Appendix C. Detailed segmentation statistics.

The tables is 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 <= d < 0) and 3 (0 <= d <= MX) show the average value for all differences in that range and rows 3 and 5 show the total count occurring in that range.

Rows 6-9 also show average difference values and bin counts but for ranges MN-32 <= d < MN and MX < d <= 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.

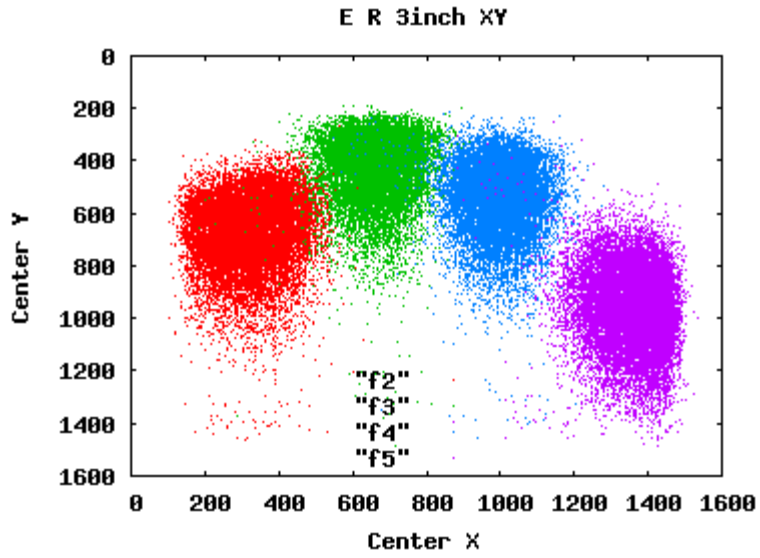
E

	R. Thumb				R. Index				R Middle				R. Ring				R. Little			
No Finger Found	**15**				**63**				**30**				**21**				**77**			
	L	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**
MN <= d < 0	-4.31	-5.44	-10.48	-12.86	-4.55	-6.16	-10.12	-11.19	-2.68	-6.59	-10.35	-12.65	-3.15	-7.74	-10.54	-11.75	-4.44	-4.50	-10.61	-11.81
#	508	450	15905	6242	780	185	16537	691	819	222	15757	1157	356	658	15161	891	511	1062	14814	235
0 <= d <= MX	18.97	20.31	5.62	22.99	22.98	28.02	10.88	35.88	23.27	26.02	11.55	35.31	23.76	24.47	11.68	36.91	20.98	20.87	11.50	44.15
