

Appendix C. Detailed segmentation statistics.

The tables in this appendix show distribution statistics, by finger position, for the segmentation algorithms tested as compared to the hand marked ground truth for 3-inch slap images. The differences between the segmentation algorithm and ground truth are sorted into bins based on the tolerances allowed for correct segmentation. Specifically, the left/right edges must be within $-32/+64$ pixels of the ground truth, top edge $-64/+64$ and bottom edge $-64/+128$. For each finger position there is a column for each of the four segmentation box edges (L, R, T and B).

The first row ("No Finger Found") shows the counts for when a finger was not detected by the segmentation algorithm. The next four rows show statistics for segmentation edges that are within the specified minimum (MN) and maximum (MX) pixel tolerances compared to the ground truth, so these are considered good segmentations. Rows 1 ($MN \leq d < 0$) and 3 ($0 \leq d \leq MX$) show the average value for all differences in that range and rows 2 and 4 show the total count occurring in that range.

Rows 6-9 also show average difference values and bin counts but for ranges $MN-32 \leq d < MN$ and $MX < d \leq MX+32$, which are just outside the accepted tolerance ranges. Rows 10-13 tally everything greater than 32 pixels away from the accepted tolerance range, $d < MN-32$ and $d > MX+32$.

The last three rows show the total count for each bin, the overall average difference value and the standard deviation of all the difference values.

J

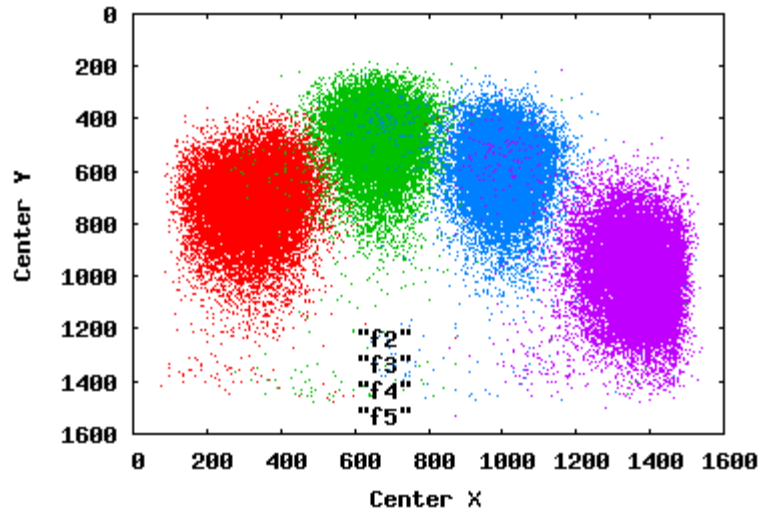
No Finger Found	R. Thumb 75				R. Index 3				R Middle 13				R. Ring 57				R. Little 760			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-13.04	-14.27	-19.34	-25.81	-13.03	-9.98	-24.86	-20.50	-12.88	-10.38	-23.98	-20.04	-10.51	-11.14	-23.77	-17.57	-11.78	-11.55	-23.80	-18.31
#	21888	19631	23619	10289	20800	19165	24008	6841	21255	19377	23838	4907	21321	16478	23816	4659	21536	16265	22798	11454
0 <= d <= MX	3.14	12.31	2.31	58.29	17.54	8.75	5.27	80.60	9.59	11.26	4.69	88.14	5.41	18.44	5.04	82.07	4.56	11.70	4.33	26.49
#	2043	3757	399	9787	3013	4717	651	2980	2962	4807	831	4974	2523	6953	779	4722	1431	6307	672	3139
MN-32 <= d < MN	-38.98	-40.48	-76.06	-71.01	-42.62	-44.48	-76.61	-77.05	-43.84	-40.43	-77.23	-78.60	-46.21	-41.42	-77.90	-79.67	-46.79	-40.65	-77.05	-76.32
#	360	735	178	2062	364	457	85	211	393	209	66	166	480	386	59	113	439	580	128	251
MX < d <= MX+32	#DIV/0!	76.38	#DIV/0!	142.73	79.42	79.12	87.00	144.90	76.00	79.27	79.07	144.21	79.13	77.56	87.31	144.49	79.43	79.25	73.00	146.32
#	0	84	0	1144	410	186	3	3535	31	213	7	4369	23	559	18	4187	7	411	3	782
d < MN-32	-199.55	-477.01	-160.51	-384.96	-130.09	-100.19	-603.05	-135.98	-252.30	-289.38	-572.61	-170.59	-148.29	-516.91	-567.07	-300.44	-103.05	-1146.37	-453.34	-874.29
#	70	181	142	381	100	185	120	104	205	92	222	108	415	190	188	152	550	1023	485	942
d > MX+32	827.30	211.07	892.57	186.95	124.78	341.16	205.33	206.88	281.99	293.32	218.63	208.81	425.64	187.78	179.43	208.50	1007.99	132.65	662.06	236.87
#	61	34	84	759	281	258	101	11297	122	270	4	10444	206	402	108	11135	1005	382	882	8400
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	-10.51	-13.77	-17.09	12.98	-7.18	-3.45	-26.08	116.90	-11.11	-3.45	-27.98	124.94	-8.19	-2.03	-26.13	127.27	27.61	-49.15	-7.42	45.45
Std Dev	45.71	64.21	58.04	104.24	25.05	46.93	50.79	108.34	38.55	45.59	66.62	105.74	53.49	66.70	56.45	105.83	218.17	253.29	146.36	231.32

