

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 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 $MN-32 \leq d < MN$ 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.

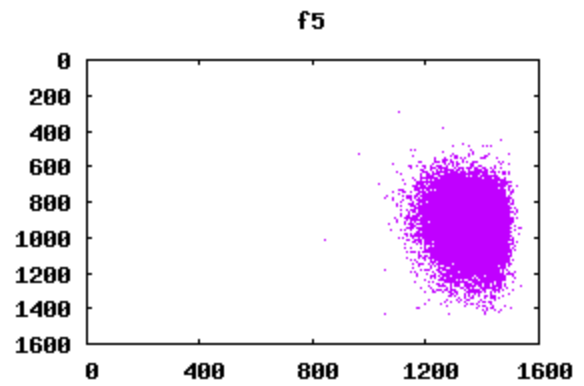
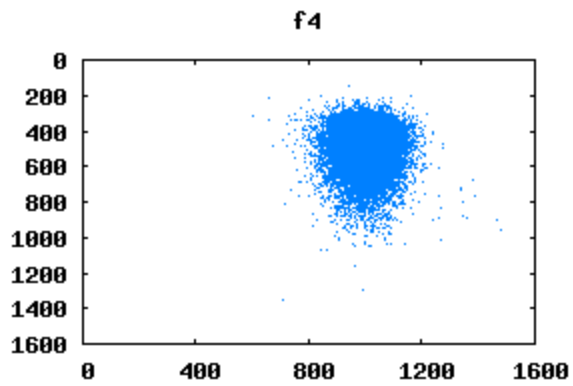
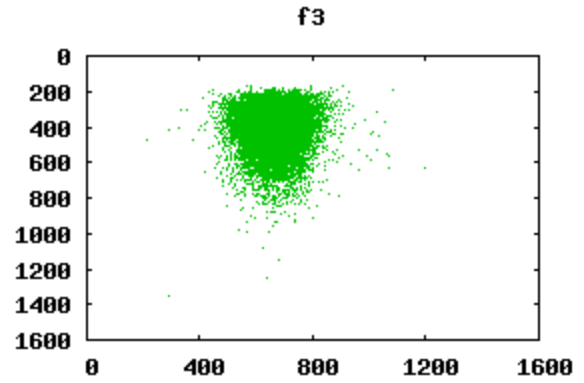
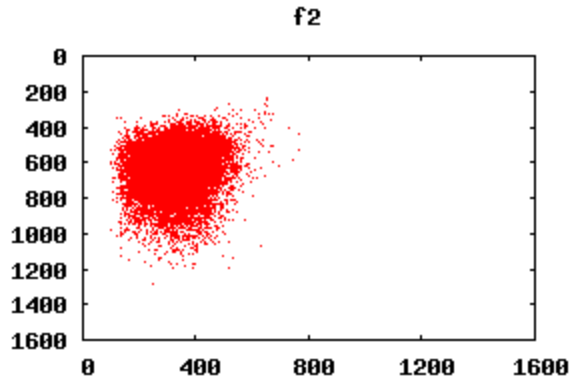
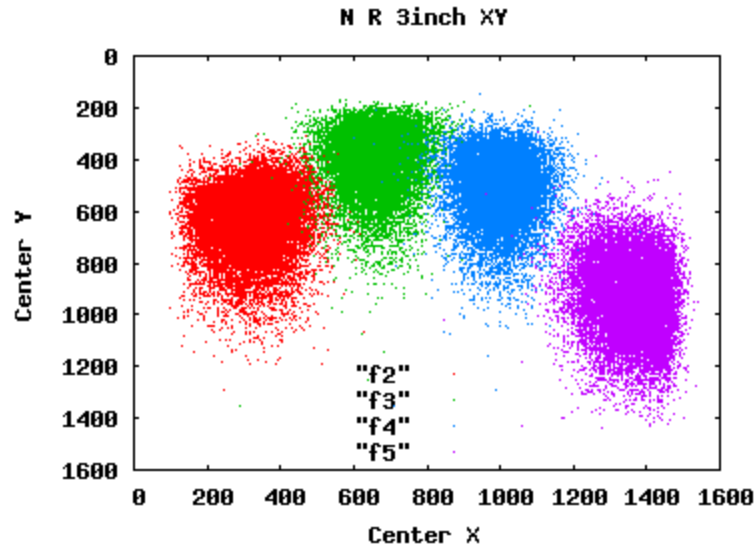
N = Green Bit

