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.

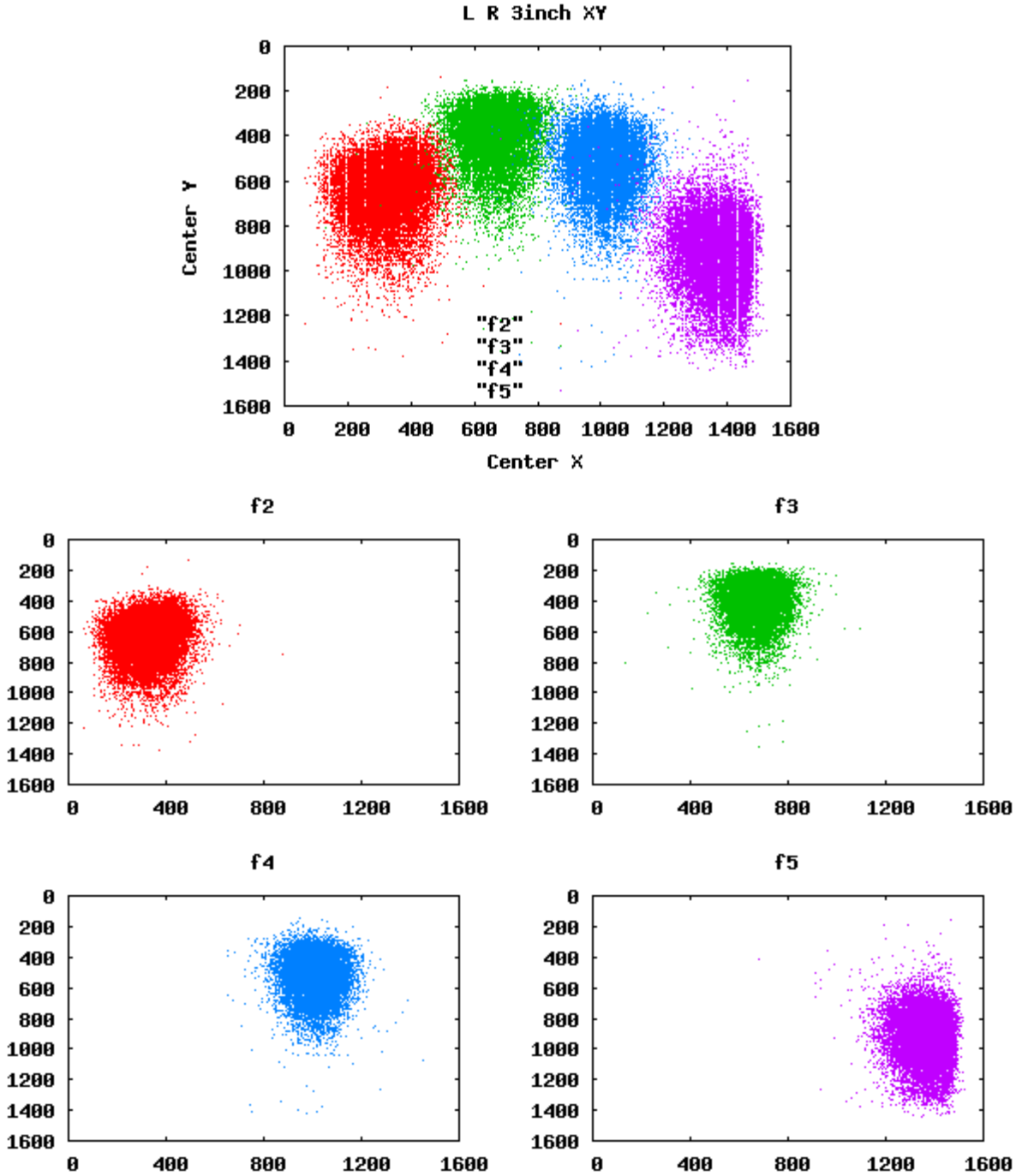
L = L-1 Identity Solutions

	R. Thumb				R. Index				R Middle				R. Ring				R. Little			
No Finger Found	19				10				11				18				97			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-7.91	-9.18	-11.63	-15.12	-7.68	-7.82	-11.80	-21.00	-7.83	-7.18	-13.34	-18.95	-6.29	-8.86	-13.92	-21.44	-7.35	-8.73	-23.80	-21.64
#	3671	1964	1936	2134	655	396	479	2819	2603	236	660	3415	3161	298	710	2901	1841	172	644	2619
0 <= d <= MX	18.70	24.71	26.11	32.23	25.73	31.16	33.40	34.13	18.82	30.43	32.54	33.34	17.56	38.47	33.35	36.88	25.86	41.44	41.52	36.82
#	20499	21955	22107	20507	24193	24376	23628	21559	22223	24582	23468	20703	21716	24103	23247	20840	22740	23063	21543	20698
MN-32 <= d < MN	-42.73	-43.24	-73.17	-78.30	-40.18	-40.75	-77.33	-75.89	-39.34	-41.23	-80.98	-75.59	-42.28	-43.03	-76.42	-77.64	-45.05	-37.90	-77.08	-77.40
