

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.

C

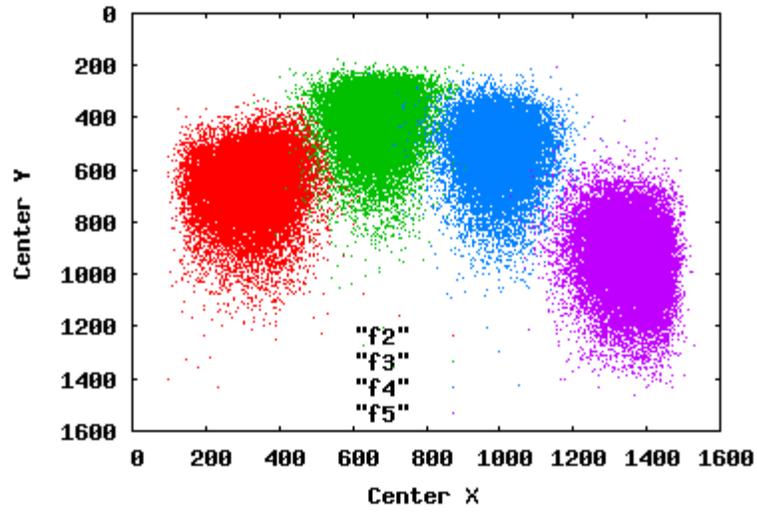
No Finger Found	R. Thumb 5				R. Index 3				R Middle 5				R. Ring 7				R. Little 19			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-6.29	-8.12	-9.53	-19.31	-6.30	-6.26	-8.07	-12.10	-5.05	-6.49	-8.18	-15.80	-4.56	-8.27	-7.41	-15.63	-5.39	-6.46	-9.17	-12.85
#	1555	2809	7521	12352	866	568	13852	1543	662	655	14584	2069	303	1409	13778	1834	713	2867	11784	1784
0 <= d <= MX	21.08	17.86	12.50	26.05	13.91	17.65	10.33	31.92	15.31	17.10	11.50	35.85	18.23	16.51	11.40	36.02	14.26	13.76	10.73	30.57
#	22825	21453	16825	11414	24081	24378	11096	23340	24294	24298	10372	22733	24647	23533	11176	22876	24234	22050	13145	23077
MN-32 <= d < MN	-55.00	-42.12	-78.34	-76.48	-44.00	-41.43	-68.00	-73.00	-36.00	-43.33	-74.33	-76.04	-35.50	-39.00	-77.80	-77.84	-42.43	-39.71	-70.80	-76.78
#	5	86	29	460	8	7	1	20	1	3	3	67	2	11	5	123	7	31	20	37
MX < d <= MX+32	78.75	74.33	66.00	142.04	70.50	77.33	77.25	139.77	74.25	76.25	#DIV/0!	139.81	77.20	77.00	78.00	140.88	75.67	80.19	74.00	141.92
#	4	21	1	23	2	3	4	32	4	4	0	52	5	4	2	73	3	8	1	19
d < MN-32	-373.85	-426.61	-421.94	-177.86	-285.44	-225.50	-584.40	-131.00	-437.00	-806.50	-280.50	-188.92	-590.40	-761.00	-411.50	-137.83	-412.13	-1489.31	-360.93	-439.52
#	26	31	40	140	9	1	15	8	6	1	7	19	5	3	6	41	4	8	7	22
d > MX+32	600.29	689.64	1063.50	706.88	160.00	473.50	#DIV/0!	634.82	555.50	508.43	333.75	270.29	429.17	518.00	358.50	306.24	932.07	428.13	555.41	270.22
#	7	22	6	33	2	11	0	25	1	7	2	28	6	8	1	21	7	4	11	29
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	19.08	14.75	5.16	1.04	13.10	17.29	-0.23	29.80	14.69	16.59	-0.06	31.58	17.94	15.17	0.92	31.92	13.88	10.98	1.41	27.26
Std Dev	22.51	39.78	30.96	52.46	10.38	13.88	20.99	32.45	11.93	13.80	13.94	28.75	14.38	17.77	14.12	29.73	20.83	37.11	20.30	31.12

