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.

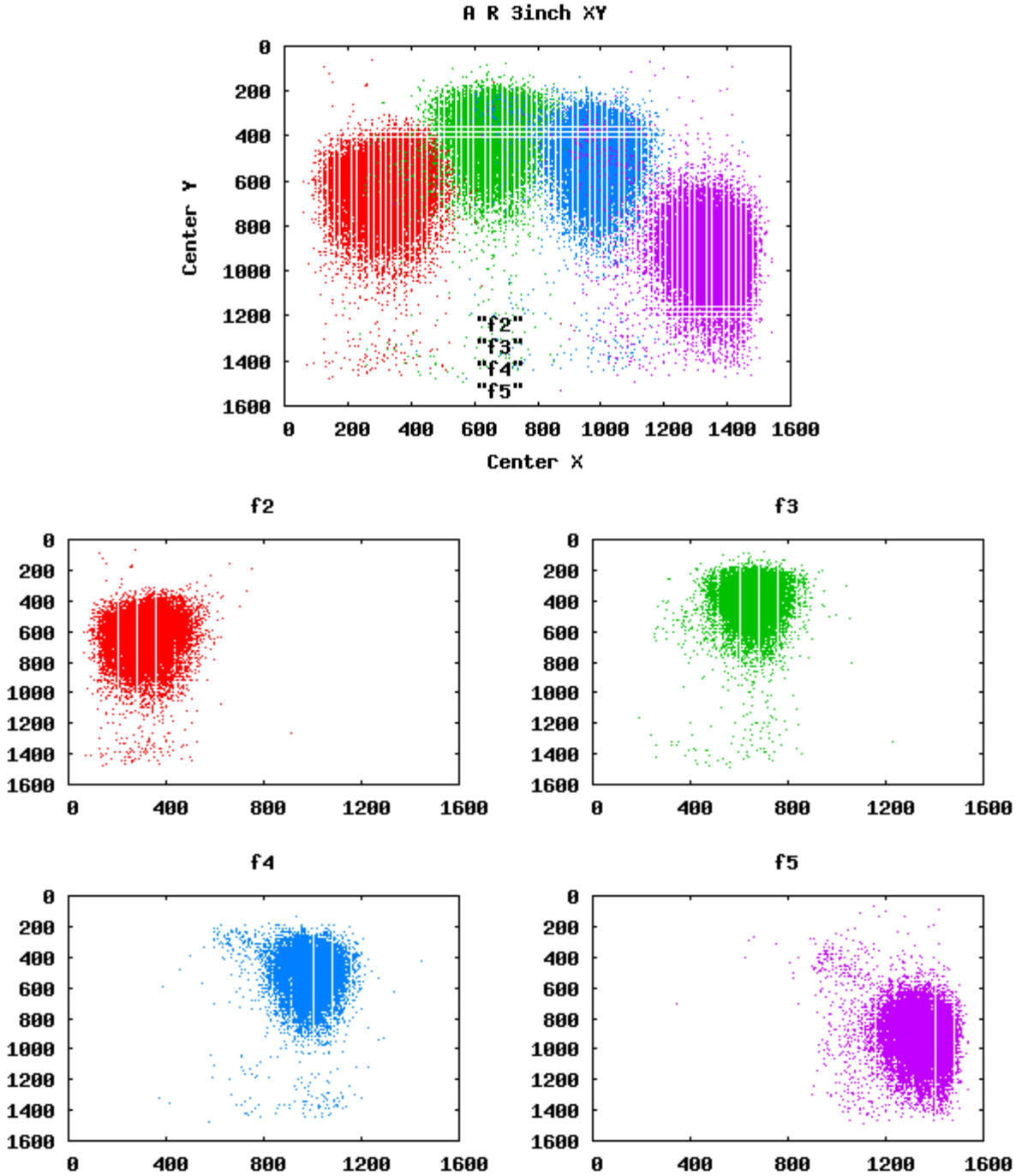
A

No Finger Found	R. Thumb 89				R. Index 121				R Middle 76				R. Ring 101				R. Little 638			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-11.51	-22.67	-18.73	-39.86	-13.91	-19.45	-24.28	-44.11	-13.44	-21.10	-24.59	-42.53	-10.87	-22.12	-24.91	-43.57	-11.08	-21.52	-25.01	-42.61
#	17025	13116	21205	13835	21015	21047	23131	19172	19954	18639	22768	17533	18472	15578	22580	16069	18688	14855	22335	15711
0 <= d <= MX	6.89	17.68	7.81	44.54	8.18	8.81	9.97	37.99	8.91	11.52	10.55	45.39	7.67	13.60	11.92	42.42	6.00	15.44	9.66	36.70
