

Distance Histograms and Statistics from Annotated Positions to the Keypoint Positions of the Ground Truth Matches & Statistics about Spatial Distance Thresholds t_d

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Abstract. This document presents histograms and statistics on the distances from the right keypoint positions of the Ground Truth Matches (GTM) to the annotated positions. At the end of this document a table lists statistics about the estimated thresholds t_d used for generating the GTM for various datasets.

Dataset	Detector	GTM Descr.	\tilde{d}_a^{GTM}	$\Delta \tilde{d}_a$	Matching precision using SIFT descriptors			
					$d_a^{GTM} < t_d$	$4 < d_a^{GTM} \leq 8$	$d_a^{GTM} > 8$	Occ.
KITTI 2015 flow	FAST	FREAK	0.629	0.154	0.761	0.476	0.333	0
KITTI 2015 flow	SIFT	FREAK	0.576	-0.037	0.848	0.154	0	0.143
KITTI 2015 flow	SIFT	SIFT	0.668	0.005	0.836	0.200	0.238	0.143
KITTI 2015 disp.	FAST	FREAK	0.802	0.102	0.790	0.636	0.333	0.313
KITTI 2015 disp.	SIFT	FREAK	0.811	-0.048	0.798	0.250	0.222	0.500
KITTI 2012 disp.	FAST	FREAK	0.690	0.205	0.788	0.500	0.333	0.417
Oxford wall	FAST	FREAK	0.547	-0.419	0.764	0.500	0	0
Oxford wall	SIFT	FREAK	0.524	-0.579	0.759	0	0	0
Oxford wall	SIFT	SIFT	0.722	-0.512	0.766	0	0.016	0
Oxford graffiti	FAST	FREAK	1.080	0.483	0.529	0.228	0.2	0
Oxford bark	FAST	FREAK	1.189	-0.387	0.245	0.064	0.016	0

Table 1. GTM accuracy for various datasets as a result from annotation using the median distances \tilde{d}_a^{GTM} from the annotated positions to the keypoint positions of the GTM. $\Delta \tilde{d}_a = \tilde{d}_a^{GTM} - \tilde{d}_a^{GT}$ specifies the difference of the GTM to the GT errors shown in Table 3 of the paper. The GTM used for annotation was generated using the descriptors stated in the table. The precision is calculated for GTM featuring different classes of distances d_a^{GTM} .

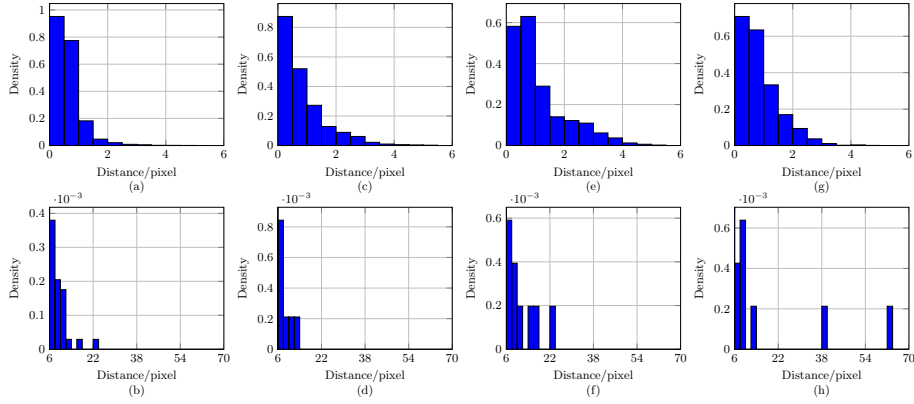


Fig. 1. Density over the pixel distances from annotated positions to the right keypoint positions of the GTM for (a)-(b) HCI flow [1], (c)-(d) KITTI 2015 flow [2], (e)-(f) KITTI 2015 disparity [2], and (g)-(h) KITTI 2012 disparity [3]. The annotated positions are based on randomly selected matches of the GTM using FAST keypoints.