#	49	190	9	55	20	12	29	148	69	13	49	156	23	20	49	255	71	5	83	212
MX < d <= MX+32	79.58	71.93	69.16	143.86	70.08	67.87	70.20	143.04	71.76	69.15	70.34	142.96	71.79	68.79	70.35	143.26	70.88	71.22	71.09	144.23
#	33	129	92	382	39	123	742	125	25	89	692	214	14	489	841	291	99	1430	2279	132
d < MN-32	-242.22	-255.03	-526.11	-763.00	-260.15	-237.00	-382.48	-266.88	-305.07	-423.35	-209.64	-206.42	-338.69	-606.47	-309.08	-229.04	-138.64	-1100.78	-347.12	-519.38
#	99	121	9	314	17	39	32	80	23	24	38	132	26	31	52	156	86	123	162	301
d > MX+32	277.36	363.67	798.97	233.20	251.63	353.93	296.16	261.19	372.54	362.27	260.30	230.39	558.45	368.67	296.20	226.94	926.43	151.71	517.37	269.60
#	71	63	269	1030	44	22	58	237	25	24	61	348	28	27	69	525	131	175	257	1006
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	14.35	21.19	31.55	27.84	25.07	30.56	33.58	28.99	15.99	30.06	32.34	27.93	14.75	37.99	33.05	32.51	27.54	37.93	44.52	32.96
Std Dev	31.07	40.86	85.70	111.79	18.49	21.10	29.33	46.96	21.65	24.09	24.94	45.33	27.49	33.79	30.77	52.99	77.00	92.23	67.54	97.09