#	23883	23803	8441	17021	23813	24257	8296	23602	23702	24338	9130	22881	24371	23942	9728	23067	24192	23556	9913	23936
MN-32 <= d < MN	-45.00	-43.50	-78.42	-77.31	-44.88	-40.90	-74.94	-74.63	-49.00	-35.50	-74.80	-78.80	-48.50	-37.50	-67.00	-76.75	-46.36	-44.50	-72.46	-72.33
#	2	13	33	149	4	5	9	16	2	2	5	79	3	1	6	64	32	2	24	6
MX < d <= MX+32	69.83	74.25	#DIV/0!	143.76	73.70	75.24	68.33	144.71	74.30	75.72	75.17	143.30	76.04	75.82	85.00	144.32	74.16	75.06	77.50	142.17
#	3	110	0	349	274	399	3	160	347	281	9	268	156	262	3	368	81	166	1	113
d < MN-32	-435.97	-640.64	-291.91	-220.50	-302.92	-437.45	-771.69	-729.27	-444.00	-533.21	-506.05	-350.57	-195.18	-540.65	-784.56	-257.37	-87.11	-880.75	-410.97	-759.55
#	17	14	34	108	6	57	61	62	4	49	46	45	11	47	25	63	23	118	118	96
d > MX+32	589.17	390.59	788.17	219.11	176.73	160.23	373.44	285.56	296.27	142.57	186.45	235.08	417.15	153.87	221.18	223.98	790.09	136.00	596.32	270.89
#	9	32	9	553	91	65	62	437	94	76	21	538	71	58	45	515	129	64	98	582
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	18.38	20.15	-5.10	18.30	23.15	27.79	-4.07	37.68	24.08	25.54	-3.07	37.49	24.72	23.40	-2.24	39.58	24.42	16.18	-1.40	46.23
Std Dev	20.25	30.18	23.96	55.57	18.36	28.39	45.65	62.89	26.05	31.96	29.60	48.24	29.45	34.36	30.76	46.44	64.90	75.33	50.80	70.13

	L. Thumb				L. Index				L. Middle				L. Ring				L. Little			
No Finger Found	**12**				**58**				**18**				**21**				**70**			
	L	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**
MN <= d < 0	-2.68	-6.59	-10.35	-12.65	-2.90	-8.46	-10.18	-9.90	-2.26	-7.06	-10.50	-12.84	-2.49	-8.27	-10.39	-10.55	-7.82	-8.77	-10.88	-11.40