#	5859	543	1942	1821	3195	686	1501	636	4234	1069	1836	1761	6012	657	1912	1463	4943	547	1374	1115
MN-32 <= d < MN	-38.17	-40.47	-77.62	-76.81	-37.47	-37.47	-73.54	-73.72	-36.90	-38.41	-77.98	-74.94	-38.79	-39.80	-74.05	-75.30	-40.46	-39.94	-79.73	-76.00
#	333	9284	113	4530	532	2998	25	3766	518	4945	25	3022	150	8224	38	4017	206	8229	97	4439
MX < d <= MX+32	80.98	80.79	77.80	143.34	78.66	78.00	77.63	142.43	74.74	78.45	76.89	143.89	74.84	78.19	78.82	140.11	80.15	81.16	75.13	143.39
#	32	54	23	131	29	8	19	43	25	19	46	97	19	24	53	57	13	34	19	84
d < MN-32	-322.82	-375.06	-244.13	-316.03	-246.71	-334.77	-730.13	-229.76	-253.14	-375.12	-596.86	-166.86	-199.63	-385.92	-764.44	-166.12	-179.11	-842.34	-414.09	-346.09
#	623	998	162	3897	21	209	130	876	33	271	215	2018	43	456	134	2934	60	1247	218	3076
d > MX+32	498.17	228.12	656.17	228.17	232.55	313.20	354.11	381.85	373.69	336.04	191.88	381.68	500.08	317.00	226.24	417.18	858.83	239.20	627.75	319.92
#	550	427	977	208	176	20	162	475	204	25	78	537	272	29	251	428	1058	56	925	543
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	-3.80	-38.33	8.71	-81.22	-9.94	-23.18	-23.41	-44.57	-7.20	-26.54	-26.13	-40.45	-1.27	-33.15	-23.38	-49.72	28.56	-67.05	-2.45	-73.88
Std Dev	101.52	107.18	142.20	173.12	25.87	36.93	64.65	89.41	40.47	49.76	67.46	90.71	62.67	75.05	66.67	93.59	199.33	225.63	136.72	180.26

No Finger Found	L. Thumb 35				L. Index 210				L. Middle 125				L. Ring 180				L. Little 797			