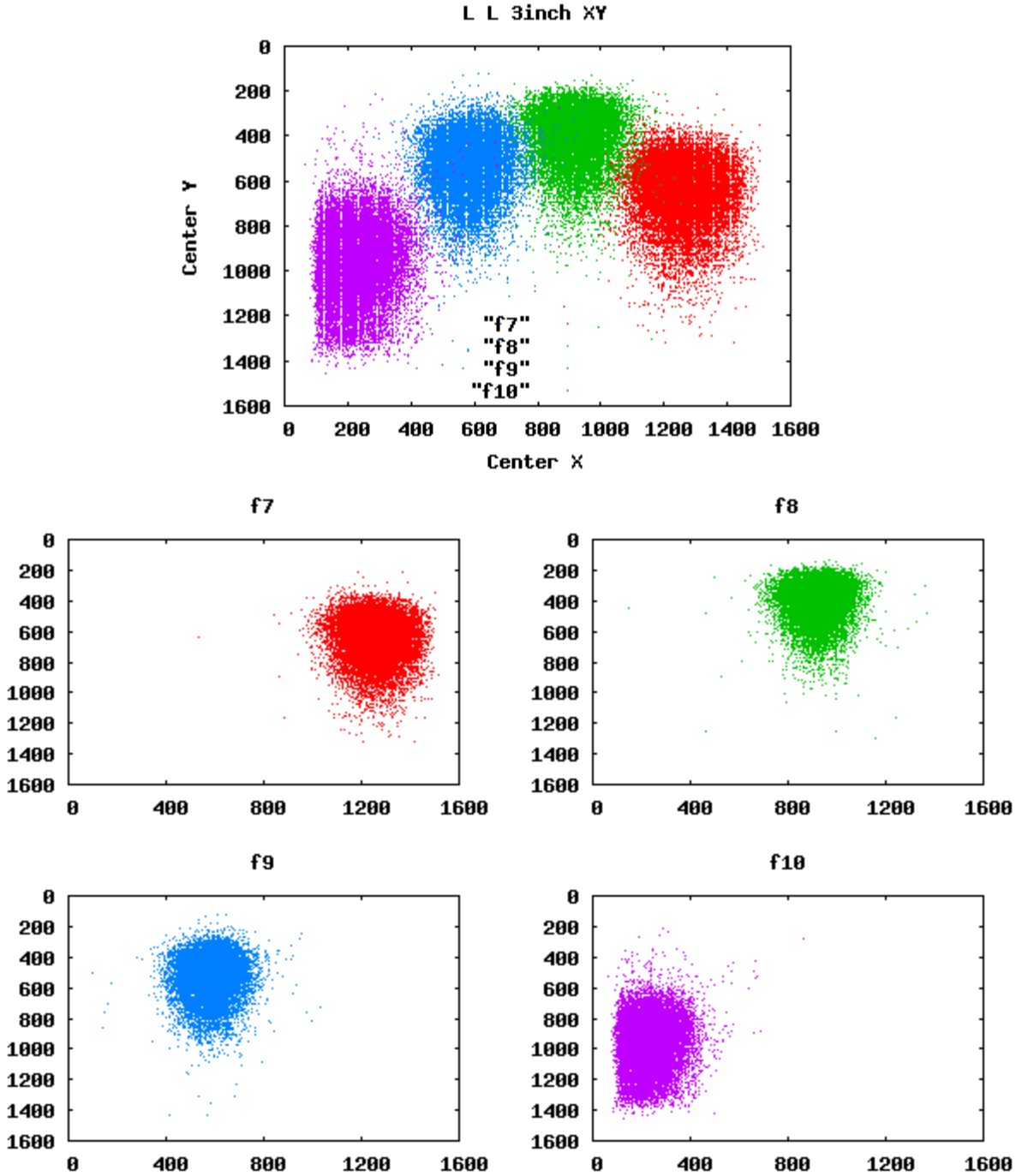
	L. Thumb				L. Index				L. Middle				L. Ring				L. Little			
No Finger Found	72				15				13				17				74			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-8.44	-7.46	-15.31	-15.09	-6.09	-8.61	-12.46	-20.28	-5.63	-7.51	-12.89	-18.93	-9.58	-6.35	-14.63	-21.10	-9.22	-8.50	-25.12	-22.73
#	1861	1834	8447	2053	595	738	449	2470	616	1277	692	3326	239	1676	681	2966	155	1148	799	2156
0 <= d <= MX	22.21	23.86	19.58	34.17	25.40	33.17	34.19	34.24	25.46	24.96	32.97	32.96	35.61	23.73	34.09	34.16	39.16	32.93	41.46	35.13
#	22087	22294	15590	18941	24274	23996	23642	21886	24243	23564	23530	20668	24278	23169	23183	20685	23297	23245	20998	20778
MN-32 <= d < MN	-43.24	-45.16	-70.76	-75.60	-44.80	-38.65	-77.43	-77.17	-39.40	-39.74	-75.72	-76.86	-43.88	-39.57	-76.16	-77.85	-39.95	-45.51	-76.44	-78.81
#	126	57	41	48	5	30	30	131	10	29	57	199	4	29	52	224	10	45	106	193
MX < d <= MX+32	72.71	79.02	70.68	144.41	69.62	69.49	69.36	143.04	69.10	70.23	69.10	142.80	69.63	69.80	69.05	142.80	73.22	69.21	69.78	144.72
#	108	26	39	913	30	136	765	134	46	42	601	218	377	28	932	350	1242	350	2709	214
d < MN-32	-206.73	-451.21	-379.19	-933.26	-244.44	-588.17	-418.99	-245.58	-346.35	-652.87	-229.58	-184.06	-317.80	-498.51	-370.16	-225.12	-271.93	-236.25	-327.40	-508.95
#	140	124	13	316	49	15	38	82	31	19	40	154	27	34	49	194	37	120	138	272
d > MX+32	297.66	287.30	863.64	223.98	670.23	306.30	339.01	255.80	549.86	409.58	227.66	227.91	349.60	432.77	312.90	232.09	140.06	309.74	559.11	251.62
#	100	87	292	2151	11	49	40	261	18	33	44	399	39	28	67	545	223	56	214	1351
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	19.58	19.93	17.32	38.13	24.44	32.20	34.09	30.24	24.67	23.29	32.24	27.91	35.79	21.43	33.79	30.42	40.96	30.72	44.30	35.98
Std Dev	32.76	47.97	98.28	137.38	25.35	30.46	29.46	44.62	24.46	30.92	23.59	46.25	22.81	29.86	32.57	56.18	22.33	31.62	64.15	93.84

