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.

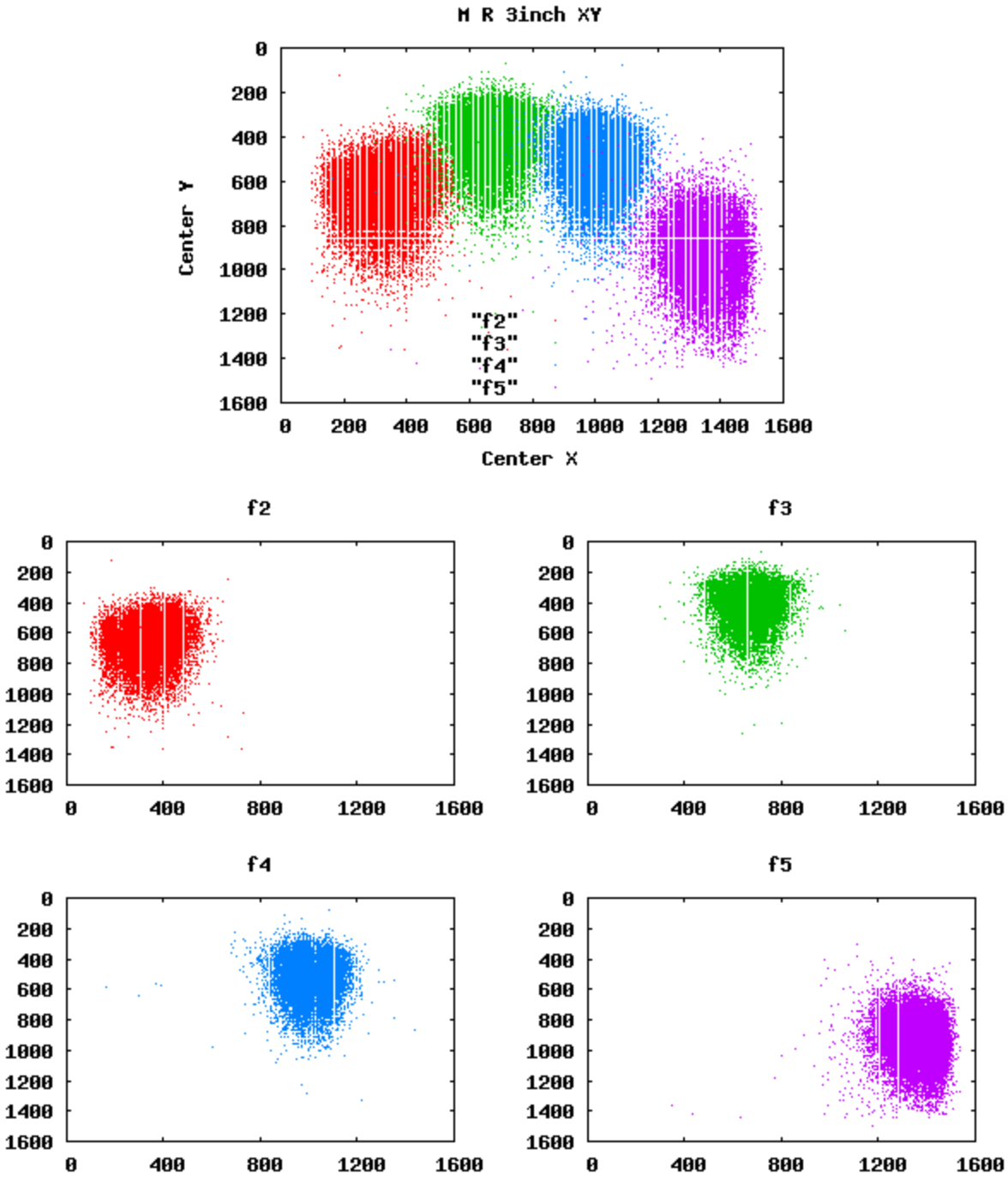
M = Aware

No Finger Found	R. Thumb 126				R. Index 36				R Middle 36				R. Ring 42				R. Little 90			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-11.30	-7.96	-18.21	-23.76	-11.99	-5.18	-22.91	-22.58	-11.78	-5.45	-23.05	-22.11	-9.04	-6.97	-22.72	-21.84	-8.88	-6.55	-21.90	-21.77
#	18486	10473	22462	16704	21858	2391	23515	18300	21000	4469	23448	14374	17805	6617	23368	15141	17398	6565	22878	18542
0 <= d <= MX	6.64	9.58	6.69	29.40	5.17	12.65	6.52	18.02	5.71	10.63	5.99	25.55	5.19	10.18	6.01	24.89	5.10	9.75	6.14	20.78
#	5503	13384	1696	4930	2890	22486	1342	5956	3761	20397	1429	8636	7047	18170	1469	7452	7219	18012	1724	4737
MN-32 <= d < MN	-36.76	-42.78	-79.32	-77.16	-39.22	-40.24	-73.79	-77.18	-36.82	-39.08	-76.98	-78.88	-39.18	-39.15	-74.49	-78.90	-40.57	-39.37	-78.71	-78.15
#	221	233	57	1132	164	19	35	329	150	30	30	741	47	97	42	991	98	89	85	822
MX < d <= MX+32	76.53	74.94	79.92	142.79	73.25	77.75	75.00	140.40	77.00	72.47	82.10	140.48	83.92	70.03	79.43	139.78	70.25	78.91	78.33	143.47
#	19	58	6	266	4	12	9	36	5	16	5	166	6	16	7	121	6	49	9	90
d < MN-32	-322.85	-668.74	-238.85	-280.29	-264.69	-379.13	-516.84	-223.00	-418.30	-673.92	-176.40	-167.62	-434.64	-826.53	-261.04	-157.92	-131.17	-696.48	-358.02	-286.51