No Finger Found	R. Thumb 64				R. Index 361				R Middle 37				R. Ring 25				R. Little 61			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-5.86	-6.19	-7.71	-16.54	-4.77	-5.74	-6.13	-14.24	-5.20	-5.24	-5.96	-16.57	-4.40	-7.08	-6.22	-15.98	-4.75	-7.30	-7.12	-15.51
#	6547	6473	7356	15121	6473	1927	13986	17891	7799	2543	13420	17495	3234	3926	12862	16132	4458	3619	13752	16853
0 <= d <= MX	8.74	9.87	10.57	20.10	7.87	12.68	10.87	13.42	7.88	11.17	11.92	14.90	9.75	11.05	11.45	15.02	8.66	9.94	11.68	12.66
#	17793	17769	16973	8518	18131	22626	10574	6386	17094	22344	11498	6654	21683	20930	12058	7355	20442	21227	11131	7452
MN-32 <= d < MN	-35.56	-40.10	-73.06	-75.57	-38.44	-38.40	-66.50	-77.85	-42.56	-37.50	-76.50	-78.03	-36.50	-37.38	-66.25	-79.08	-42.43	-37.46	-71.98	-77.36
#	8	54	18	300	17	10	2	163	8	14	3	444	3	65	2	602	14	67	24	386
MX < d <= MX+32	N/A	74.97	N/A	141.97	78.30	86.50	66.67	141.00	N/A	74.50	79.88	144.22	69.00	77.25	70.25	144.39	N/A	83.10	83.38	142.75
#	0	39	0	169	53	1	3	27	0	1	8	27	1	2	2	27	0	5	4	8
d < MN-32	-440.19	-1017.1	-358.11	-591.36	-335.68	-424.71	-328.88	-810.93	-349.54	-679.67	-241.75	-171.75	-337.16	-925.10	-298.66	-143.56	-155.25	-1404.78	-162.33	-283.72
#	13	70	18	156	54	352	4	471	28	36	4	310	22	25	22	805	6	47	9	257
d > MX+32	788.54	518.88	926.86	259.00	182.64	386.51	548.14	285.95	435.00	350.15	195.49	264.45	724.98	383.05	360.20	295.53	1158.44	187.50	639.22	282.42
#	61	17	57	158	240	52	399	30	39	30	35	38	25	20	22	47	48	3	48	12
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	6.52	3.02	6.87	-5.28	5.65	5.86	9.88	-22.08	4.04	8.89	2.54	-10.60	8.33	7.44	2.38	-11.73	8.41	4.69	2.40	-10.63
Std Dev	43.15	63.42	48.37	79.10	26.16	55.80	71.33	122.11	22.88	30.84	14.83	35.15	27.48	35.43	19.12	41.62	51.85	62.94	31.98	50.66