No Finger Found	L. Thumb 23				L. Index 0				L. Middle 0				L. Ring 7				L. Little 16			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-7.18	-5.71	-8.83	-19.02	-4.70	-8.88	-8.04	-11.92	-4.06	-6.91	-8.43	-16.12	-4.33	-7.64	-7.14	-15.86	-8.42	-7.96	-9.59	-12.80
#	3399	562	8569	12199	435	1484	13617	1565	591	858	14364	2321	724	608	13279	2565	2621	968	11203	2135
0 <= d <= MX	16.97	22.09	12.35	25.74	16.17	17.25	10.33	31.64	15.52	18.60	11.33	35.15	15.37	19.87	12.57	32.68	13.78	17.86	11.36	28.81
#	20873	23798	15781	11695	24504	23440	11329	23330	24347	24080	10577	22454	24218	24327	11663	22148	22297	23950	13709	22704
MN-32 <= d < MN	-43.96	-44.31	-75.56	-77.19	-37.00	-36.46	-82.88	-75.96	-39.33	-40.25	-76.00	-76.63	#DIV/0!	-42.71	-70.00	-78.65	-39.00	-39.11	-69.82	-74.79
#	67	16	27	332	1	28	8	25	3	4	8	64	0	7	2	136	20	22	19	28
MX < d <= MX+32	74.79	82.00	67.00	141.84	71.50	#DIV/0!	#DIV/0!	140.86	77.14	70.17	80.50	139.02	69.13	74.40	76.00	139.73	81.44	79.00	65.00	143.16
#	39	3	1	31	10	0	0	14	7	6	2	64	8	5	1	51	9	2	1	35
d < MN-32	-268.90	-448.90	-384.94	-309.73	-961.04	#DIV/0!	-430.20	-125.29	-605.22	-395.50	-585.35	-113.70	-415.00	-701.22	-522.08	-197.12	-171.90	-370.42	-473.69	-562.39
#	24	34	24	132	12	0	10	7	9	6	13	20	5	9	12	42	5	12	18	23
d > MX+32	338.03	804.06	929.33	414.48	115.00	1234.79	#DIV/0!	517.24	385.29	848.80	#DIV/0!	431.52	602.11	496.94	365.29	502.73	197.00	307.40	557.14	409.56
#	20	9	20	33	2	12	0	23	7	10	0	41	9	8	7	22	12	10	14	39
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	13.52	21.05	5.19	0.84	15.36	16.22	0.10	29.26	14.95	17.95	-0.37	30.90	14.95	19.08	1.93	27.33	11.48	16.74	1.85	25.34
Std Dev	21.08	28.64	34.20	55.21	23.95	29.53	16.18	27.63	16.43	20.57	19.37	34.52	15.99	19.69	19.20	34.87	12.22	15.04	25.10	37.15

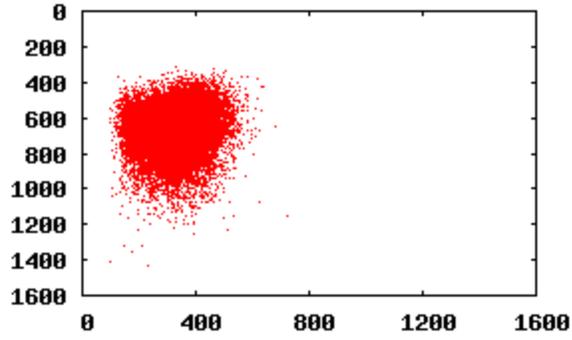
Appendix D. Plots of 3-inch segmentation box centers.

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.

