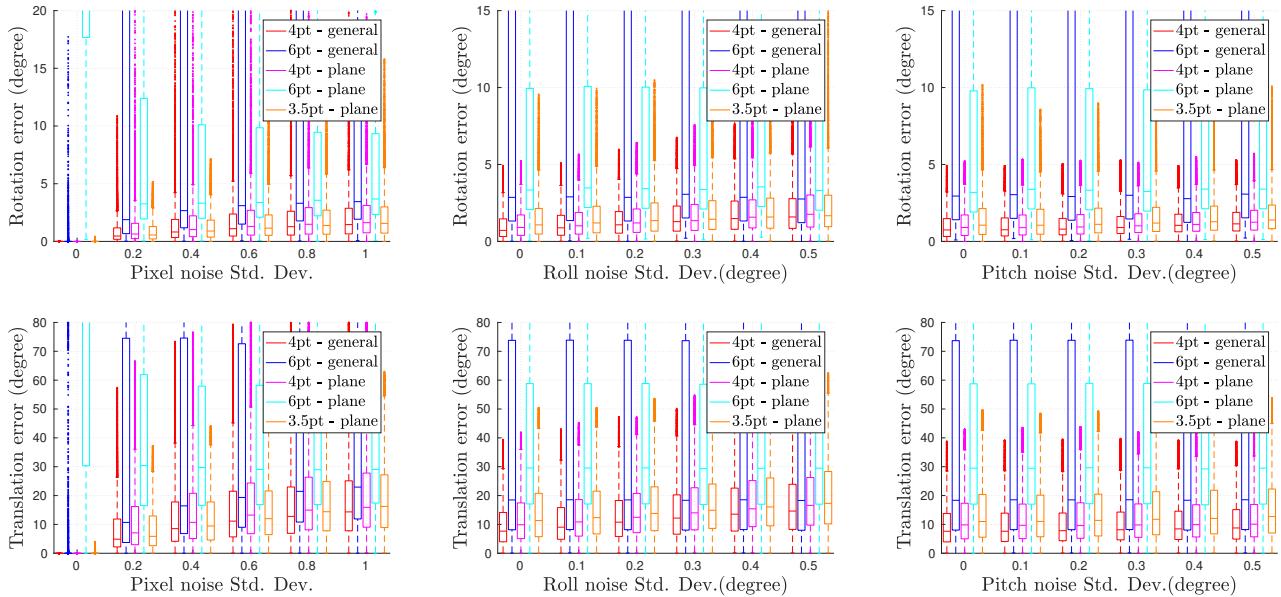


Figure 1: Performance under forward motion for the shared and unknown focal length case. **Top row:** Rotation error. **Bottom row:** Translation error. From left to right: Increased image noise; Increased roll noise with constant image noise of 0.5 pixel standard deviation; Increased pitch noise with constant image noise of 0.5 pixel standard deviation.