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-13.81	-21.15	-20.82	-37.44	-10.87	-21.17	-23.92	-44.39	-12.62	-20.08	-23.62	-41.19	-14.29	-18.56	-23.34	-42.94	-14.19	-18.37	-23.17	-41.07
#	18516	17439	21738	14492	18579	17324	23127	18849	18931	18557	22626	17823	19576	20539	22553	17431	19423	20569	22038	19496
0 <= d <= MX	10.01	12.63	8.68	46.43	7.42	13.14	9.97	44.71	9.67	10.83	10.65	45.67	10.08	9.24	10.45	50.26	10.07	7.66	7.57	45.64
#	3843	379	1482	2769	5897	497	1368	578	5340	1043	1849	2321	4294	1014	1812	2039	3660	549	1494	732
MN-32 <= d < MN	-39.15	-38.27	-77.90	-76.62	-37.75	-39.93	-76.25	-73.72	-36.24	-39.48	-74.52	-74.38	-36.91	-38.76	-79.65	-74.56	-37.10	-39.07	-81.54	-73.49
#	822	5377	102	3914	141	6592	28	3888	297	4885	42	2509	573	2848	26	3082	679	2591	106	2525
MX < d <= MX+32	78.47	78.78	78.40	141.88	74.42	80.25	77.13	143.39	76.73	77.90	78.89	143.29	77.17	82.33	80.17	143.77	78.82	82.80	77.45	143.89
#	73	29	25	168	18	28	12	54	41	15	35	133	62	3	53	93	193	10	11	119
d < MN-32	-414.71	-342.05	-308.29	-362.26	-277.95	-659.29	-665.22	-283.60	-303.80	-509.01	-546.62	-185.65	-302.54	-438.95	-659.31	-211.22	-298.58	-319.44	-403.33	-738.66
#	634	718	135	2848	74	452	151	973	183	288	299	1514	224	334	177	1669	286	959	229	1383
d > MX+32	240.43	471.85	630.53	285.71	924.08	314.15	358.18	357.72	633.35	305.10	208.81	398.44	417.20	293.07	241.25	375.72	187.62	321.35	664.44	296.07