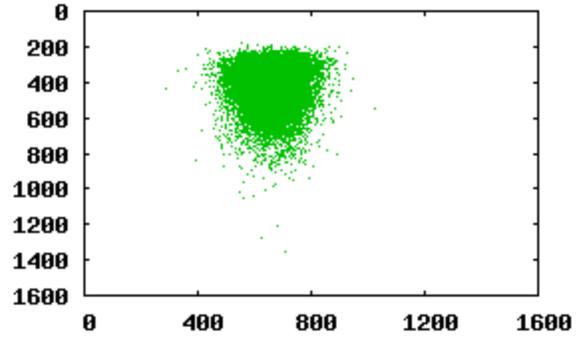
C R 3inch XY



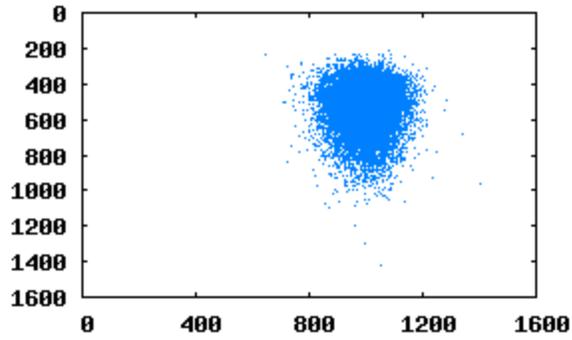
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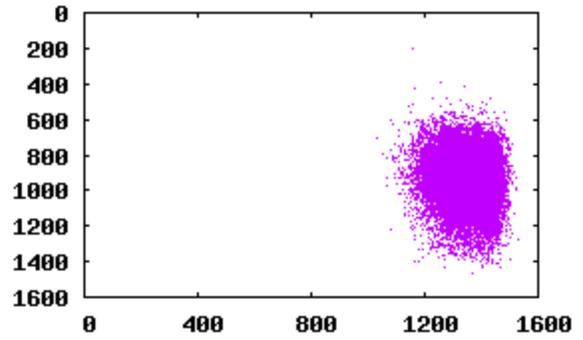
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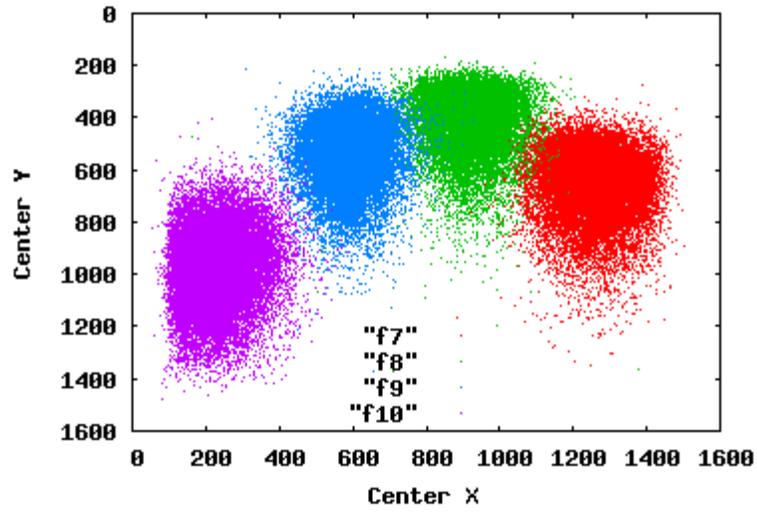
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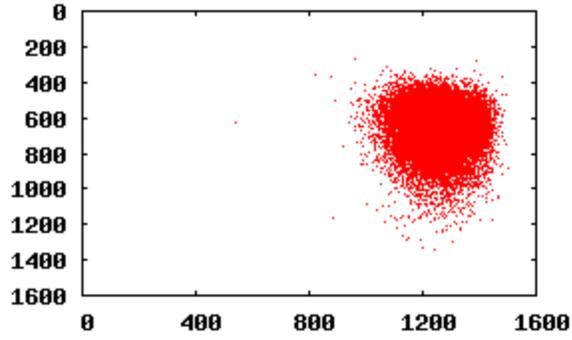
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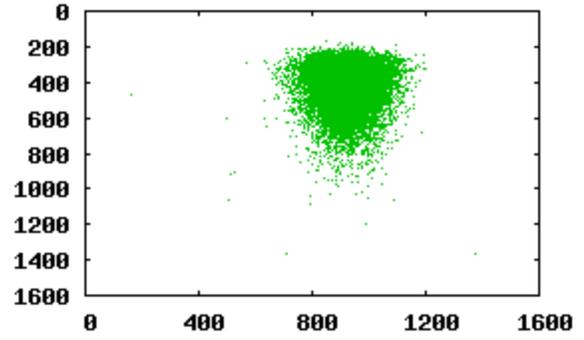
C L 3inch XY