No Finger Found	L. Thumb 9				L. Index 657				L. Middle 71				L. Ring 12				L. Little 0			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-13.79	-12.93	-21.04	-27.17	-12.31	-10.13	-23.96	-20.31	-12.94	-9.47	-23.06	-20.44	-13.37	-8.38	-22.19	-20.14	-12.93	-8.97	-22.24	-20.57
#	19573	21510	23898	9142	19989	17032	23708	5656	19843	17622	23714	4468	17139	16697	23548	5099	18915	17322	23162	11537
0 <= d <= MX	16.30	3.13	2.48	59.71	12.11	11.96	2.41	86.17	13.38	6.98	3.16	89.03	22.05	4.10	8.84	86.59	16.65	3.54	1.77	34.88
#	4018	2453	257	10466	3109	5706	431	2926	3896	6127	482	5350	6101	6725	724	5246	4063	5641	452	2511
MN-32 <= d < MN	-40.25	-40.27	-77.98	-70.19	-46.89	-41.97	-75.70	-78.31	-41.52	-41.83	-74.27	-78.88	-40.43	-44.74	-76.71	-79.45	-43.01	-46.12	-76.12	-75.79
#	514	323	115	2212	508	643	60	135	162	354	44	185	112	554	28	156	307	646	161	407
MX < d <= MX+32	75.80	#DIV/0!	82.50	142.75	78.88	79.14	92.00	144.88	77.71	75.61	80.25	144.40	77.04	78.80	81.73	144.41	79.45	79.13	76.33	145.77
#	148	0	1	1379	233	501	2	3795	189	31	18	4596	605	15	121	4327	522	16	3	966
d < MN-32	-270.92	-225.14	-275.62	-237.00	-99.10	-1256.62	-580.19	-738.35	-332.49	-511.45	-344.19	-275.43	-325.08	-132.16	-584.25	-189.41	-297.45	-96.05	-447.64	-220.42
#	116	101	121	242	317	719	97	719	632	157	667	178	674	224	149	125	784	520	529	728
d > MX+32	178.33	784.73	772.67	205.21	924.43	129.03	379.73	205.78	320.12	348.77	173.03	215.71	144.39	360.06	149.23	205.65	127.93	374.00	452.73	234.77
#	53	35	30	981	808	363	666	11733	242	673	39	10187	333	749	394	10011	373	819	657	8815
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	-9.66	-11.42	-21.34	23.01	20.10	-37.99	-15.01	102.55	-13.19	0.72	-30.84	127.48	-8.96	4.17	-21.50	120.14	-13.38	3.70	-18.66	74.88
Std Dev	32.87	37.90	40.25	87.40	180.79	221.32	78.93	179.46	70.20	81.42	65.47	112.13	62.14	69.71	57.99	101.54	59.04	74.45	103.77	137.21

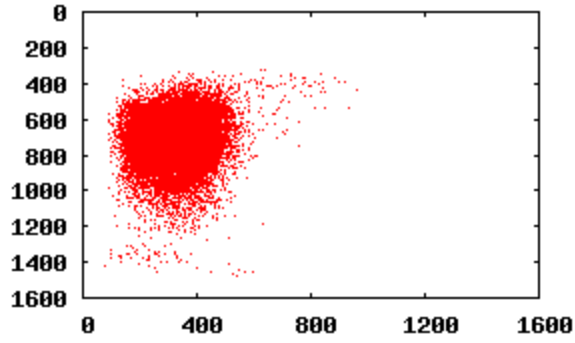
Appendix D. Plots of 3-inch segmentation box centers.