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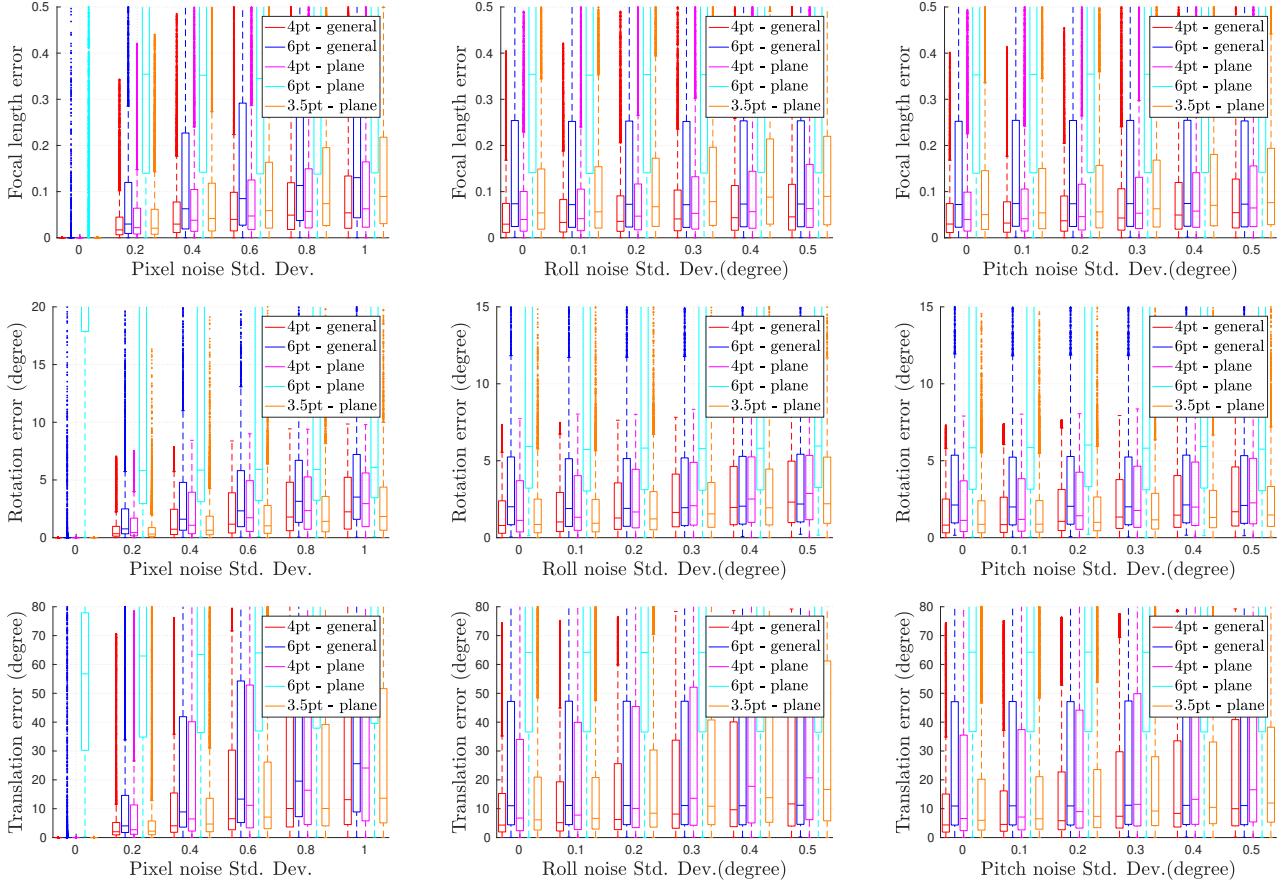


Figure 2: Performance under sideways motion for the shared and unknown focal length case. **Top row:** focal length error. **Middle row:** Rotation error. **Bottom row:** Translation error.

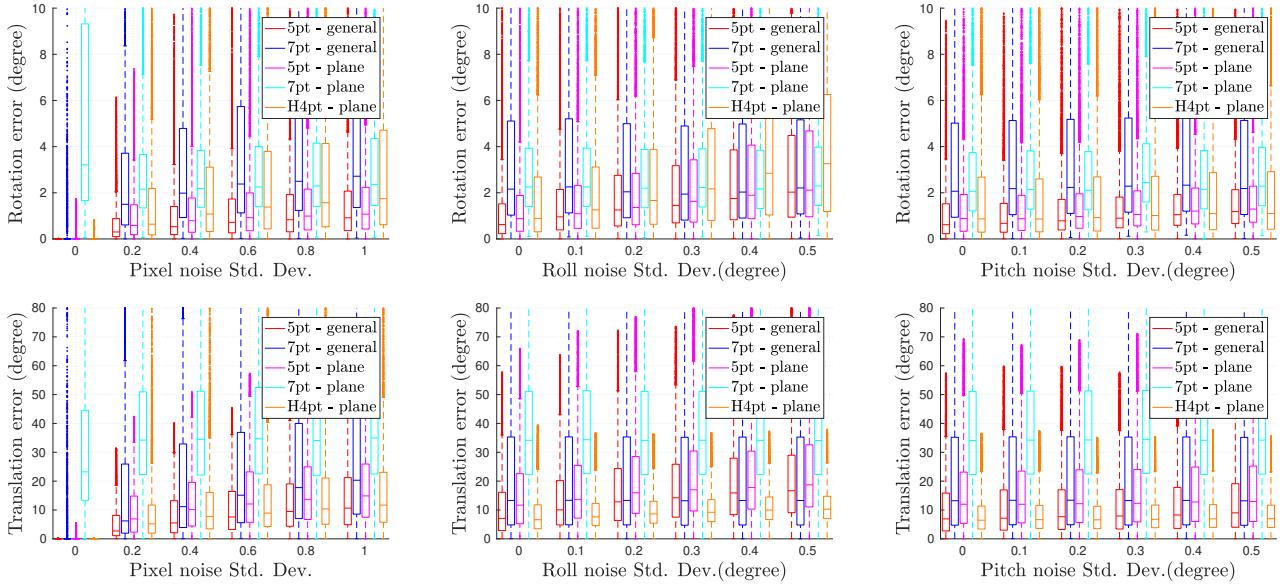


Figure 3: Performance under forward motion for the different and unknown focal lengths case. **Top row:** Rotation error. **Bottom row:** Translation error.