#	819	222	15757	1157	568	648	16181	658	852	335	15211	1272	1022	235	14177	1241	2308	358	13711	369
0 <= d <= MX	23.27	26.02	11.55	35.31	23.66	27.73	11.41	35.57	22.63	28.57	11.63	34.00	22.06	29.10	12.34	33.94	20.66	27.20	11.99	41.04
#	23702	24338	9130	22881	23947	23825	8654	23586	23793	23968	9689	22675	23579	24373	10712	22663	22210	24293	11002	23590
MN-32 <= d < MN	-49.00	-35.50	-74.80	-78.80	-33.50	-36.36	-75.15	-81.36	-33.50	-42.83	-70.50	-76.76	#DIV/0!	-50.00	-80.83	-76.44	-36.83	-47.13	-71.70	-78.25
#	2	2	5	79	1	7	10	21	1	3	6	80	0	8	3	50	3	34	33	8
MX < d <= MX+32	74.30	75.72	75.17	143.30	74.98	74.33	73.67	143.00	75.67	74.78	73.94	144.03	74.85	73.59	82.67	144.28	74.75	74.67	#DIV/0!	143.50
#	347	281	9	268	339	382	6	162	234	540	9	311	272	270	3	408	260	150	0	122
d < MN-32	-444.00	-533.21	-506.05	-350.57	-481.10	-1280.12	-698.51	-701.03	-338.55	-795.10	-617.13	-295.81	-281.98	-547.52	-737.25	-271.04	-305.05	-320.05	-440.40	-834.96