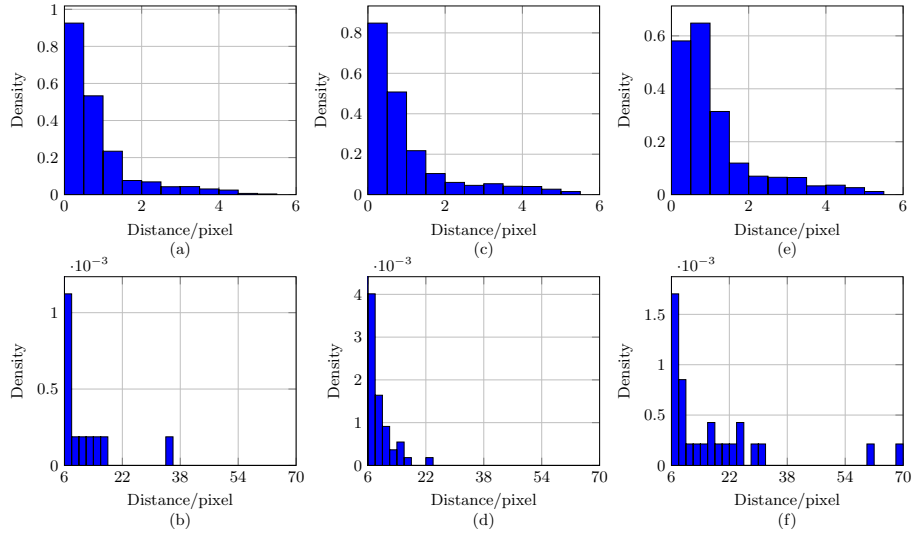


Fig. 2. Density over the pixel distances from annotated positions to the right keypoint positions of the GTM for (a)-(b) KITTI 2015 flow [2] (GTM generated with SIFT keypoints and FREAK descriptors), (c)-(d) KITTI 2015 flow [2] (GTM generated with SIFT features), and (e)-(f) KITTI 2015 disparity [2] (GTM generated with SIFT keypoints and FREAK descriptors). The annotated positions are based on randomly selected matches of the GTM using SIFT keypoints.

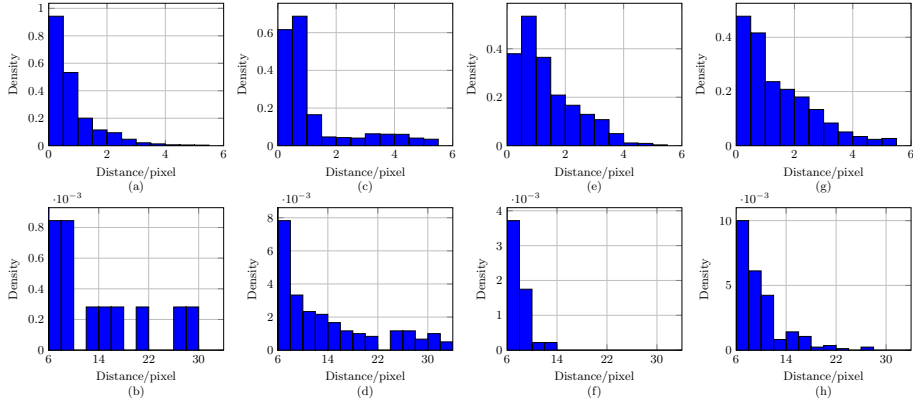


Fig. 3. Density over the pixel distances from annotated positions to the right keypoint positions of the GTM for (a)-(b) Oxford wall [4] (GTM generated with FAST keypoints and FREAK descriptors), (c)-(d) Oxford wall [4] (GTM generated with SIFT features), (e)-(f) Oxford graffity [4] (GTM generated with FAST keypoints and FREAK descriptors), and (g)-(h) Oxford bark [4] (GTM generated with FAST keypoints and FREAK descriptors). The annotated positions are based on randomly selected matches of the GTM.

Dataset	Detector	Descriptor	Mean	Median	Q_1	Q_3	Min	Max	σ	Range
KITTI 2015 disp.	FAST	FREAK	3.68	3.63	3.4	3.89	2.65	5.12	0.43	2.47
KITTI 2015 disp. 2012	FAST	FREAK	2.67	2.62	2.47	2.81	2.1	4.14	0.31	2.04
KITTI 2015 flow	FAST	FREAK	2.91	2.97	2.72	3.17	2	4.78	0.47	2.78
Oxford bark	FAST	FREAK	3.12	2.99	2.9	3.08	2.73	4.44	0.43	1.71
Oxford graffiti	FAST	FREAK	3.6	3.62	3.52	3.72	3.04	4.05	0.23	1.01
Oxford wall	FAST	FREAK	2.77	2.81	2.63	2.93	2.42	3.03	0.19	0.61
KITTI 2015 disp.	SIFT	FREAK	4.99	4.95	4.72	5.26	3.73	6.41	0.45	2.68
KITTI 2015 flow	SIFT	FREAK	4.36	4.53	4.13	4.98	2	6.09	0.95	4.09
Oxford wall	SIFT	FREAK	4.51	4.63	3.98	5.15	2.91	5.39	0.75	2.48
All	All	All	3.71	3.56	2.83	4.63	2	6.41	1.02	4.41

Table 2. Statistics about the used distance thresholds t_d in pixels for the KITTI 2015 [2] and Oxford [4] datasets. Q_1 denotes the lower quartile, Q_3 the upper quartile, and σ the standard deviation of the used thresholds.

References

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