The plots in this appendix show the distribution of the segmentation box centers (x,y) for the 3-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of x,y positions detected. The plot for the ground truth (GT) is included as a baseline for comparison. The blank lines that appear in some of the plots are most likely caused by the segmentation algorithm doing some level of sampling of the input image. The reason the lines are not evenly distributed in some plots is an artifact of the sampling when scaling the images for displaying in the report.

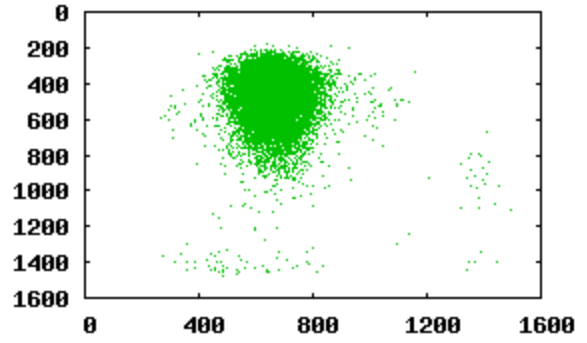
J R 3inch XY



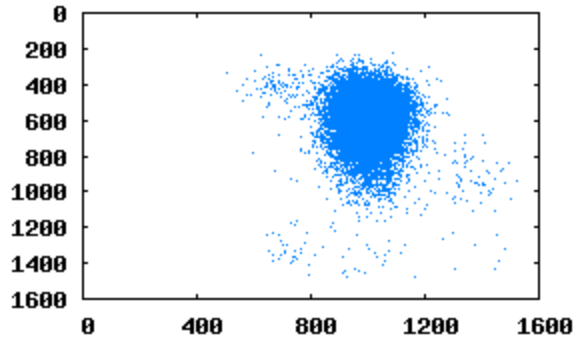
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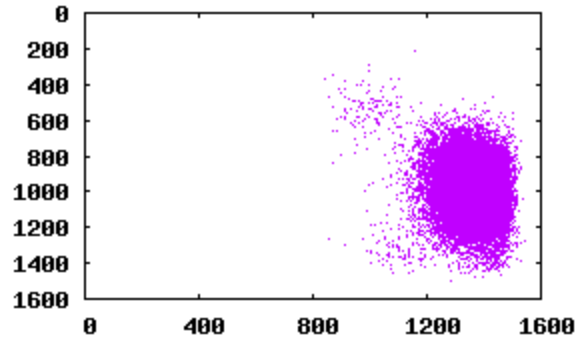
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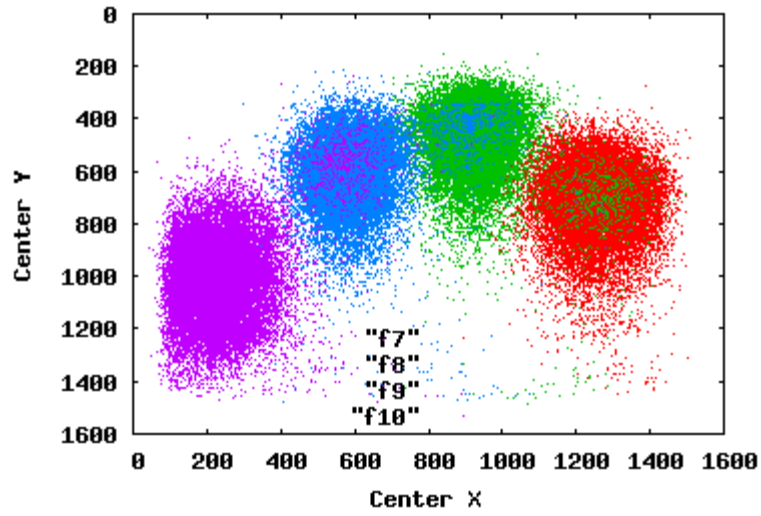
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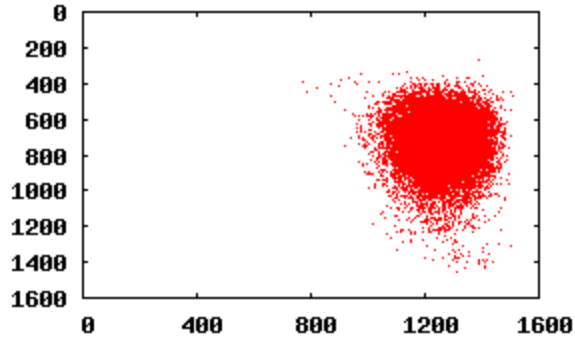
f5