#	4	49	46	45	5	53	57	55	21	20	39	36	22	22	36	70	33	78	137	85
d > MX+32	296.27	142.57	186.45	235.08	606.40	171.80	352.35	267.87	285.77	193.97	232.10	233.10	213.26	246.42	293.71	232.46	160.41	350.51	641.55	270.99
#	94	76	21	538	104	49	56	482	63	98	10	590	69	56	33	532	150	51	81	790
Total #	24968	24968	24968	24968	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	24.08	25.54	-3.07	37.49	26.07	24.99	-3.46	37.84	22.64	29.07	-2.74	36.86	21.89	29.19	-1.28	36.69	18.99	26.44	-1.12	45.02
Std Dev	26.05	31.96	29.60	48.24	52.47	64.86	40.41	57.95	26.72	34.21	31.29	49.18	21.25	26.26	34.78	50.79	22.68	29.49	53.26	75.34

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.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Center X
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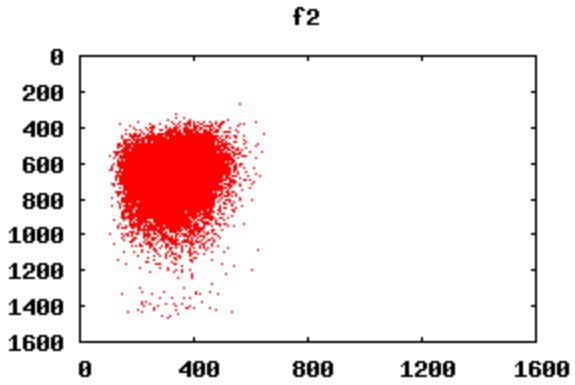
1000
1200
1400
1600
"f2"
"f3"
"f4"
"f5"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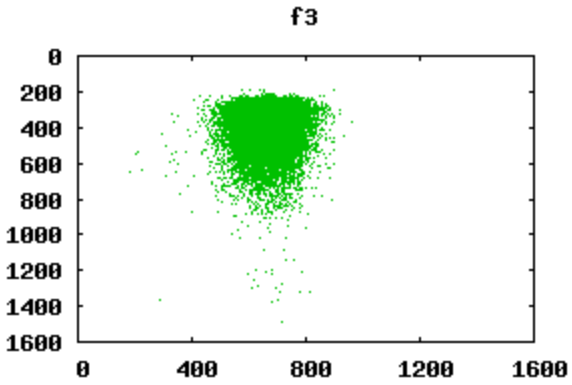