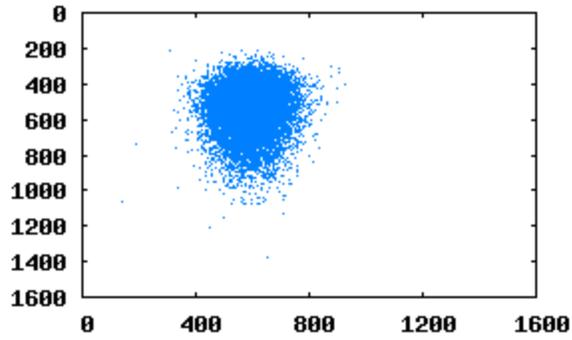
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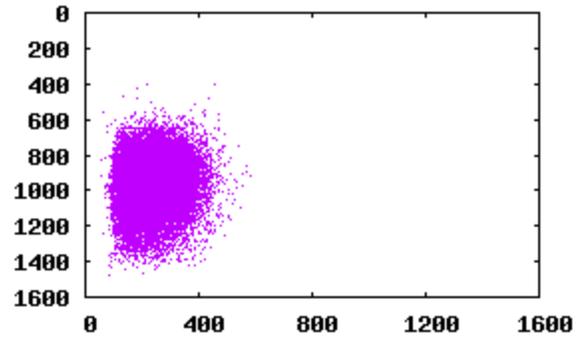
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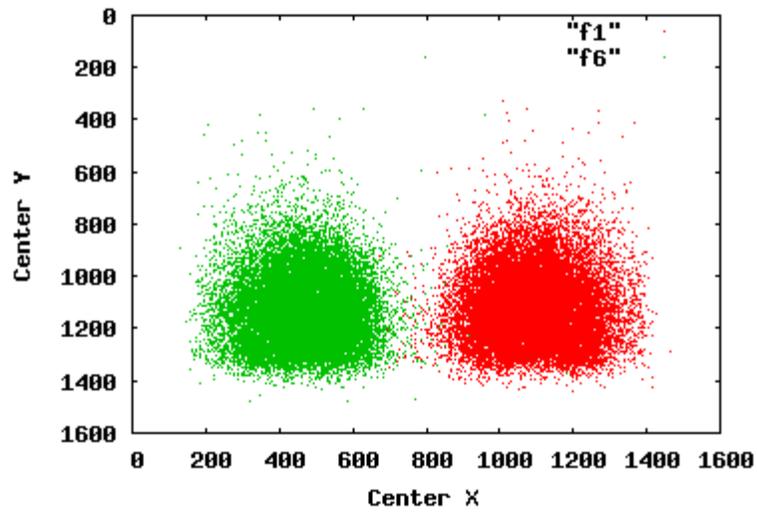
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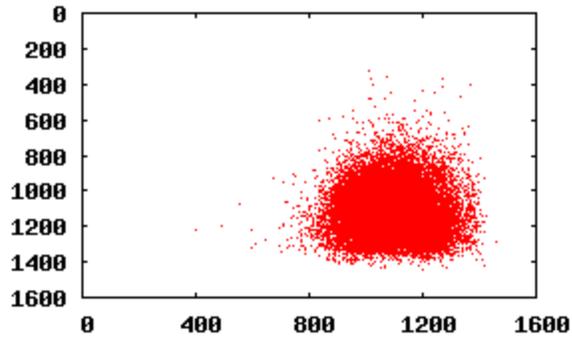
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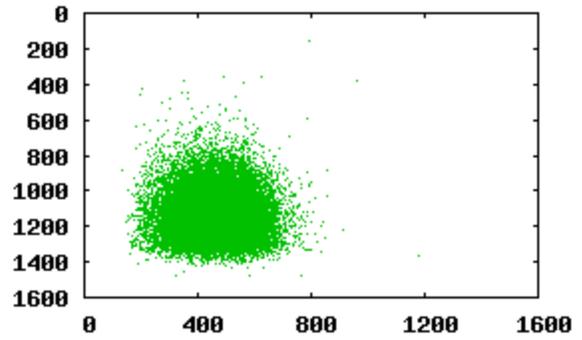
C T 3inch XY