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

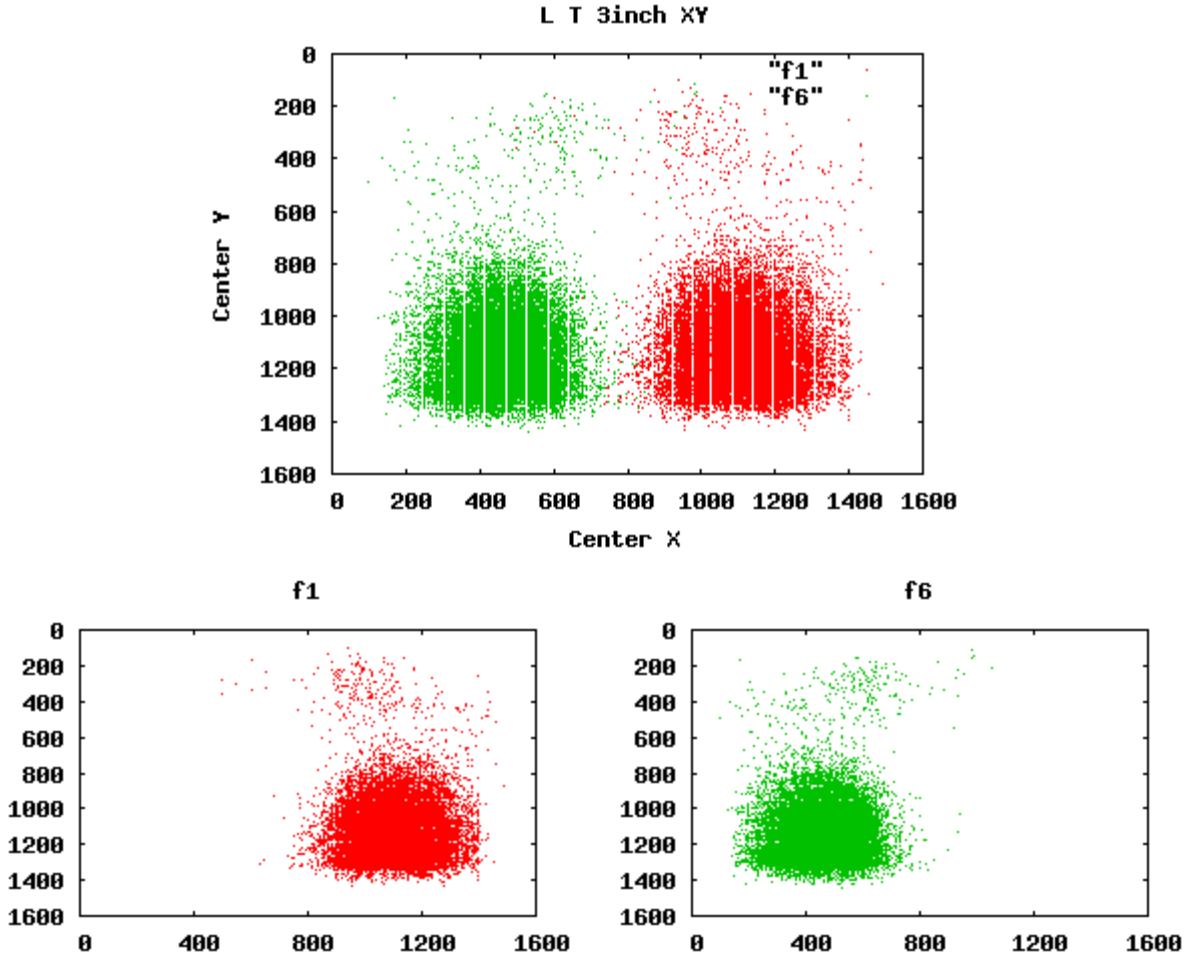
The plots in this appendix show the distribution of the segmentation box centers (x,y) for the 3-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of x,y positions detected. The 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.