#	34	242	69	1091	16	43	22	295	10	42	24	956	7	57	26	1207	38	218	151	534
d > MX+32	680.17	412.91	871.05	226.88	253.24	346.56	356.40	390.79	490.29	409.29	242.41	209.73	688.71	361.77	303.79	239.35	661.89	178.51	619.86	294.89
#	159	32	132	299	36	17	45	52	42	14	32	95	56	11	56	56	209	35	121	243
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	-3.35	-4.48	-12.41	-22.08	-9.95	10.49	-21.12	-14.89	-8.59	6.80	-21.24	-10.92	-3.61	3.73	-20.60	-15.37	0.48	-0.51	-19.04	-17.54
Std Dev	63.05	89.14	70.52	113.50	15.54	22.11	27.52	46.90	25.25	33.29	17.92	52.83	37.66	46.58	24.07	55.35	76.70	87.07	57.48	78.18

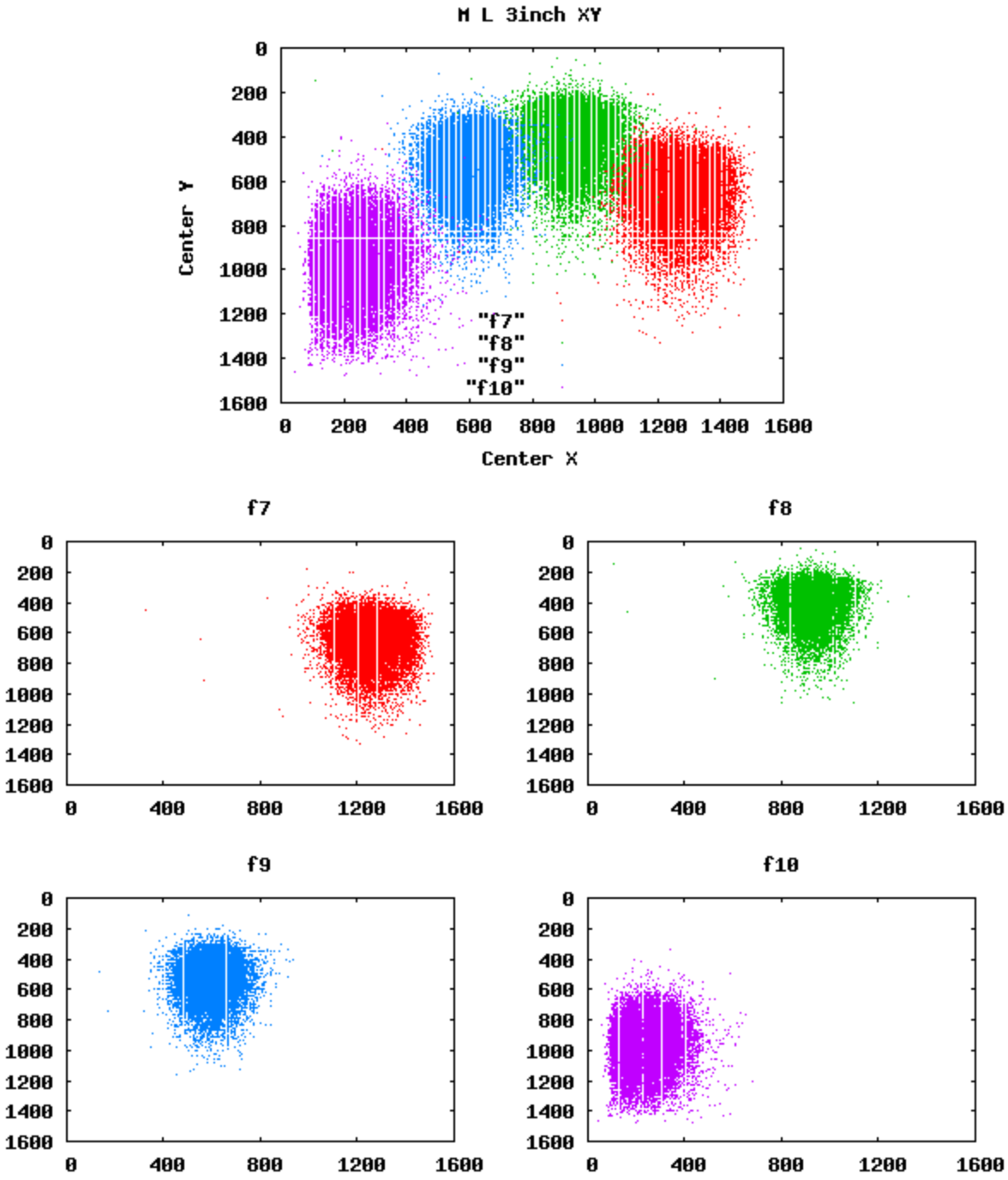
No Finger Found	L. Thumb 125				L. Index 56				L. Middle 57				L. Ring 61				L. Little 84			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-13.68	-5.85	-20.02	-23.08	-9.53	-7.56	-22.46	-21.33	-11.40	-6.78	-22.40	-21.66	-12.45	-6.81	-21.62	-21.66	-11.80	-7.12	-20.82	-20.34
#	19696	6490	22867	15923	18224	5700	23581	17998	19867	4621	23625	13527	20064	2468	23082	15304	19217	2062	22520	18276
0 <= d <= MX	11.22	10.23	7.69	33.84	5.62	10.62	4.66	17.89	5.73	11.55	4.30	28.35	6.73	14.00	4.05	27.01	7.90	14.82	4.36	17.90