f1



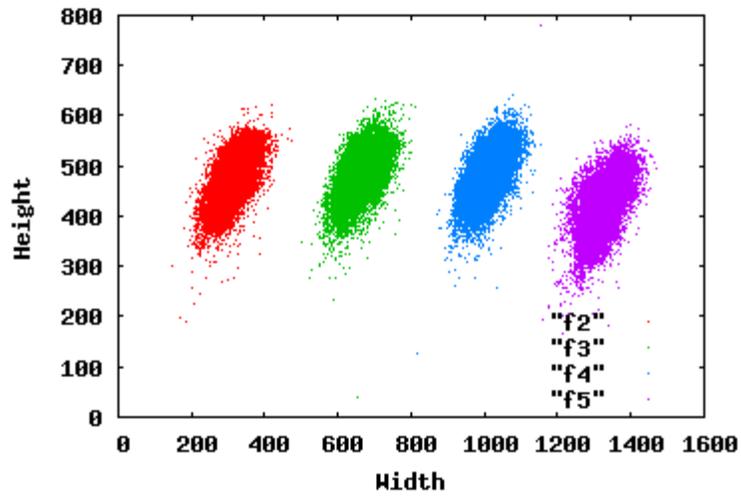
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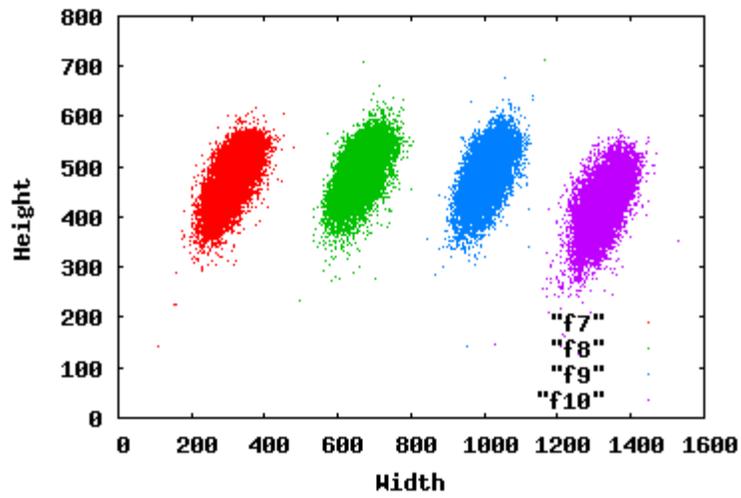
Appendix E. Plots of 3-inch segmentation box widths and heights.

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.

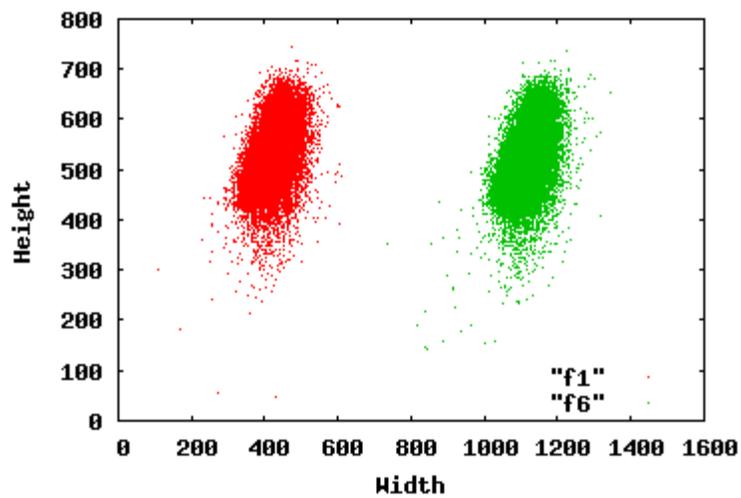
C R 3inch MH



C L 3inch MH



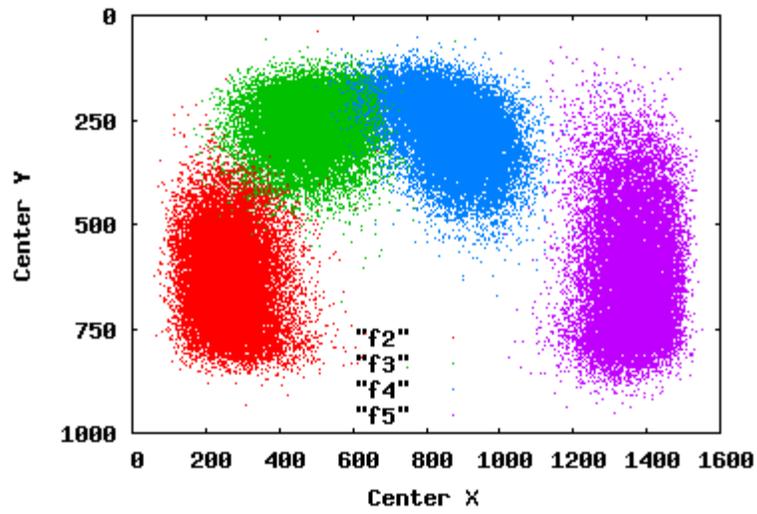
C T 3inch MH



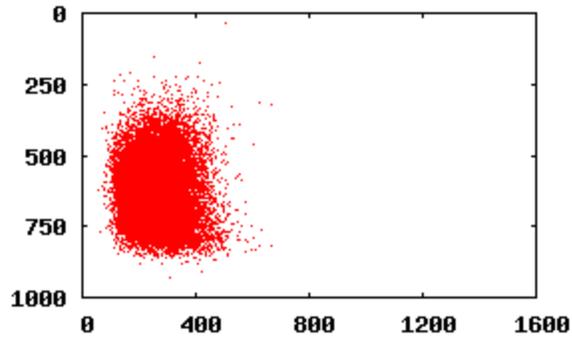
Appendix F. Plots of 2-inch segmentation box centers.