L = L-1 Identity Solutions



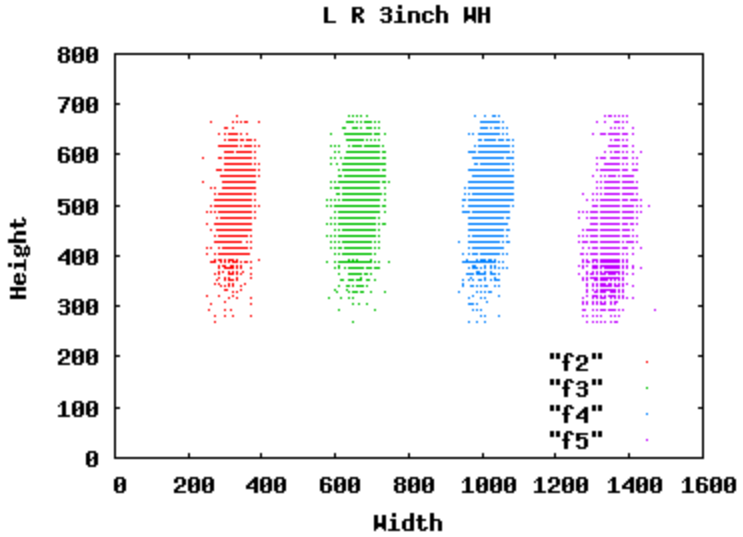
L = L-1 Identity Solutions

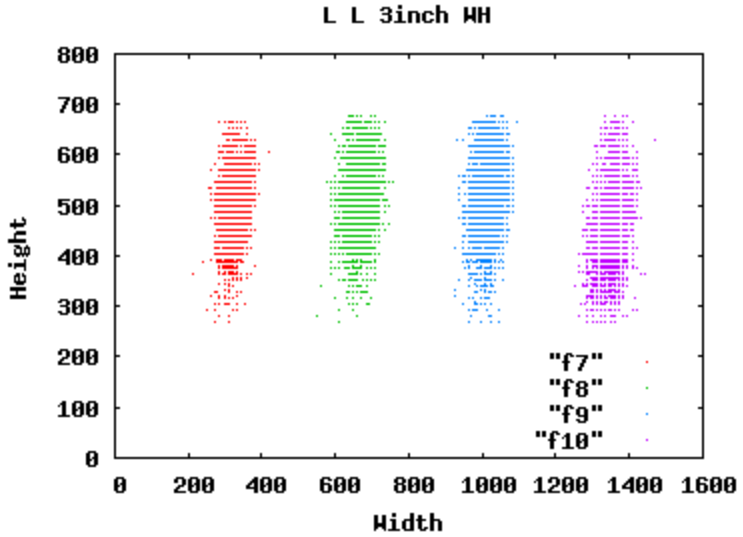


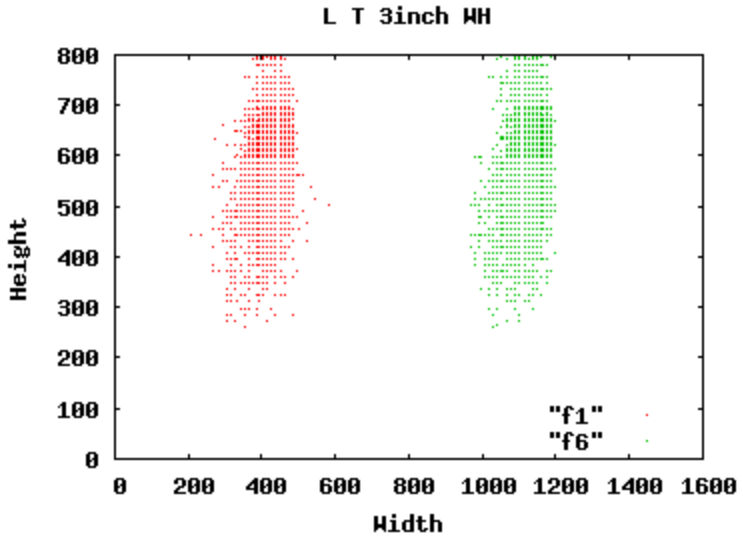
L = L-1 Identity Solutions

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.