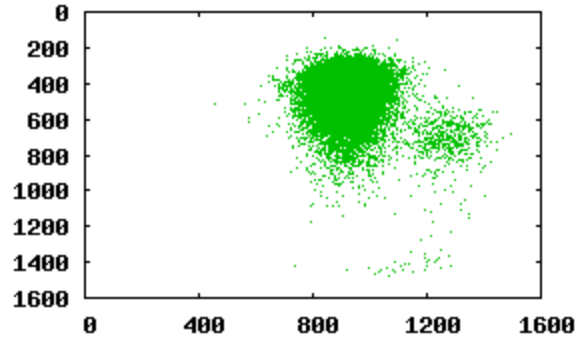
J L 3inch XY



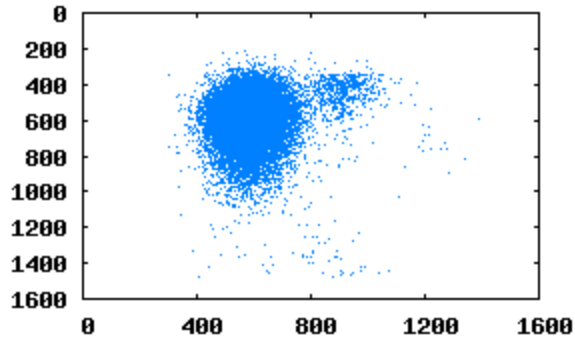
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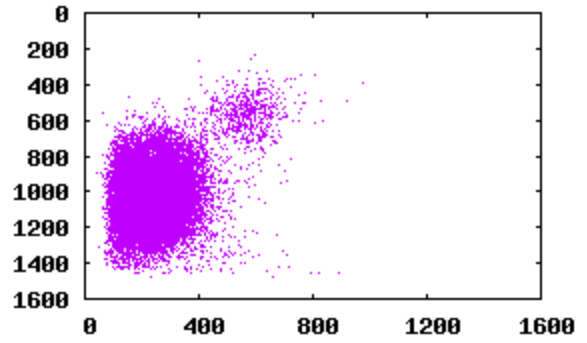
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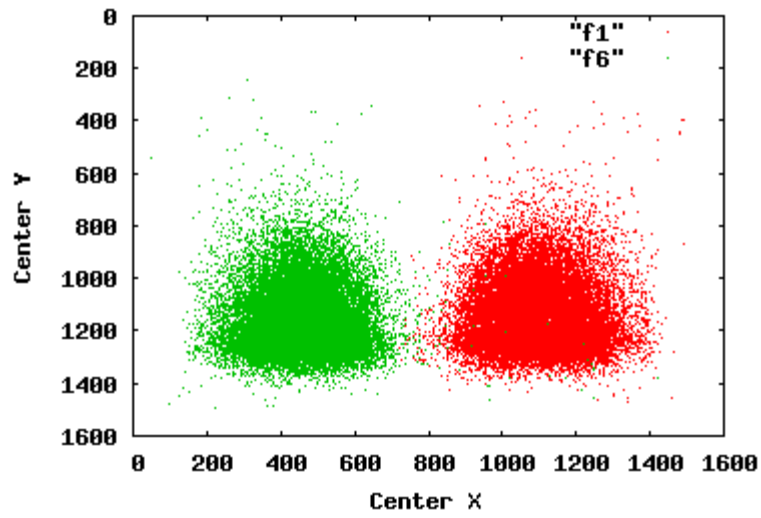
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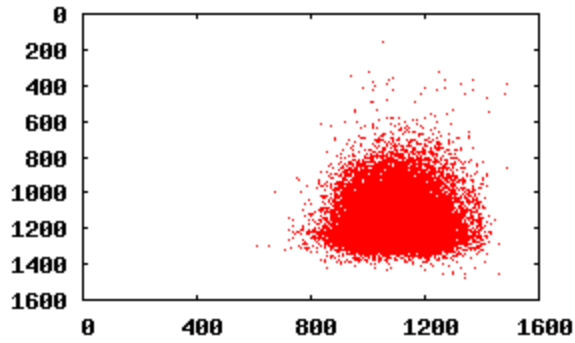
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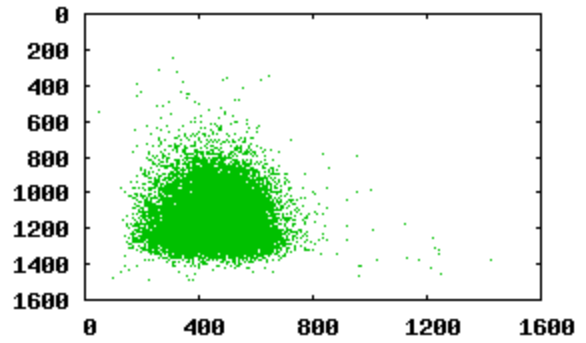
J T 3inch XY