#	534	480	940	231	255	71	278	622	172	176	113	664	235	226	343	650	723	286	1086	709
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	-15.49	-24.02	4.32	-67.80	2.12	-35.93	-21.70	-45.79	-5.67	-25.87	-26.23	-32.53	-8.92	-22.52	-21.60	-38.89	-7.95	-27.58	4.89	-70.00
Std Dev	87.47	101.21	137.39	169.03	102.33	121.09	70.77	103.68	64.66	78.35	73.88	102.18	54.69	69.34	70.02	104.89	50.12	74.66	152.59	203.03

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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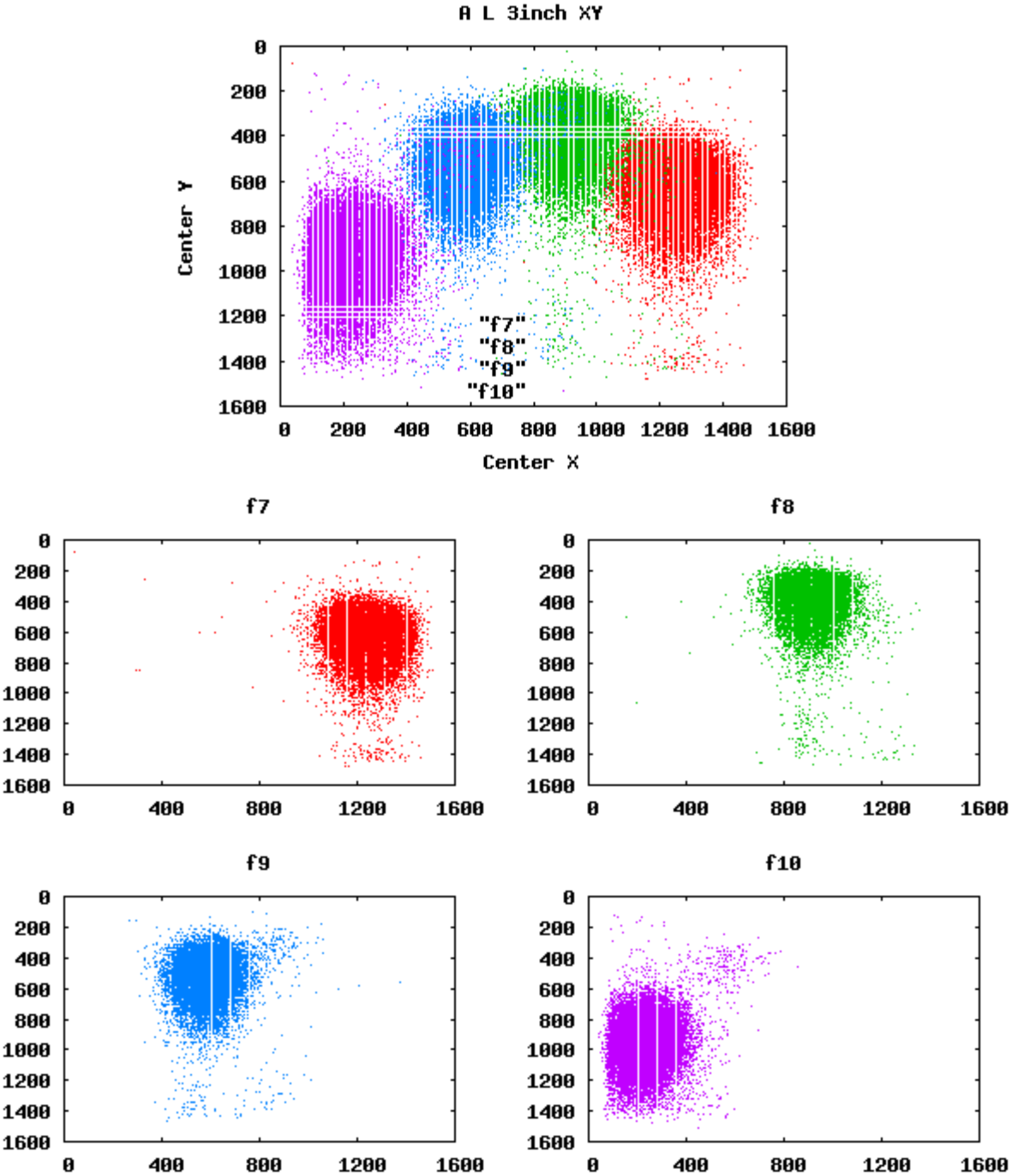
"f4"
"f5"
f2
f3
f4
f5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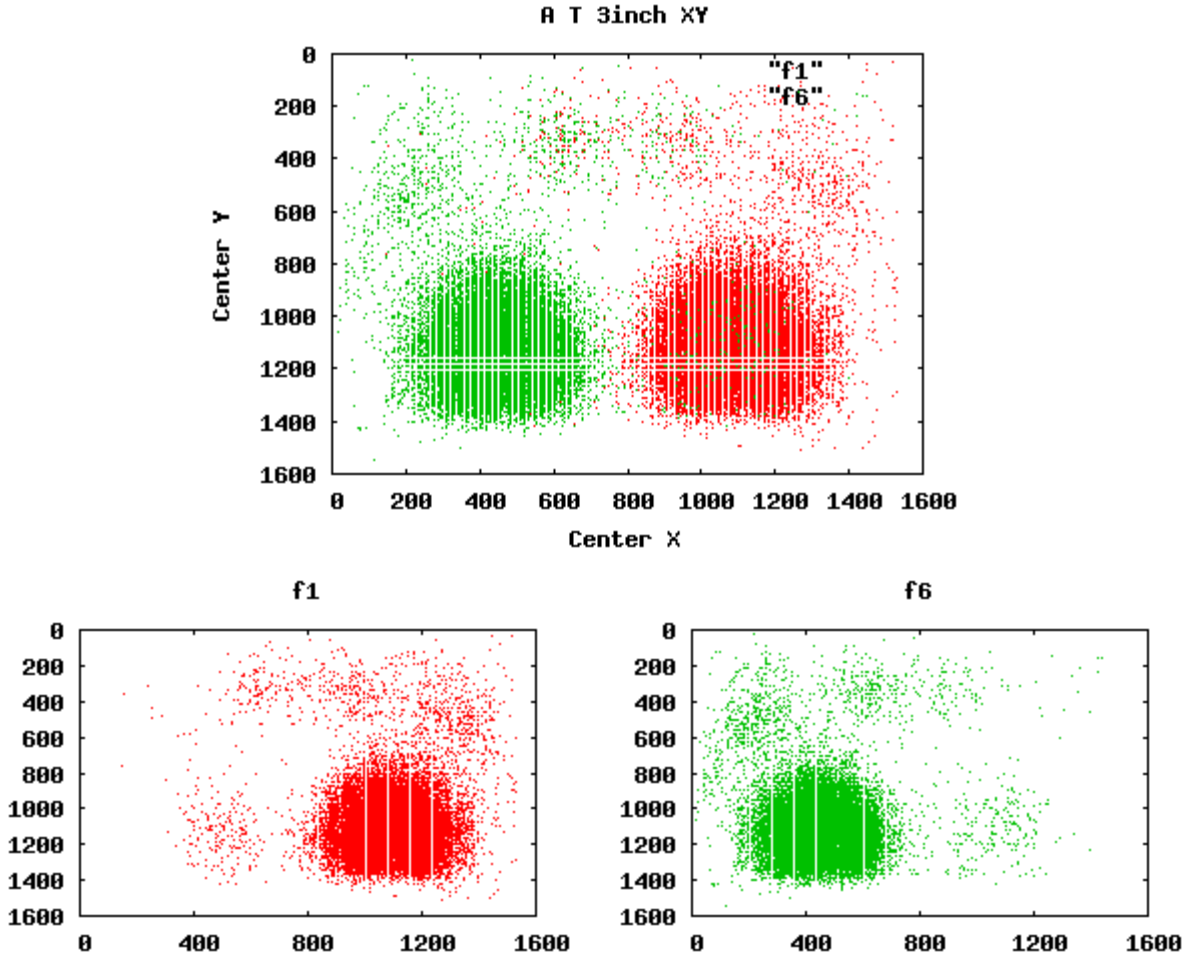
f9