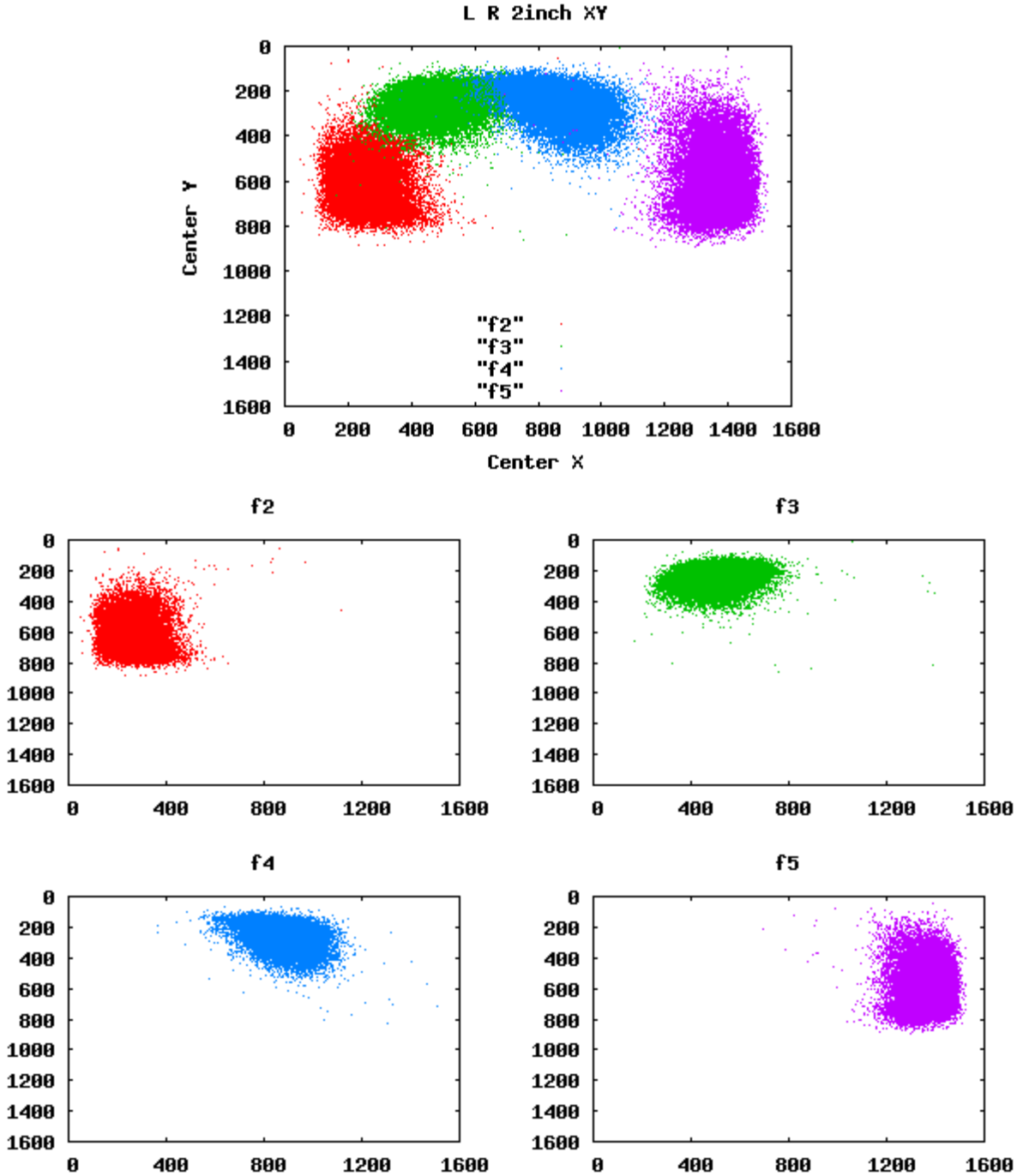




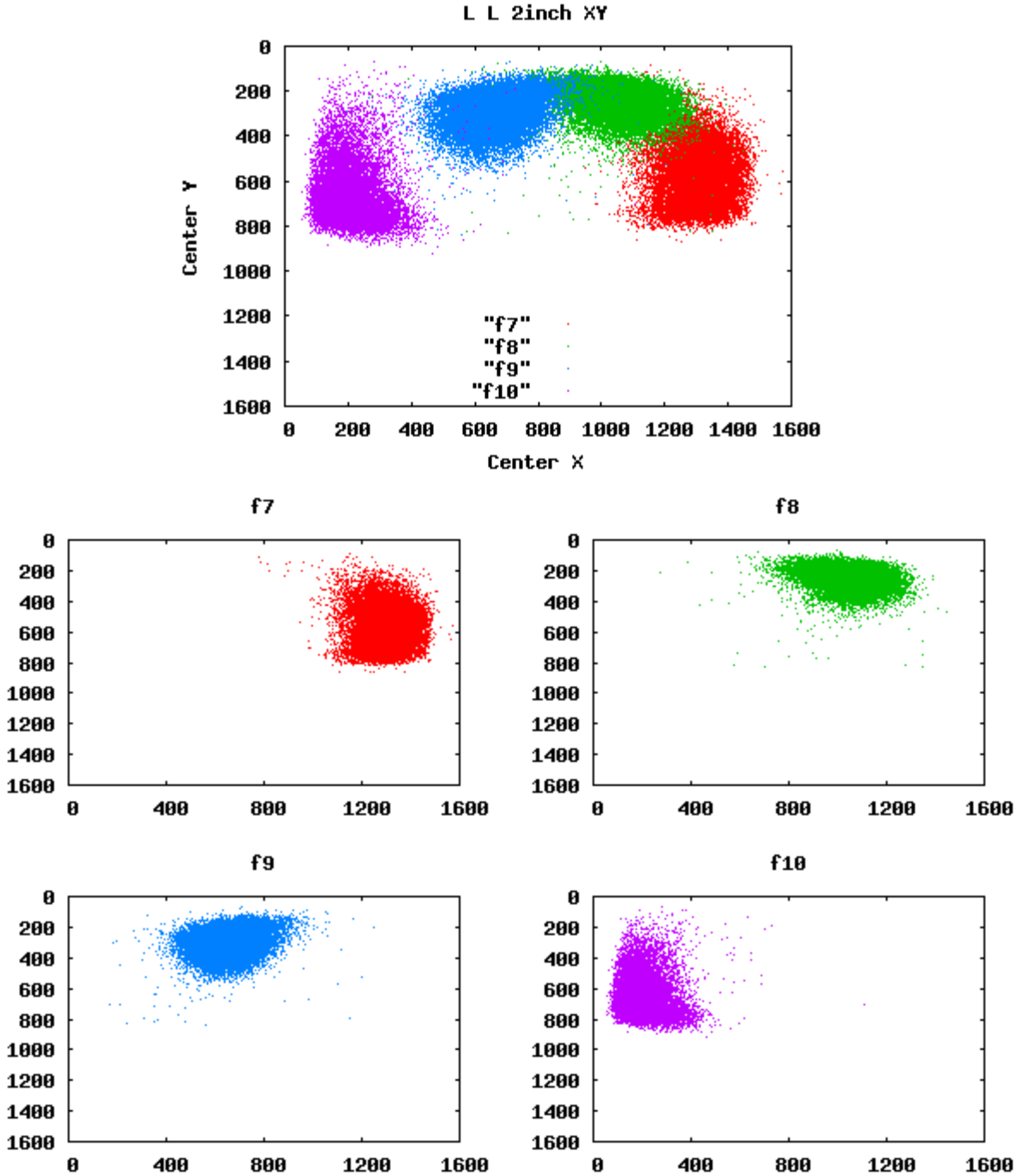
L = L-1 Identity Solutions

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.