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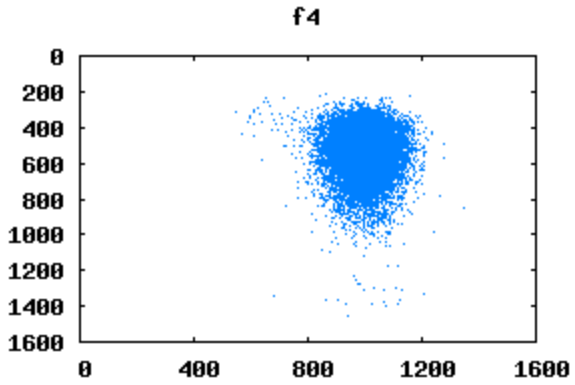
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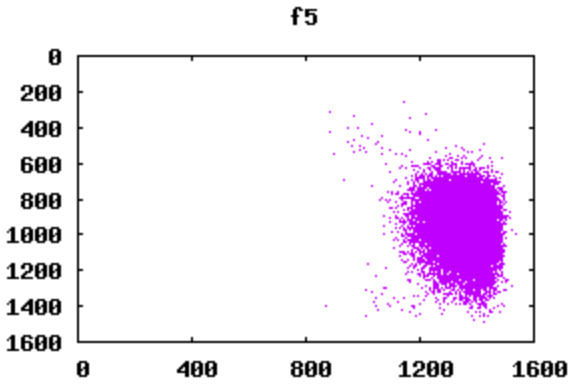
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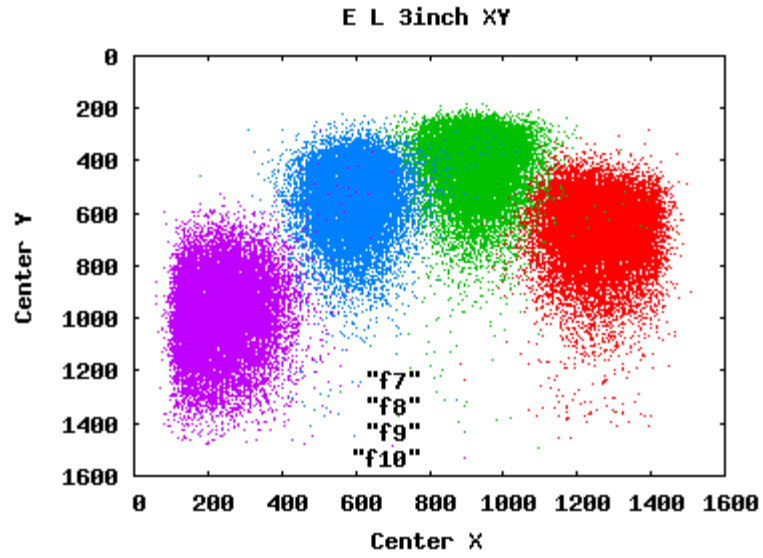
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Center X
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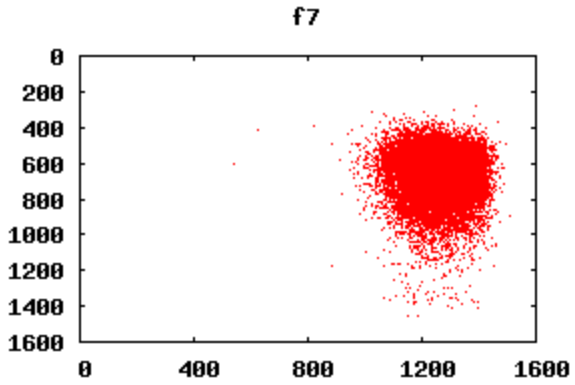
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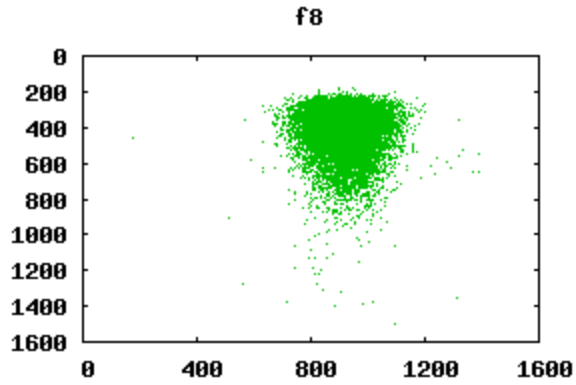
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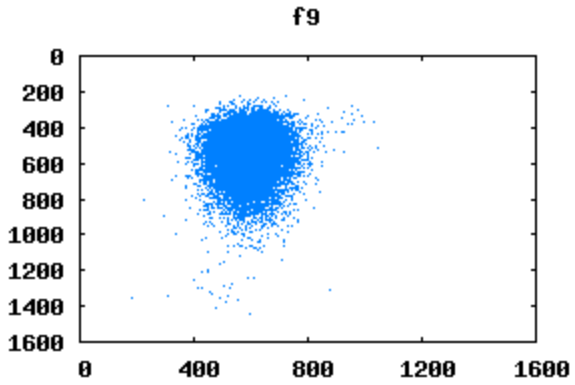
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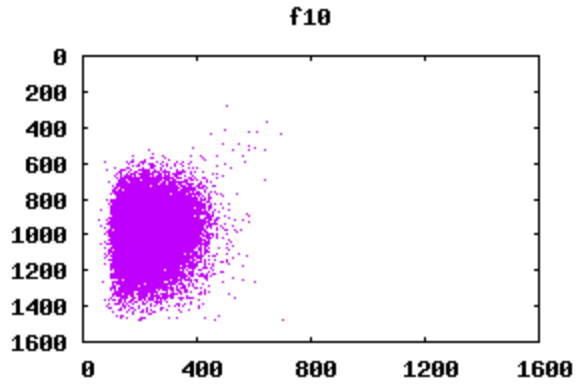
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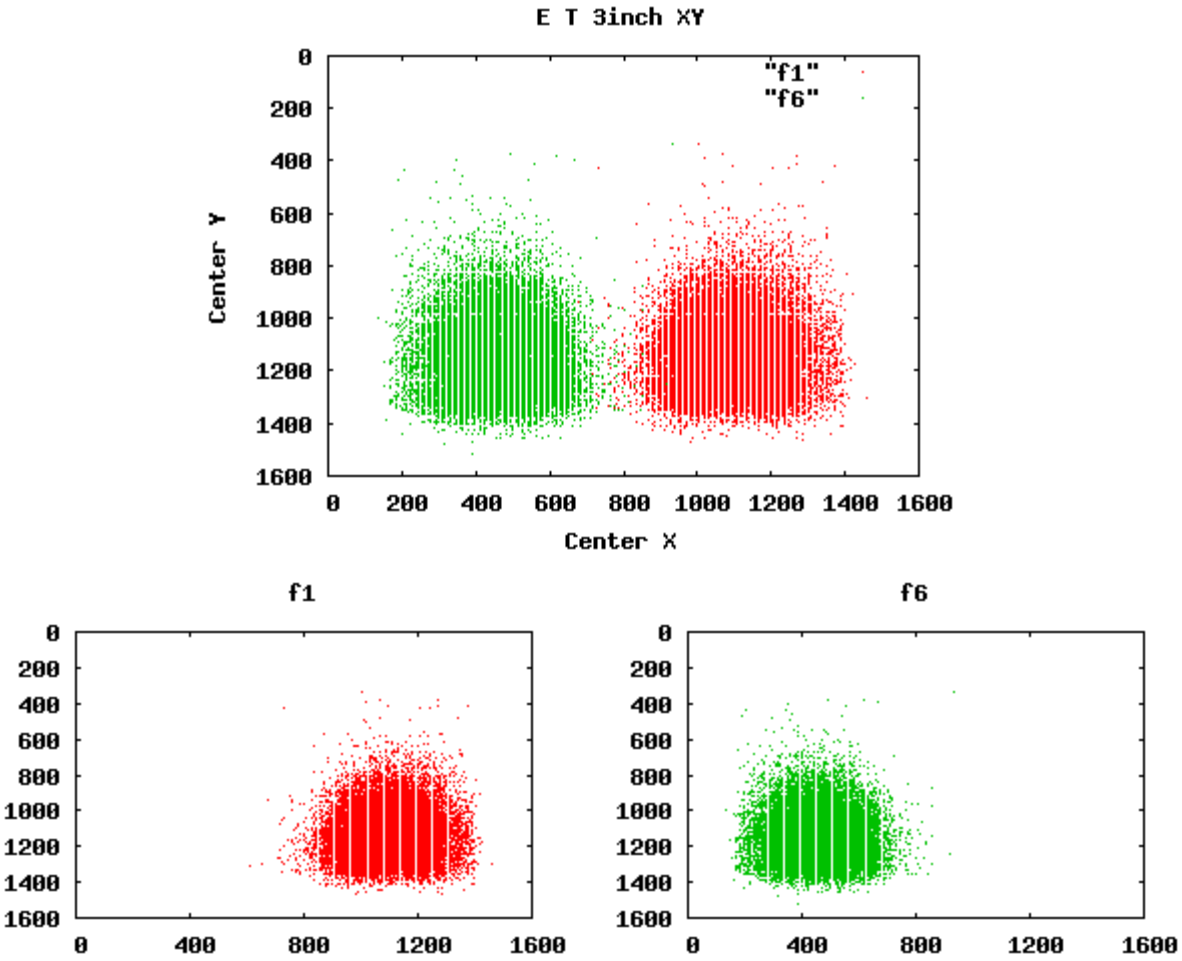
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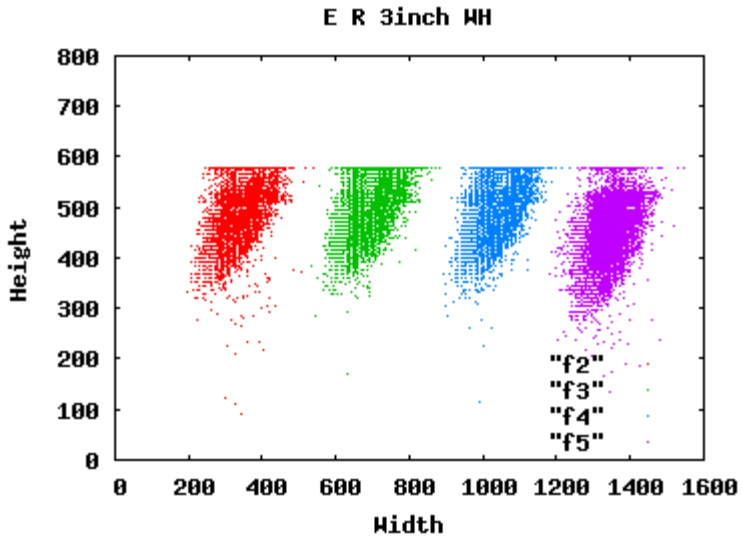
"f6"
Center Y
Center X
0
200
400
600
800
1000
1200