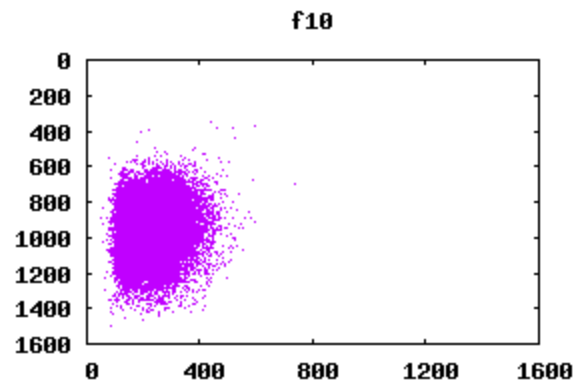
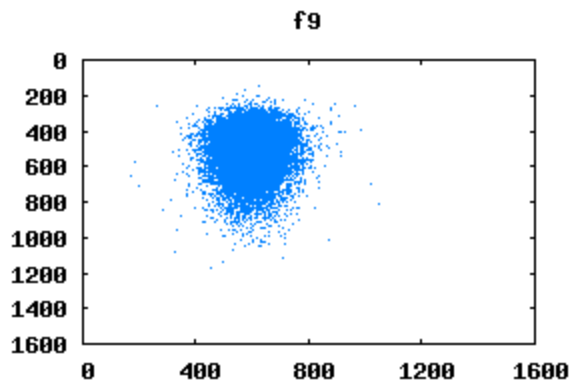
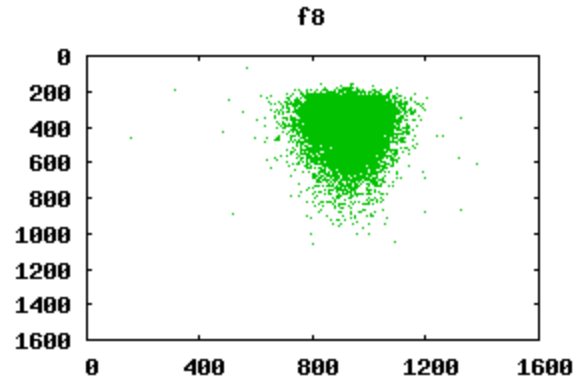
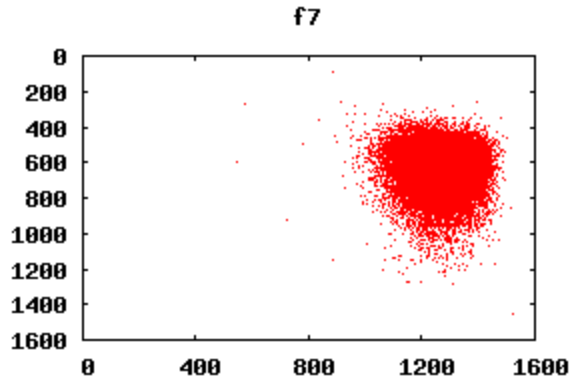
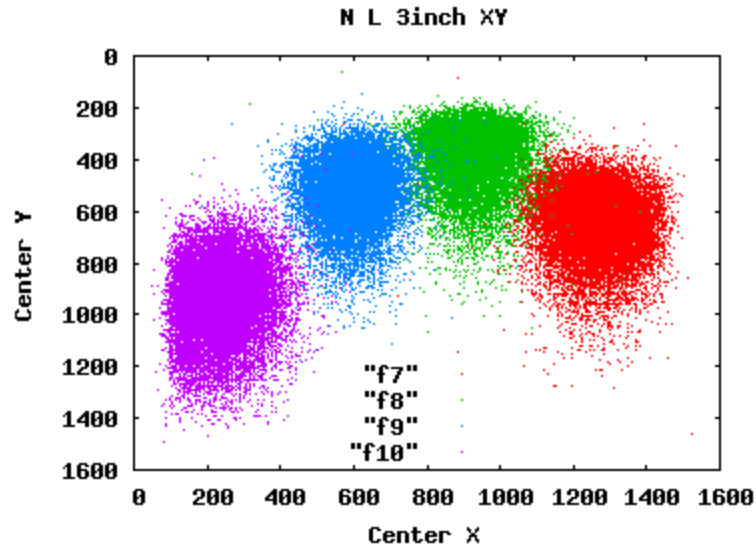
No Finger Found	L. Thumb 64				L. Index 175				L. Middle 15				L. Ring 41				L. Little 158			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-6.51	-5.19	-7.54	-17.57	-4.90	-8.41	-5.85	-14.70	-5.43	-6.25	-5.85	-17.77	-5.83	-6.68	-5.89	-18.28	-6.54	-7.14	-7.17	-17.76
#	9850	4094	9288	14915	6563	2308	13279	17937	8648	2129	12628	17773	9003	1193	12040	17695	9511	1428	12613	18247
0 <= d <= MX	8.16	10.53	9.99	22.63	8.24	13.65	11.06	10.63	8.16	13.34	11.93	12.68	8.34	16.03	12.61	12.45	8.00	15.67	12.70	10.56
#	14387	20238	15044	8631	18191	22400	11481	6469	16247	22769	12294	5979	15874	23695	12862	5182	15278	23343	12155	5616
MN-32 <= d < MN	-40.10	-47.35	-80.35	-75.33	-36.70	-36.70	-73.19	-76.84	-38.00	-38.17	-71.38	-77.37	-36.91	-36.71	-66.38	-79.27	-39.62	-39.38	-69.26	-77.21
#	47	10	10	294	10	57	8	201	9	9	4	647	17	12	4	908	39	25	23	632
MX < d <= MX+32	76.86	N/A	65.75	143.27	75.25	85.17	76.00	141.02	66.50	71.88	79.44	141.49	74.86	N/A	90.13	142.00	75.74	N/A	N/A	138.50
#	53	0	2	219	2	3	2	24	1	4	9	41	11	0	4	26	23	0	0	7
d < MN-32	-286.42	-628.20	-402.47	-652.55	-784.00	-1267.74	-237.17	-638.55	-506.00	-574.61	-263.88	-141.79	-435.35	-564.33	-353.04	-143.47	-245.46	-357.50	-494.59	-486.70
#	19	66	15	151	2	192	3	297	13	37	8	462	10	53	14	1111	14	156	16	431
d > MX+32	296.70	624.14	950.48	246.92	1019.25	494.88	554.72	291.57	458.72	618.63	242.95	297.65	418.40	503.05	308.93	312.25	170.90	397.79	764.36	420.55
#	66	14	63	212	196	4	191	36	46	16	21	62	49	11	40	42	99	12	157	31
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	2.85	6.50	5.46	-4.25	12.65	1.72	6.17	-15.47	4.00	11.18	3.05	-13.27	3.85	13.90	3.96	-18.97	2.95	12.16	6.99	-20.40
Std Dev	22.63	40.13	51.71	83.33	94.02	117.68	50.97	85.94	27.01	33.95	15.18	36.57	22.96	32.41	20.57	44.80	16.03	32.83	65.05	95.35