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.

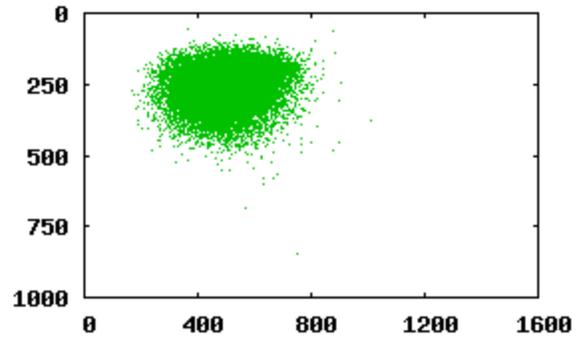
C R 2inch XY



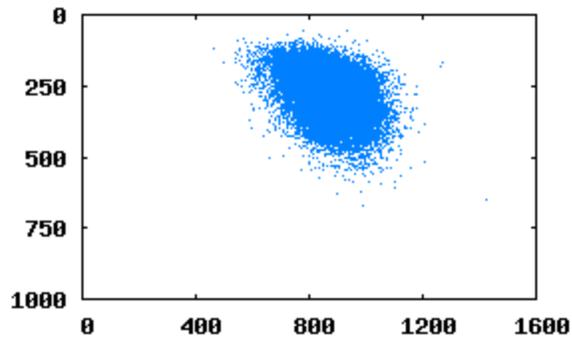
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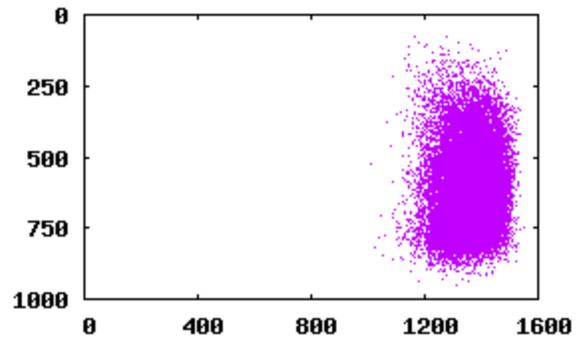
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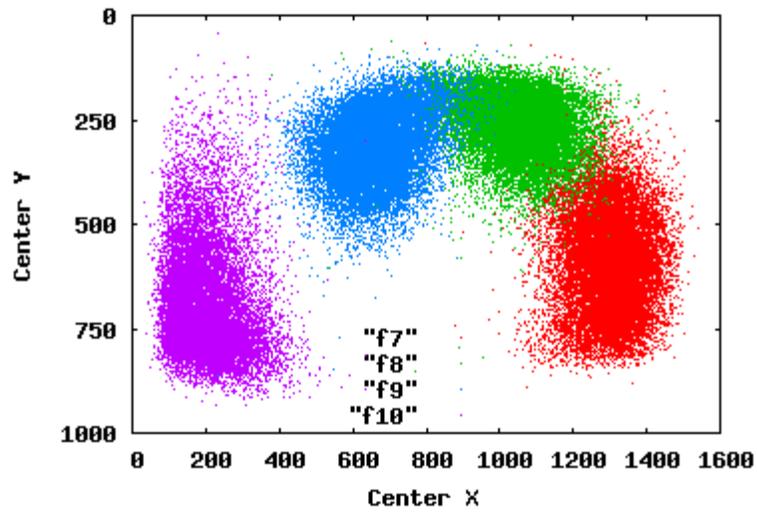
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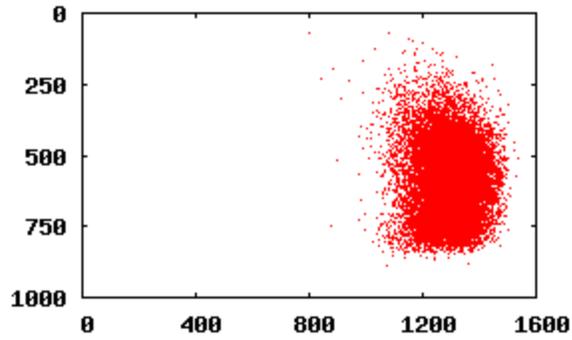
f5