1400
1600
f1
f6

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 2^{nd}, 3^{rd}, and 4^{th} 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.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Height
Width
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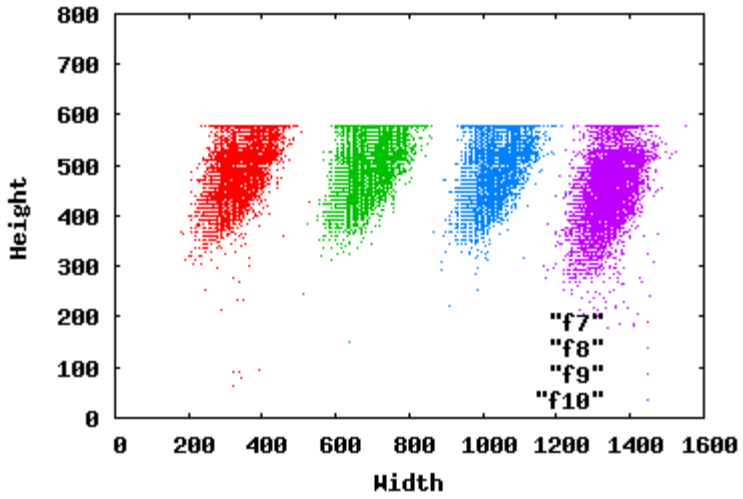
"f4"
"f5"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Height
Width
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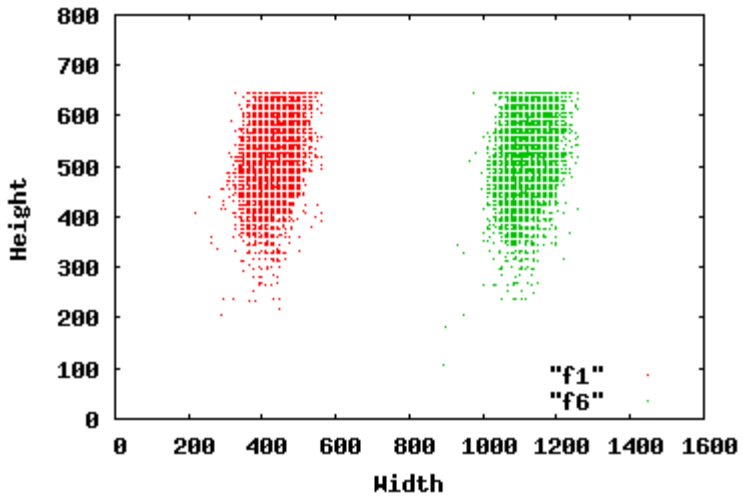
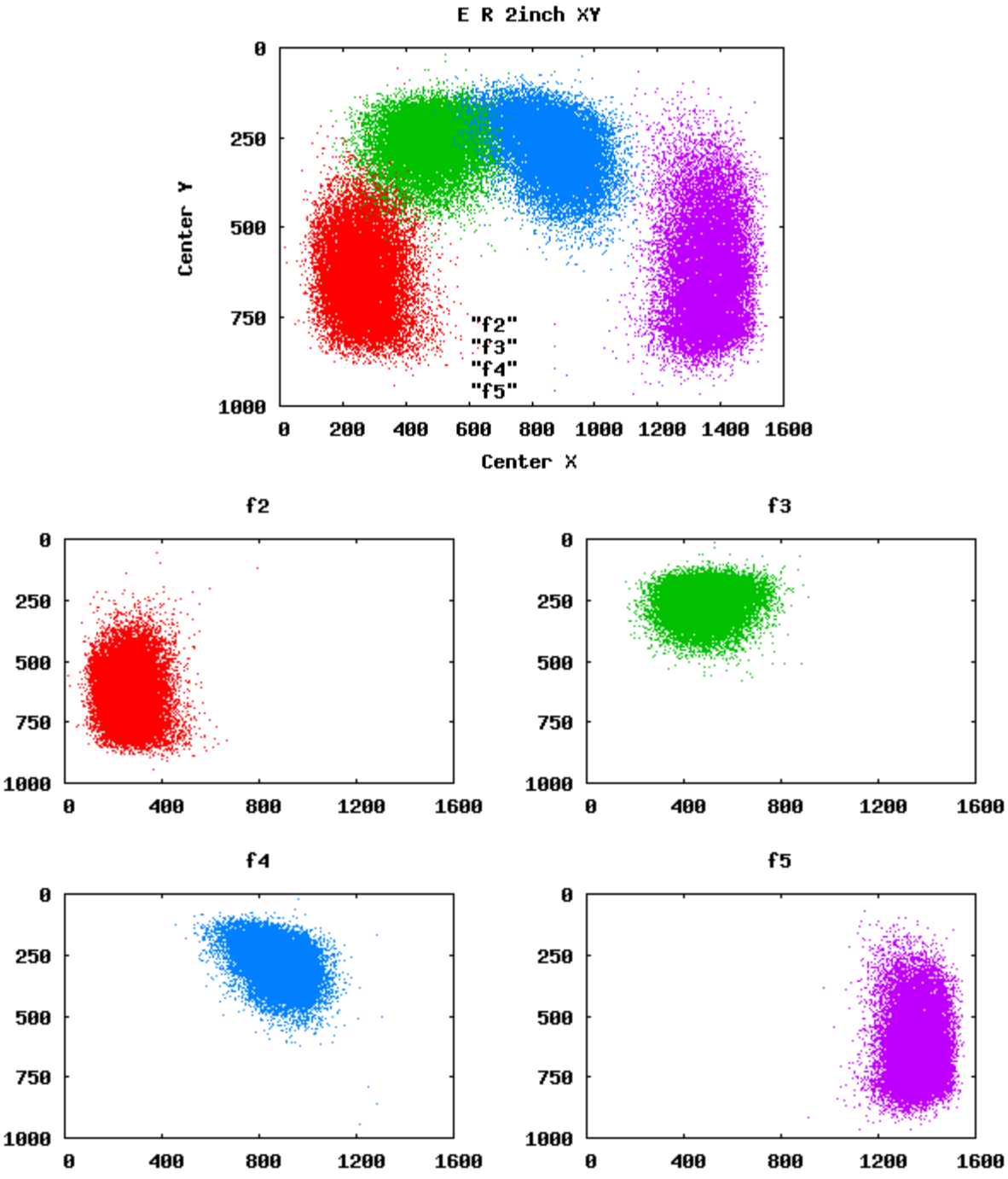

E T 3inch WH
Height
Width
"f1"
"f6"

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.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Center X
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400
600
800
1000
1200
1400
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f2
f3
f4
f5
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1200