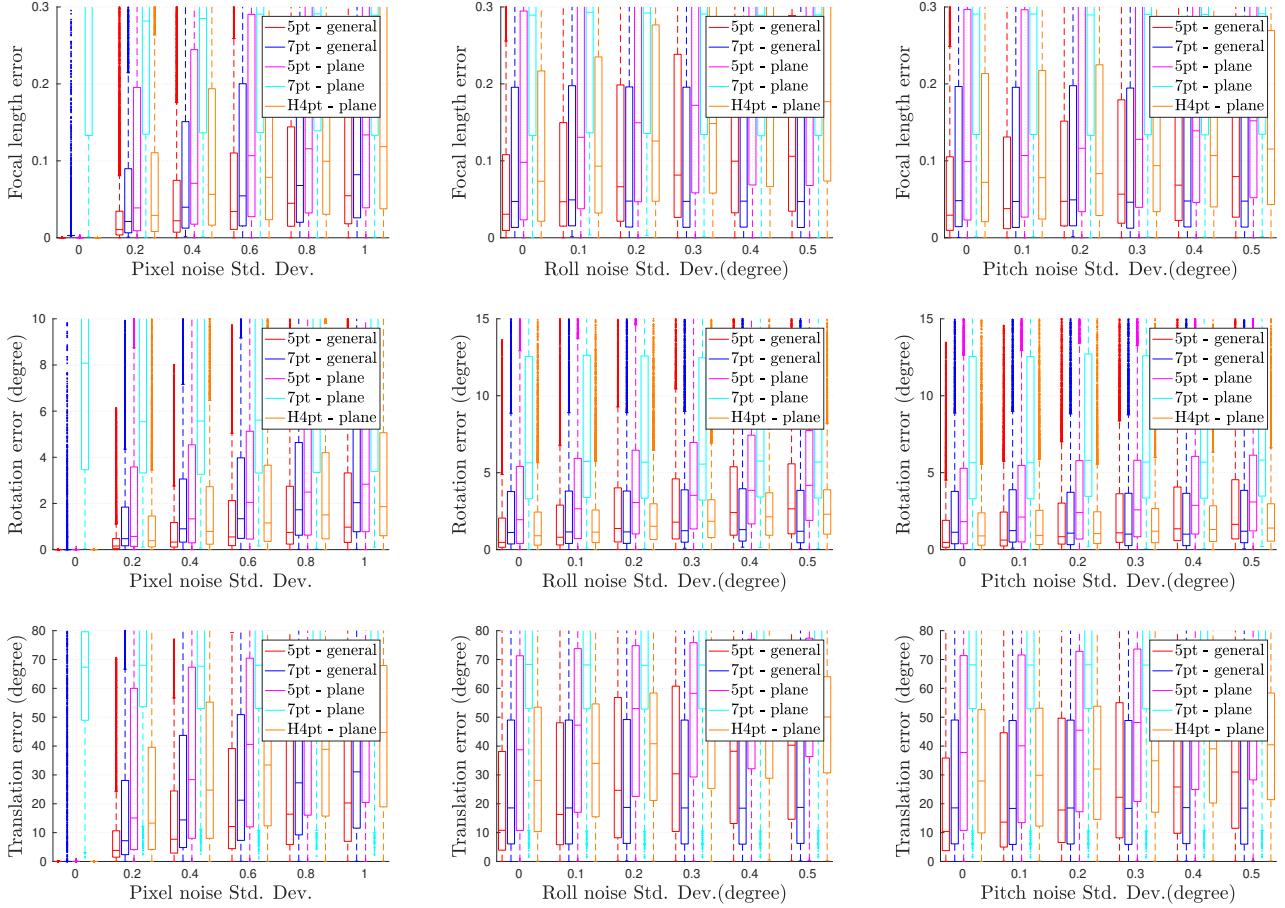


Figure 4: Performance under sideways motion for the different and unknown focal length case. **Top row:** focal length error. **Middle row:** Rotation error. **Bottom row:** Translation error.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.5161	0.4489	0.3780	0.7581	1.3553	0.4605
	mean	0.8794	0.6089	0.4106	1.4490	1.7638	0.5486
Translation error in degree	median	20.5728	6.1478	3.4994	18.5667	13.8252	4.9718
	mean	29.6738	9.7115	5.2482	30.6279	14.6325	6.6597
Focal length error (%)	median	25.12	21.11	5.60	50.27	43.41	16.03
	mean	38.52	36.24	14.78	51.90	44.65	23.84