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

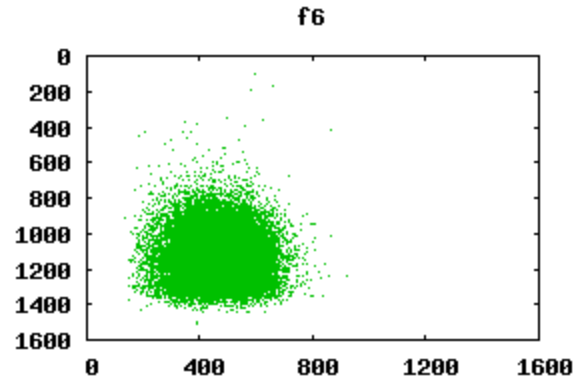
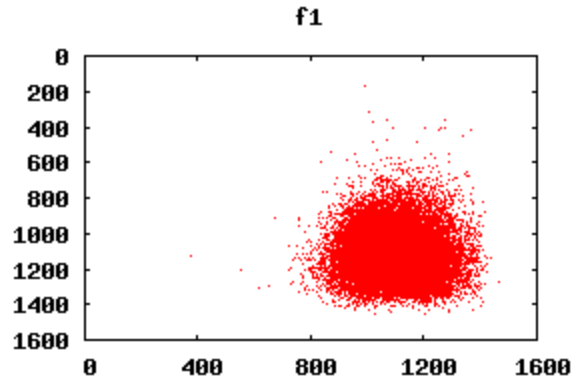
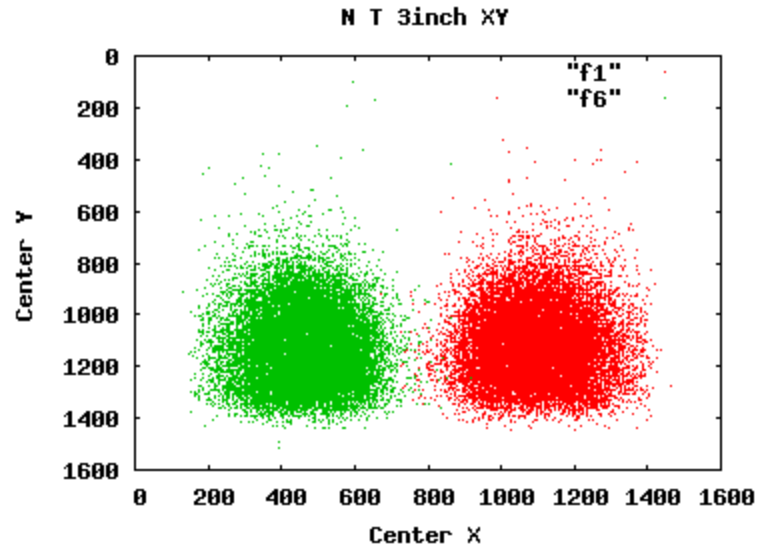
The plots in this appendix show the distribution of the segmentation box centers (x,y) for the 3-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of x,y positions detected. The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