f10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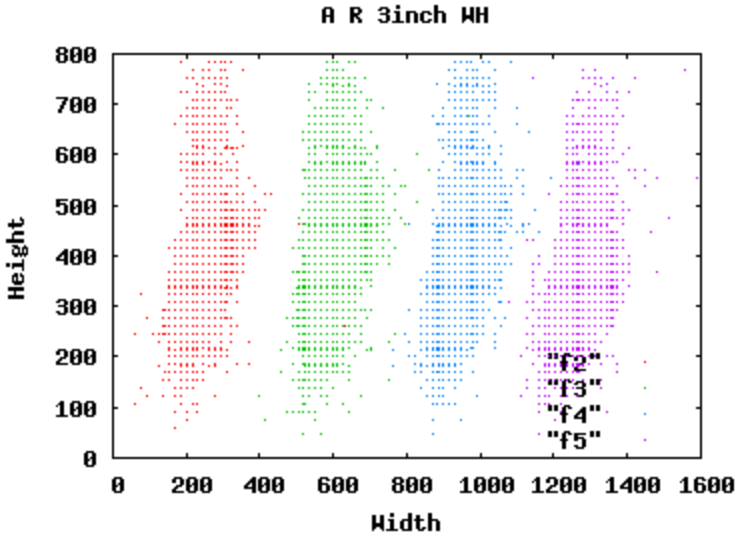
"f6"
Center Y
Center X
0
200
400
600
800
1000
1200
1400
1600
f1
f6

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 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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Width
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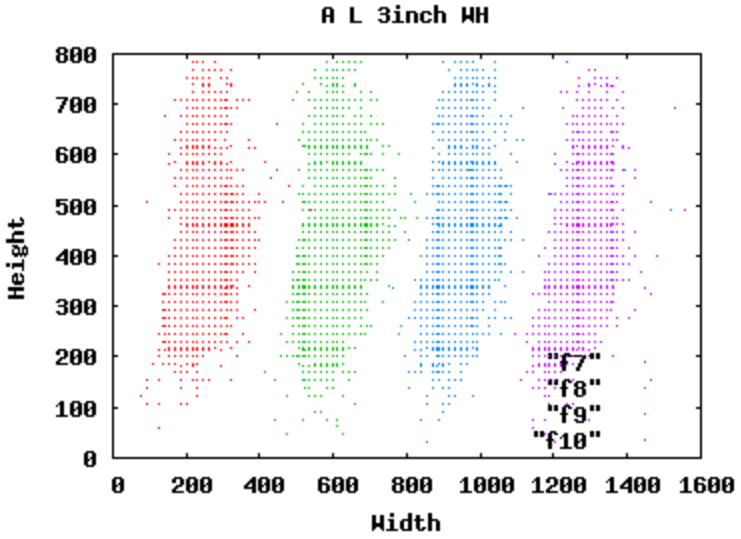
"f3"
"f4"
"f5"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Height
Width
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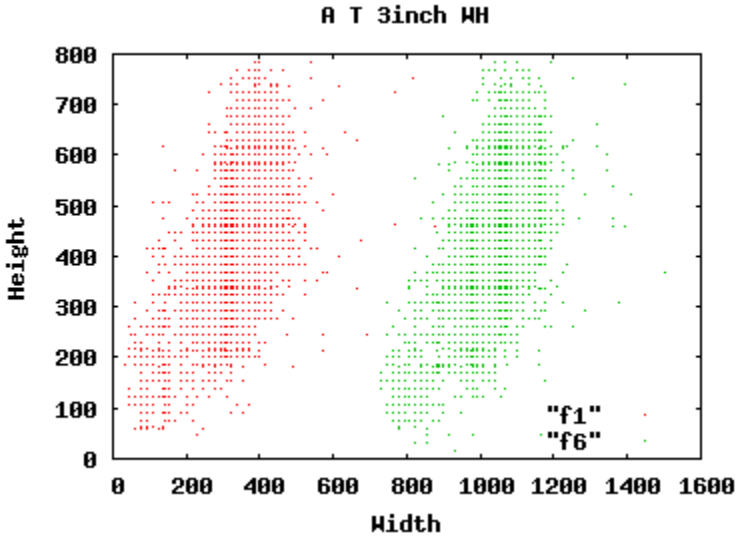
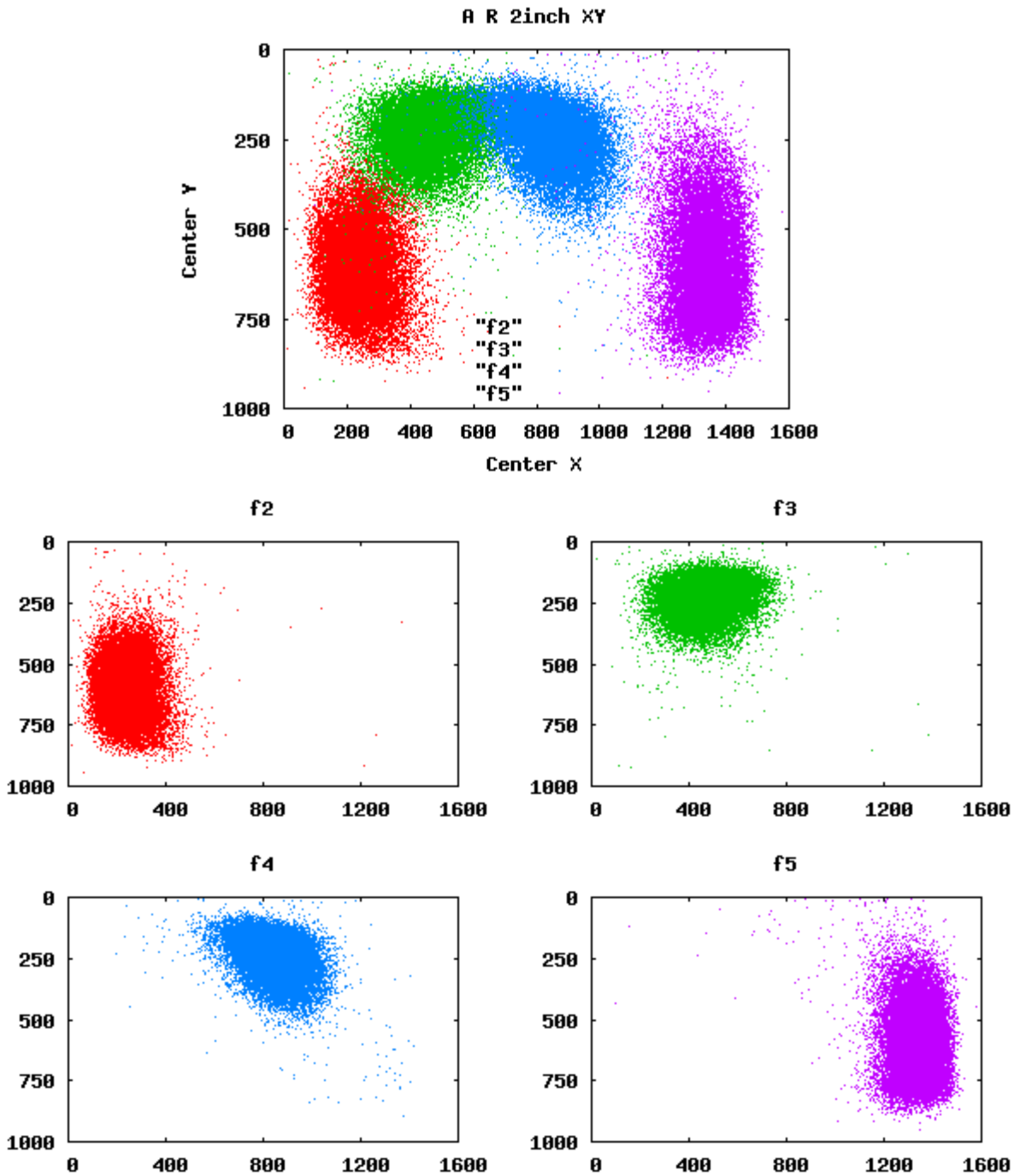
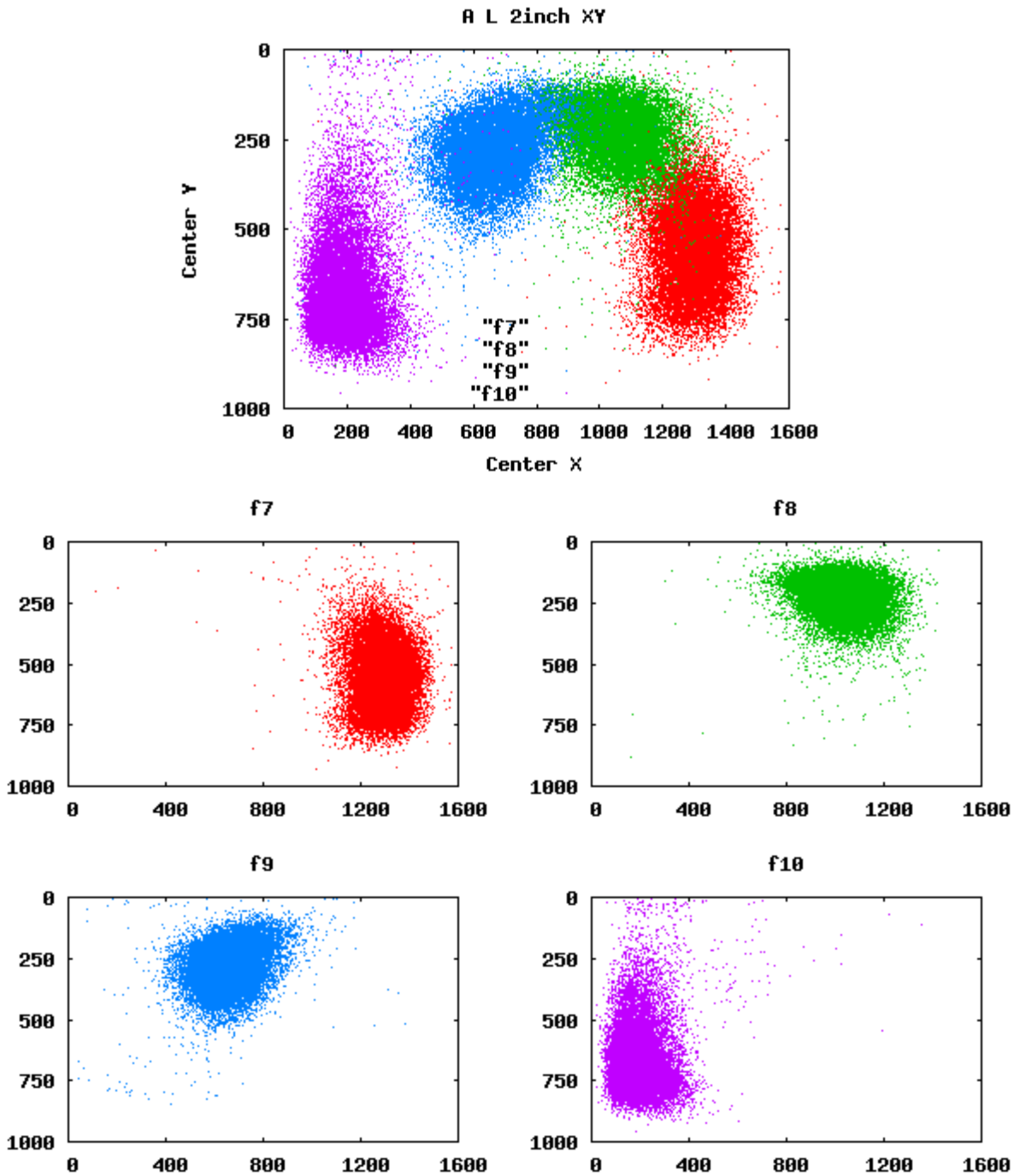

A T 3inch WH
Height
Width
"f1"
"f6"