(a)

(b)

Table 1: Median and mean relative errors in the estimated rotation, translation and focal length on 839 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.5564	0.5008	0.4745	0.7337	1.8769	0.5615
	mean	0.8085	0.6099	0.5332	1.0180	2.4096	0.6126
Translation error in degree	median	15.2535	7.84372	3.6431	19.8128	17.0173	5.1540
	mean	23.6661	10.0618	4.9687	26.7780	18.6251	6.8178
Focal length error (%)	median	18.21	28.41	8.87	44.88	47.46	14.07
	mean	29.97	34.10	14.95	51.75	53.93	21.12

(a)

(b)

Table 2: Median and mean relative errors in the estimated rotation, translation and focal length on 842 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.8825	0.6919	0.5927	0.9189	2.1183	0.5385
	mean	1.9574	0.8560	0.6168	2.1906	2.7899	0.7118
Translation error in degree	median	29.6891	12.8934	4.9070	40.2979	28.8053	6.7558
	mean	35.4475	15.2077	5.6724	41.1688	26.8515	9.8934
Focal length error (%)	median	37.98	43.15	11.31	54.31	52.36	27.07
	mean	44.67	46.82	20.00	54.58	57.13	37.33

(a)

(b)

Table 3: Median and mean relative errors in the estimated rotation, translation and focal length on 534 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.3949	0.8294	0.3712	0.6146	3.1926	0.4036
	mean	0.6672	1.0847	0.4494	0.8204	3.2130	0.5683
Translation error in degree	median	2.2923	7.2963	2.0123	5.2429	11.4773	3.0876
	mean	4.4875	11.1112	3.4426	8.4639	13.4639	4.9117
Focal length error (%)	median	13.69	43.60	11.18	44.51	51.15	20.55
	mean	24.10	45.32	16.44	49.68	42.94	30.56

(a)

(b)

Table 4: Median and mean relative errors in the estimated rotation, translation and focal length on 434 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.4476	0.5648	0.3662	0.5712	2.2499	0.5237
	mean	0.7960	0.7683	0.4372	0.7820	2.8463	0.6215
Translation error in degree	median	3.4676	8.0050	2.9877	6.4101	9.4254	5.7730
	mean	6.8629	11.4300	3.9750	11.5707	14.5480	7.7085
Focal length error (%)	median	7.37	42.21	9.80	46.36	41.69	30.06
	mean	22.39	43.37	14.26	50.28	45.84	37.33

(a)

(b)

Table 5: Median and mean relative errors in the estimated rotation, translation and focal length on 1015 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.9302	0.6670	0.4959	1.1731	1.7699	0.6359
	mean	1.5251	0.7754	0.5861	1.5192	2.1232	0.7401
Translation error in degree	median	32.8021	8.1086	3.7424	36.7195	14.5543	4.8271
	mean	37.2051	10.7536	5.8474	42.1550	15.1866	8.2175
Focal length error (%)	median	25.83	34.74	12.23	57.56	59.89	19.84
	mean	41.47	42.72	21.38	57.38	58.01	28.37

(a)

(b)

Table 6: Median and mean relative errors in the estimated rotation, translation and focal length on 1839 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.



		3.5pt [3]	6pt [4]	4pt	H4pt [3]	7pt [2]	5pt
Rotation error in degree	median	0.5119	0.5845	0.3715	0.8658	1.3710	0.3761
	mean	0.7571	0.7753	0.4435	1.2413	1.7518	0.4782
Translation error in degree	median	3.7547	8.2716	4.7496	5.5202	12.0806	5.9753
	mean	13.1361	11.1310	7.0652	21.1360	13.8622	8.4681
Focal length error (%)	median	13.53	43.83	20.86	34.91	61.75	27.34
	mean	33.62	49.20	29.54	49.21	58.33	34.58

(a)

(b)

Table 7: Median and mean relative errors in the estimated rotation, translation and focal length on 1713 images. (a) Shared and unknown focal length. (b) Different and unknown focal lengths.

References

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