N = Green Bit



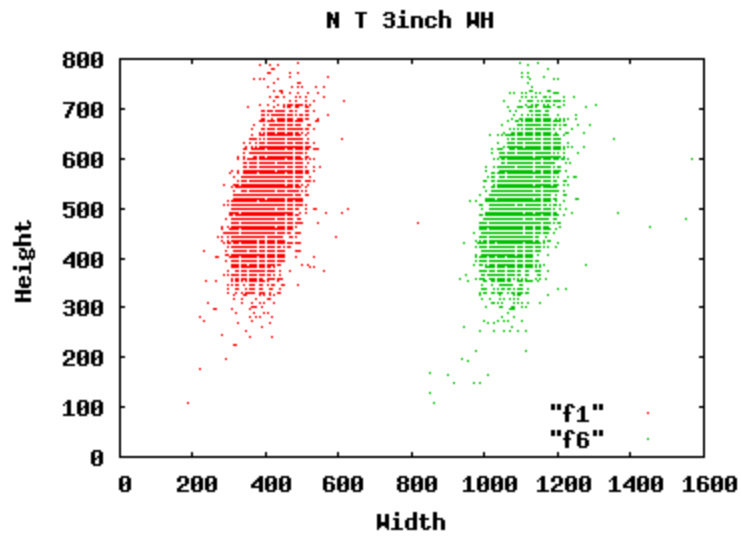
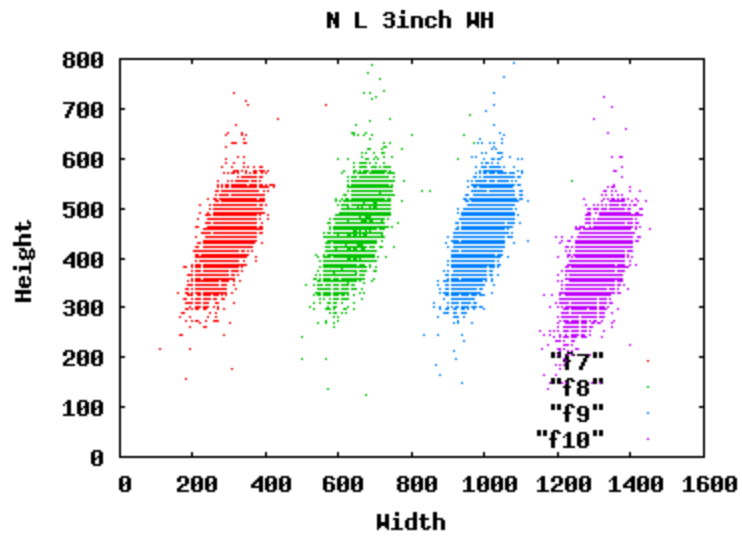
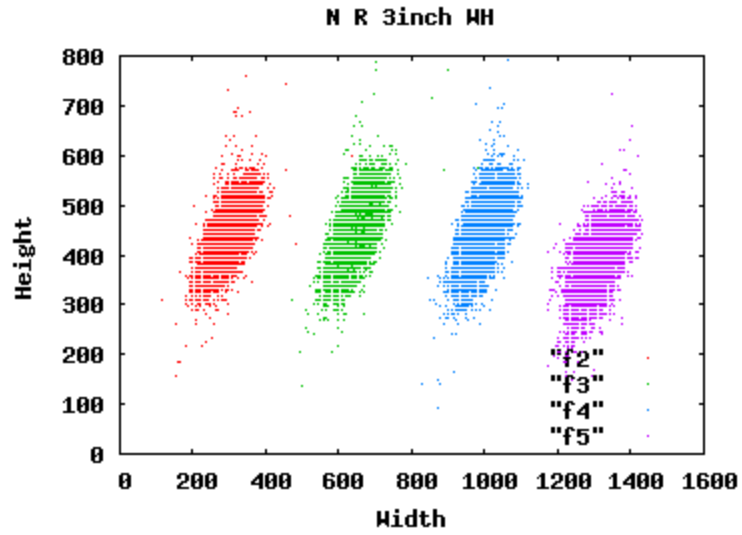
N = Green Bit



N = Green Bit

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.



N = Green Bit