f1



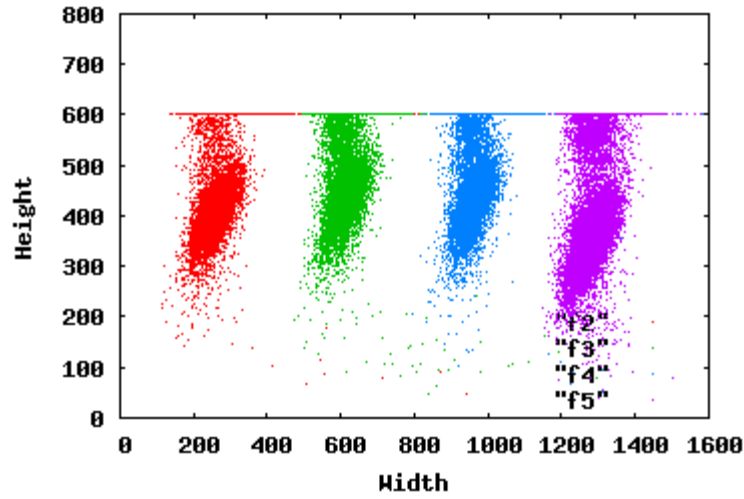
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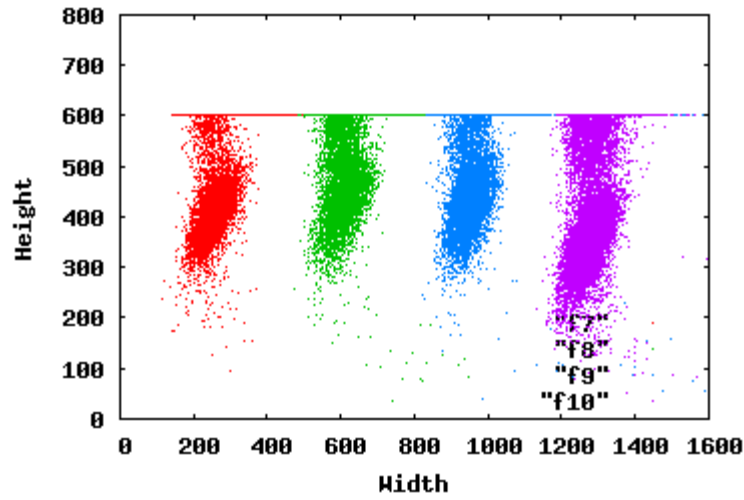
Appendix E. Plots of 3-inch segmentation box widths and heights.

The plots in this appendix show the distribution of the segmentation box widths and heights for the 3-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of widths and heights detected. The widths are “spread out” on the plot by adding 350, 750 and 1050 to the 2nd, 3rd, and 4th widths plotted. The plot for the ground truth (GT) is included as a baseline for comparison. The blank lines that appear in some of the plots are most likely caused by the segmentation algorithm doing some level of sampling of the input image. The reason the lines are not evenly distributed in some plots is an artifact of the sampling when scaling the images for displaying in the report.