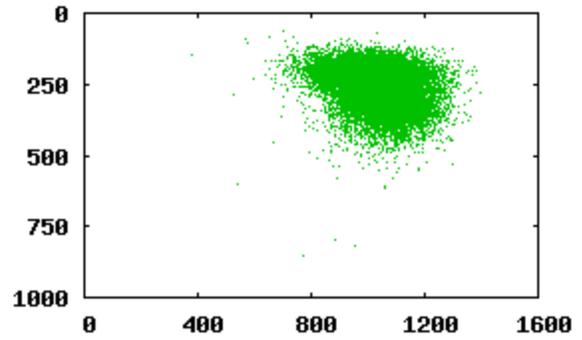
C L 2inch XY



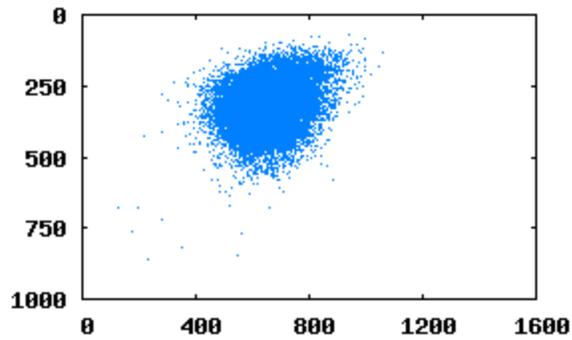
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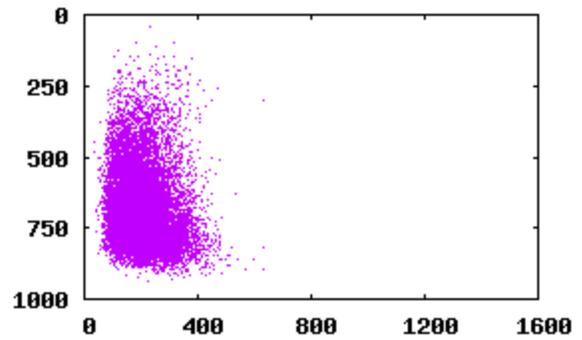
f8



f9



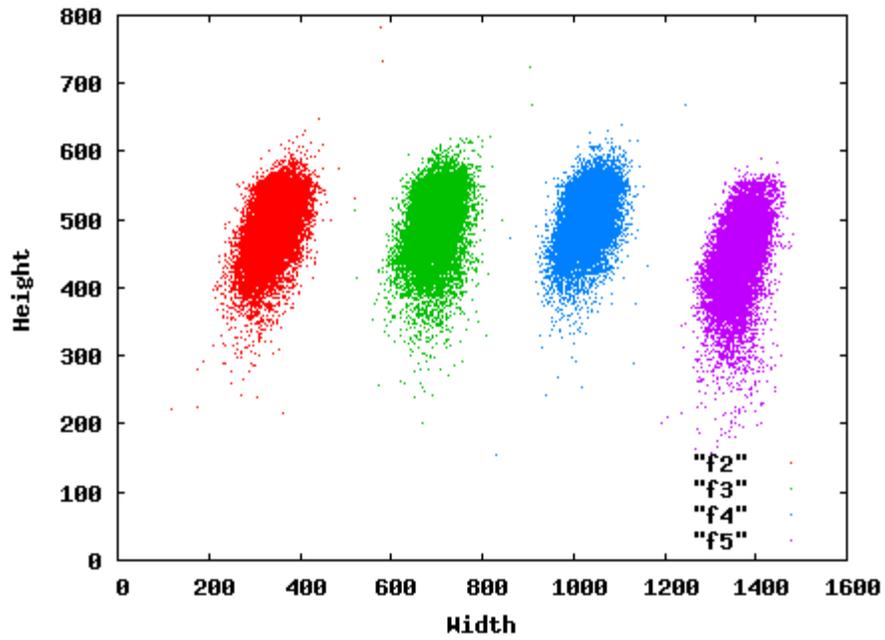
f10



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.

C R 2inch MH



C L 2inch MH