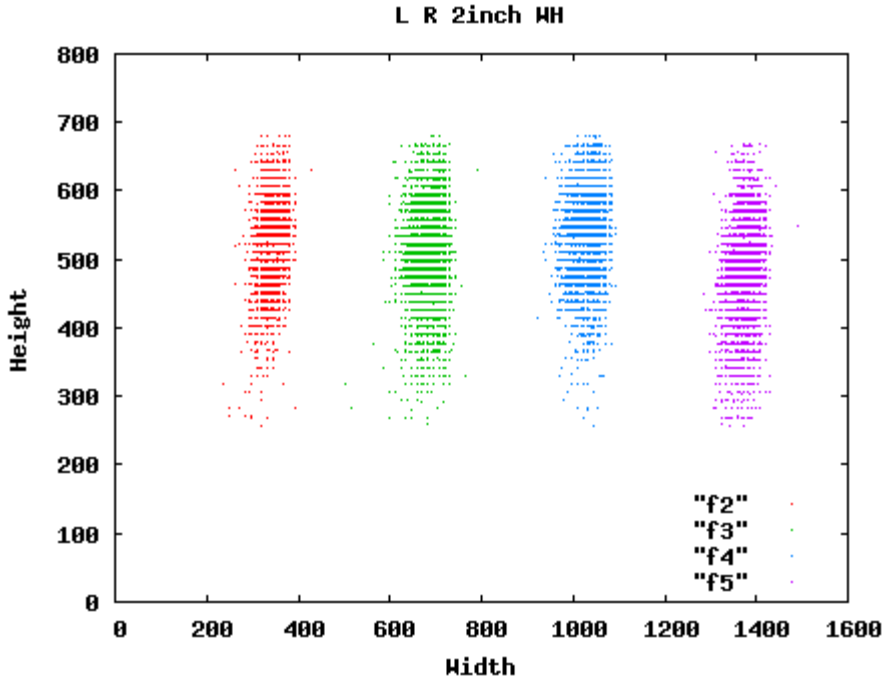
L = L-1 Identity Solutions

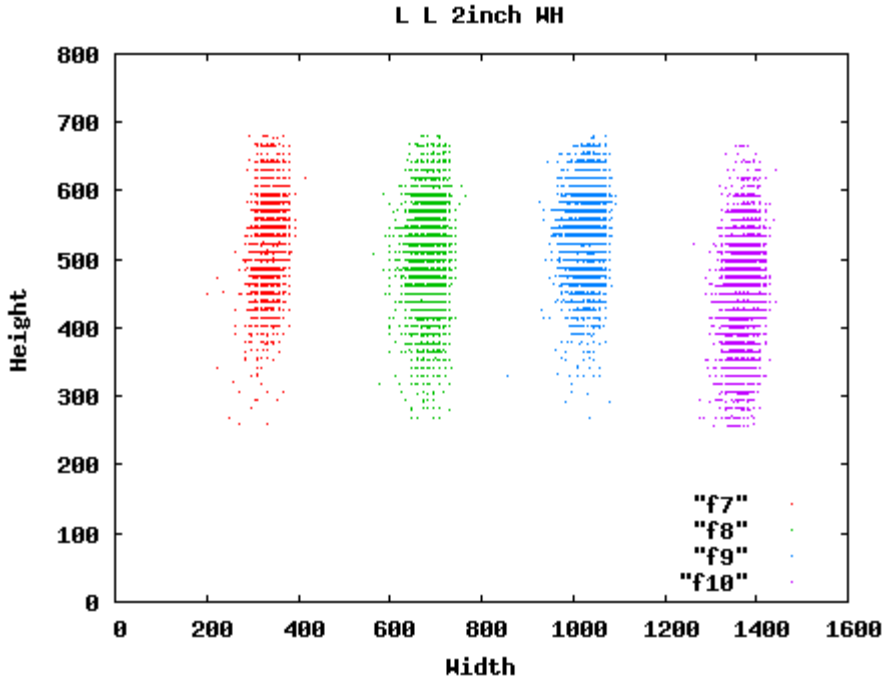


L = L-1 Identity Solutions

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.





L = L-1 Identity Solutions