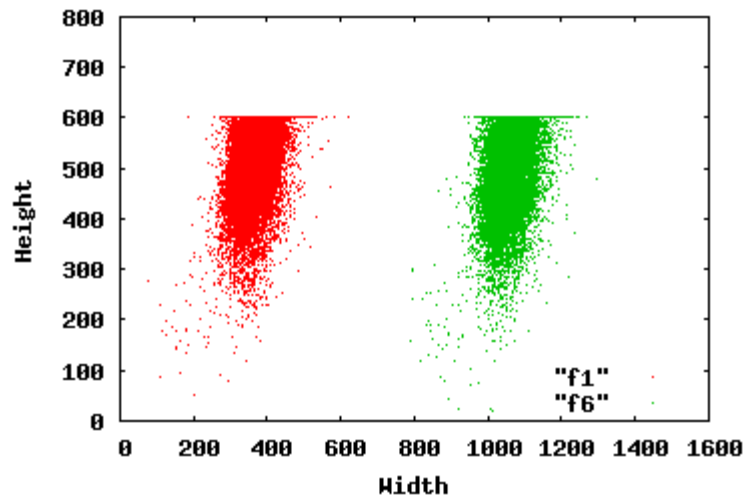
J R 3inch MH



J L 3inch MH



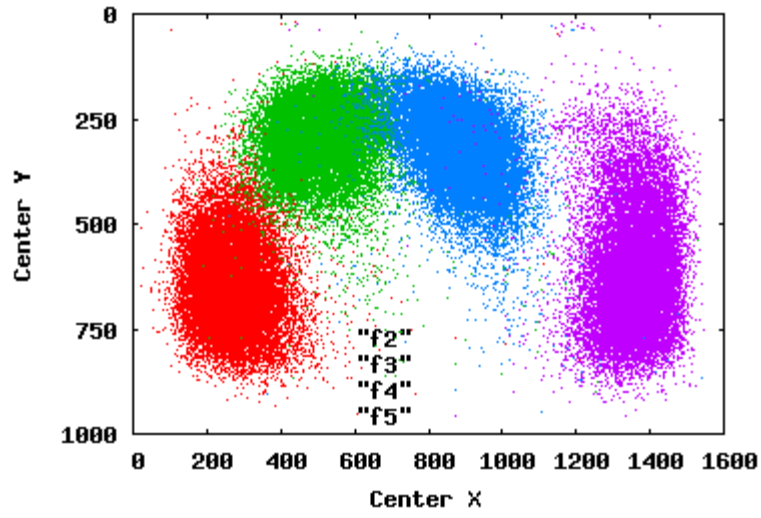
J T 3inch MH



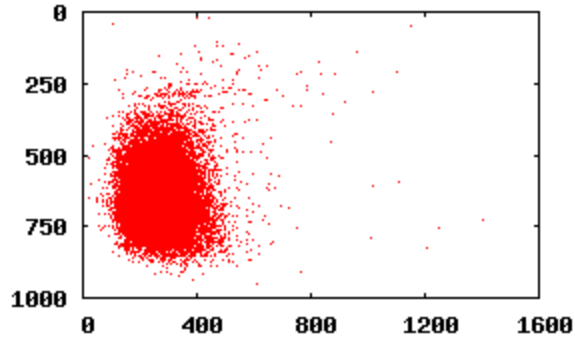
Appendix F. Plots of 2-inch segmentation box centers.

The plots in this appendix show the distribution of the segmentation box centers (x,y) for the 2-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of x,y positions detected. The plot for the ground truth (GT) is included as a baseline for comparison. The blank lines that appear in some of the plots are most likely caused by the segmentation algorithm doing some level of sampling of the input image. The reason the lines are not evenly distributed in some plots is an artifact of the sampling when scaling the images for displaying in the report.