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

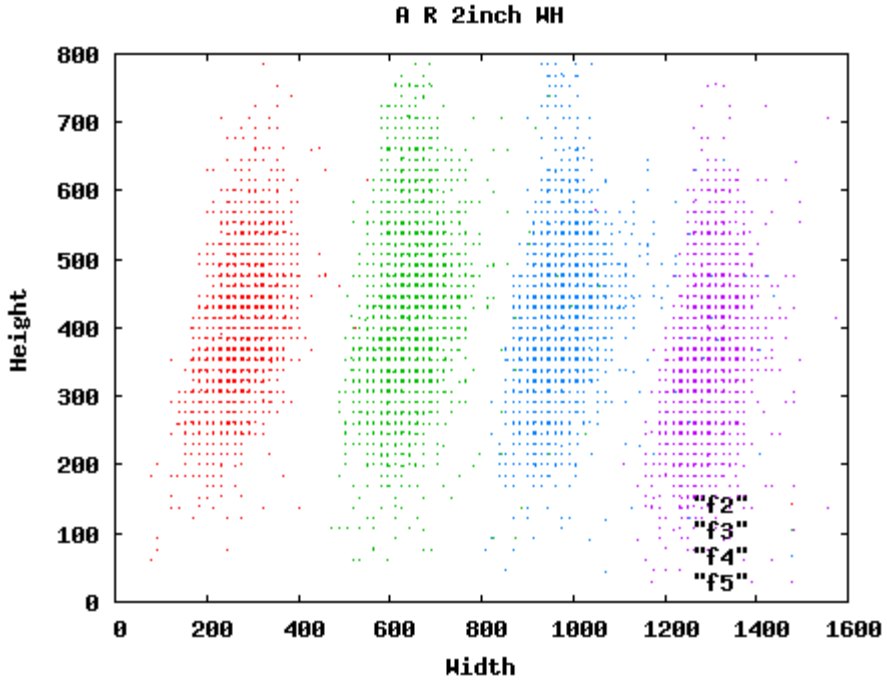
The plots in this appendix show the distribution of the segmentation box centers (x,y) for the 2-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of x,y positions detected. The 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.


A R 2inch XY
Center Y
Center X
"f2"
"f3"
"f4"
"f5"
f2
f3
f4
f5


A L 2inch XY
Center Y
Center X
"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.


A R 2inch WH
Height
Width
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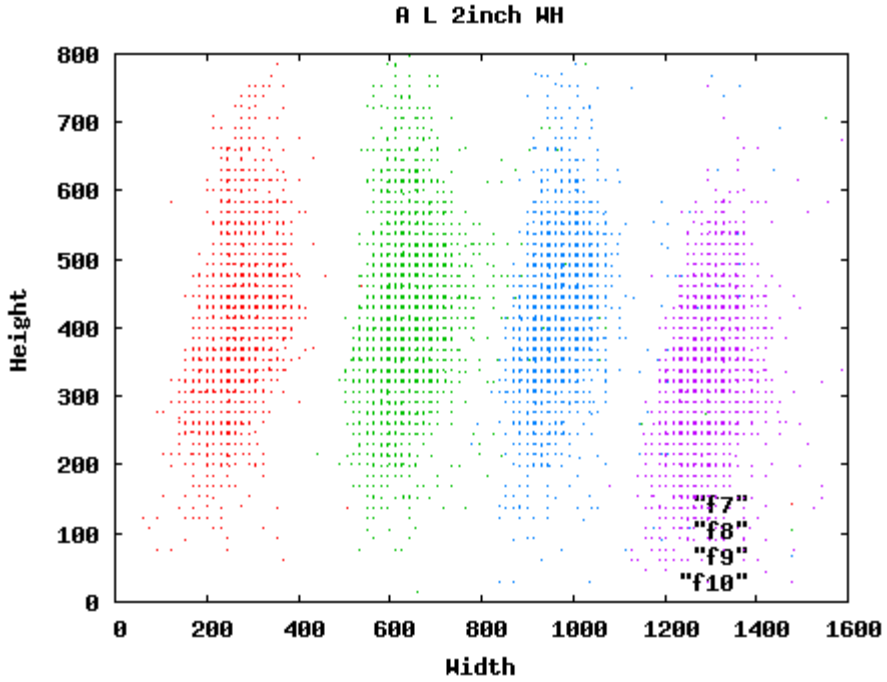
"f3"
"f4"
"f5"


A L 2inch WH
Height
Width
"f7"
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"f9"
"f10"