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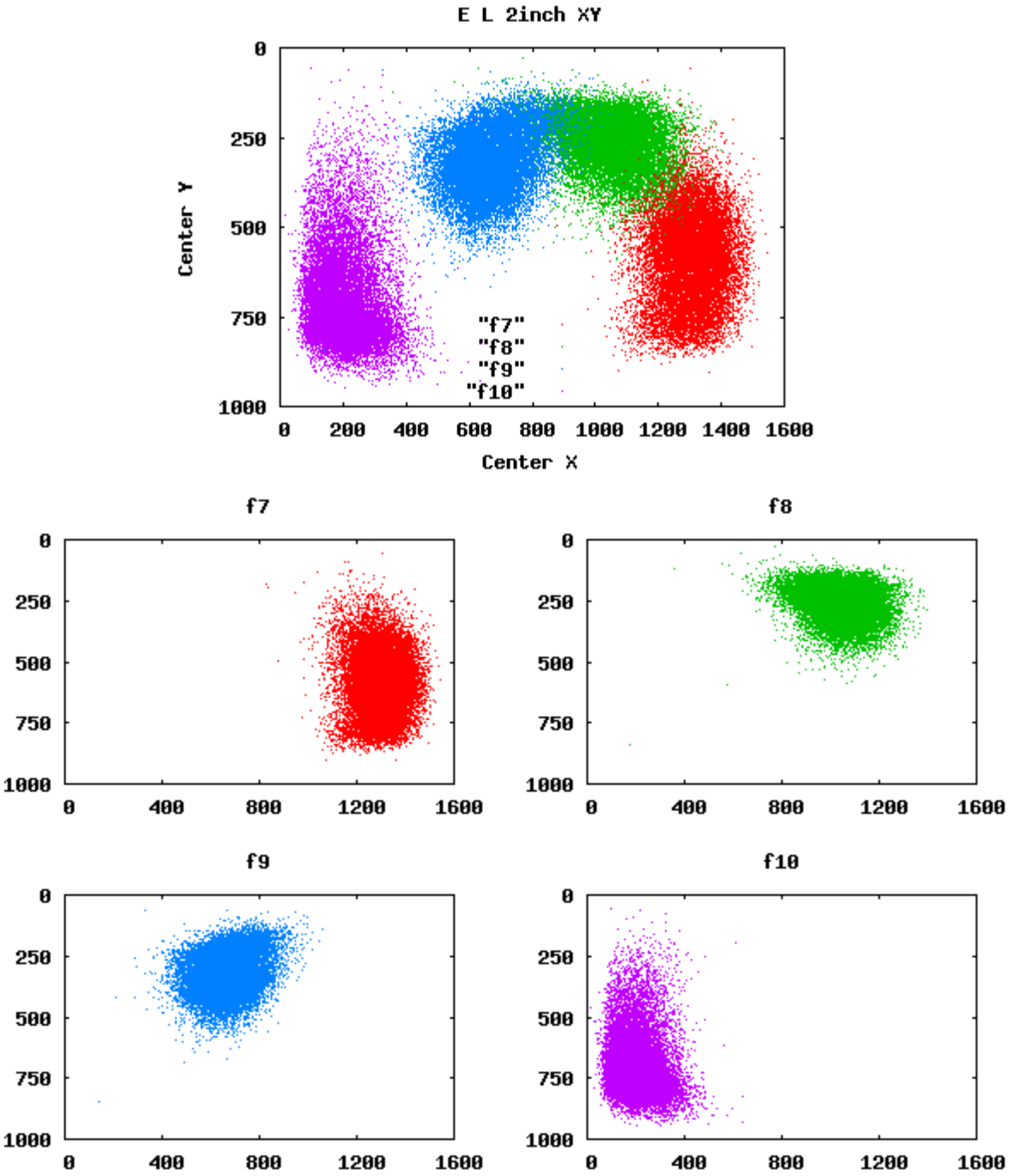
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Center X
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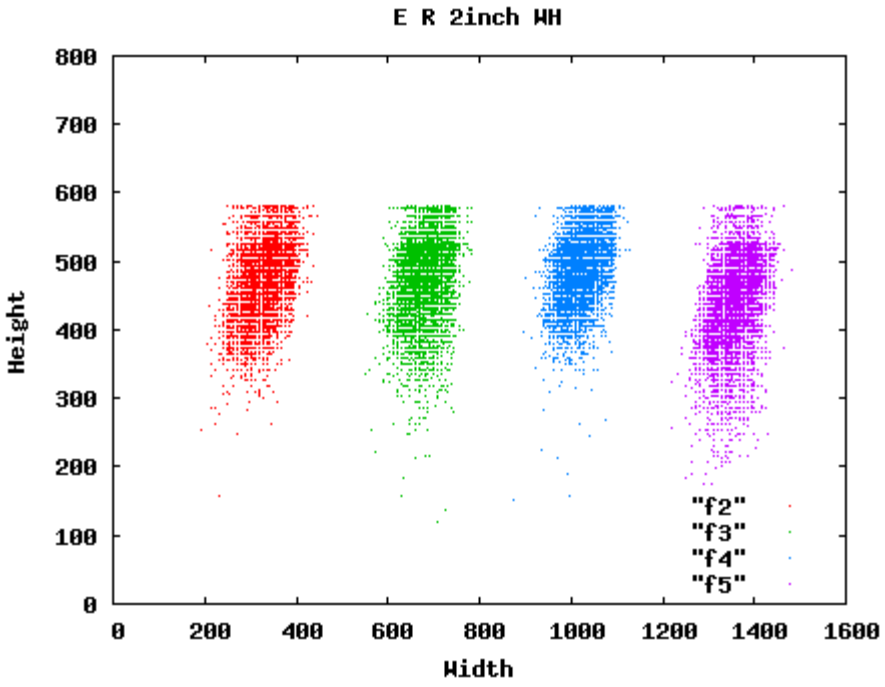
1000
1200
1400
1600
"f7"
"f8"
"f9"
"f10"
f7
f8
f9
f10

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.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Height
Width
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100
200
300
400
500
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800
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200
400
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800
1000
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1600
"f2"
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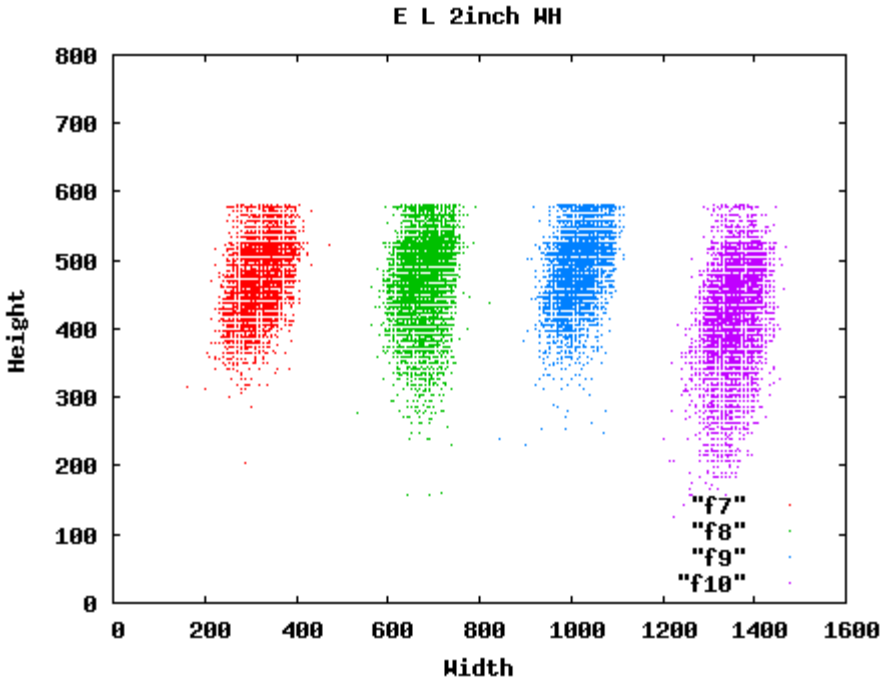
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Height
Width
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