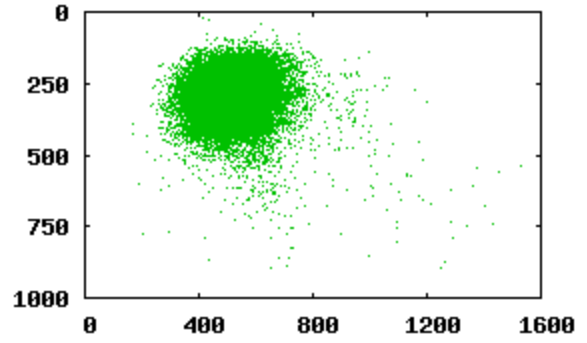
J R 2inch XY



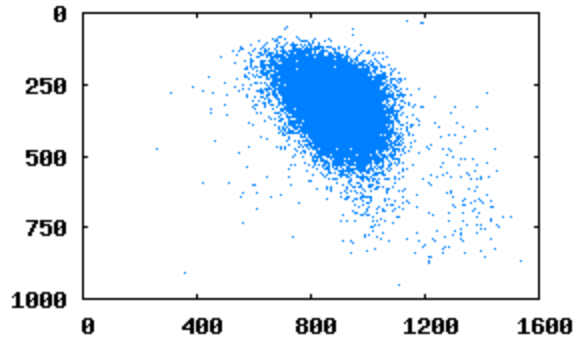
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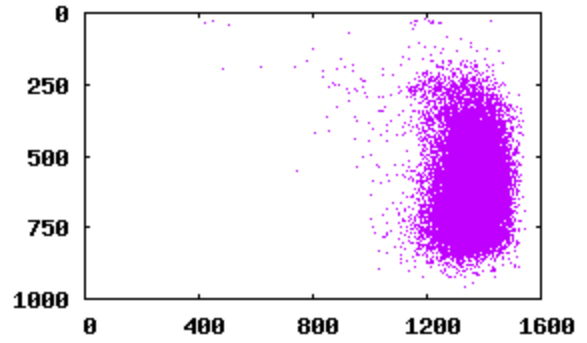
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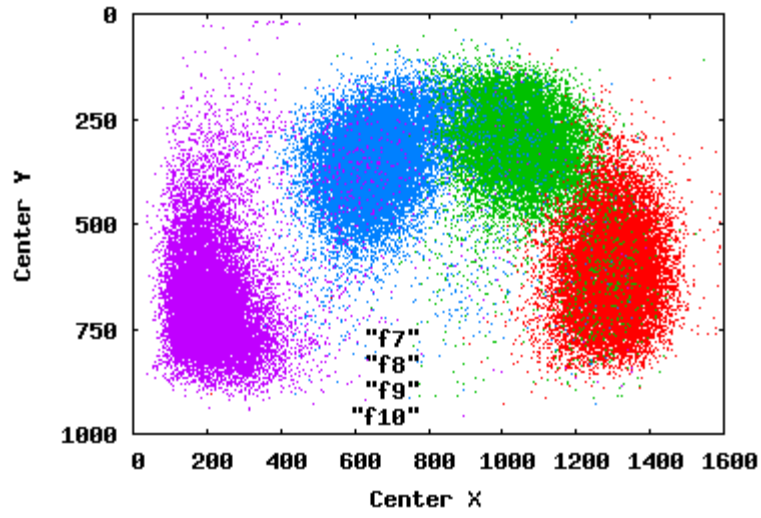
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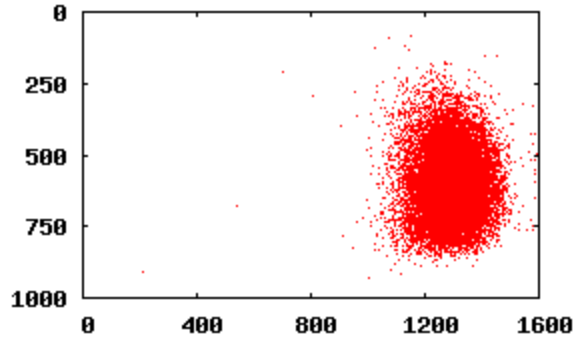
f5



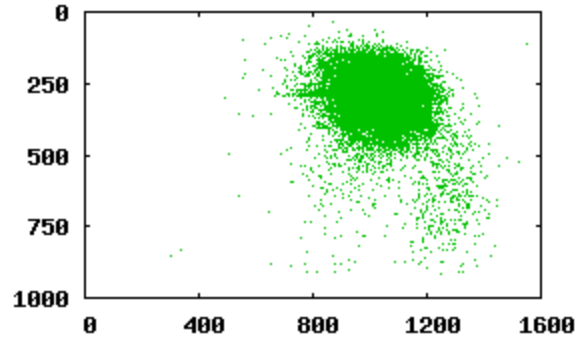
J L 2inch XY



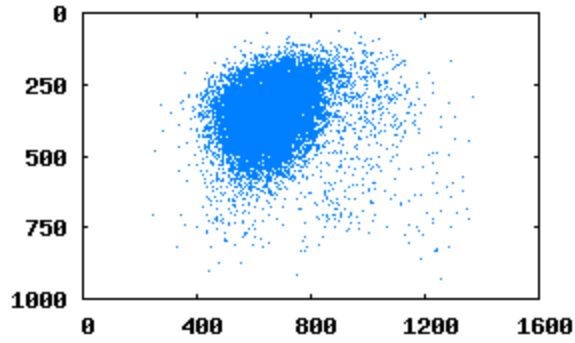
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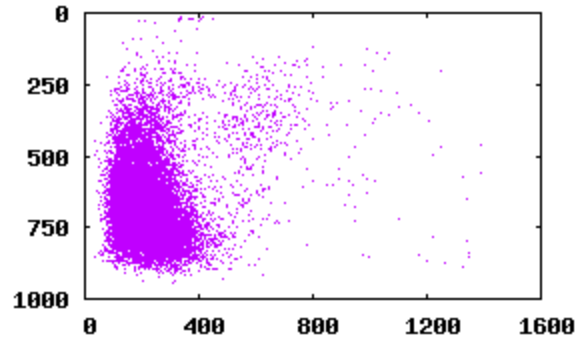
f8



f9



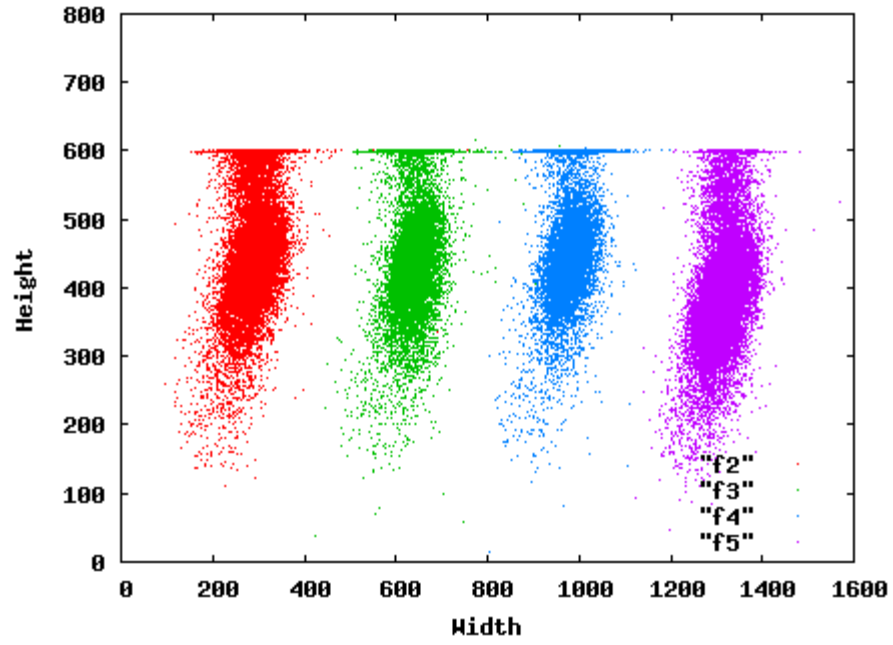
f10



Appendix G. Plots of 2-inch segmentation box widths and heights.

The plots in this appendix show the distribution of the segmentation box widths and heights for the 2-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of widths and heights detected. The widths are “spread out” on the plot by adding 350, 750 and 1050 to the 2nd, 3rd, and 4th widths plotted. The plot for the ground truth (GT) is included as a baseline for comparison. The blank lines that appear in some of the plots are most likely caused by the segmentation algorithm doing some level of sampling of the input image. The reason the lines are not evenly distributed in some plots is an artifact of the sampling when scaling the images for displaying in the report.

J R 2inch MH



J L 2inch MH