#	3978	17677	1308	6367	6632	19024	1250	6191	4941	20200	1191	9785	4706	22350	1722	8173	5372	22586	1960	5659
MN-32 <= d < MN	-38.08	-45.97	-76.61	-76.51	-39.49	-38.45	-77.12	-78.36	-37.67	-38.72	-74.64	-78.30	-37.83	-39.96	-77.73	-77.83	-39.25	-44.37	-79.32	-75.70
#	494	29	58	648	34	153	38	330	75	55	51	572	114	45	35	544	129	67	133	165
MX < d <= MX+32	75.81	77.03	81.31	143.41	77.75	77.36	91.50	143.15	74.60	79.88	80.33	141.69	72.50	72.88	77.00	140.18	77.28	76.00	79.00	144.36
#	60	37	8	433	4	11	1	66	10	12	6	209	7	20	6	188	72	12	6	156
d < MN-32	-218.64	-623.07	-263.38	-384.05	-603.05	-1061.69	-260.97	-272.67	-524.17	-891.26	-202.42	-194.51	-354.33	-599.00	-228.01	-195.74	-259.54	-214.87	-356.90	-609.27
#	53	154	52	666	10	64	29	295	9	65	39	745	6	72	51	651	75	155	230	183
d > MX+32	357.87	402.70	890.92	216.44	935.99	612.92	399.14	245.93	723.71	608.82	246.93	228.48	436.13	393.17	329.21	228.88	165.68	287.55	637.85	278.00
#	141	35	129	385	60	12	65	84	62	11	52	126	67	9	68	104	99	82	115	525
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	-8.19	2.56	-14.35	-12.77	-3.49	3.74	-20.36	-13.99	-6.41	5.99	-20.93	-5.88	-7.81	10.26	-19.37	-9.23	-7.49	12.35	-19.19	-9.05
Std Dev	35.63	58.96	70.38	115.09	51.76	62.97	27.57	51.09	40.29	52.06	20.14	57.55	26.81	37.62	26.17	57.27	22.41	28.71	62.04	84.38

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

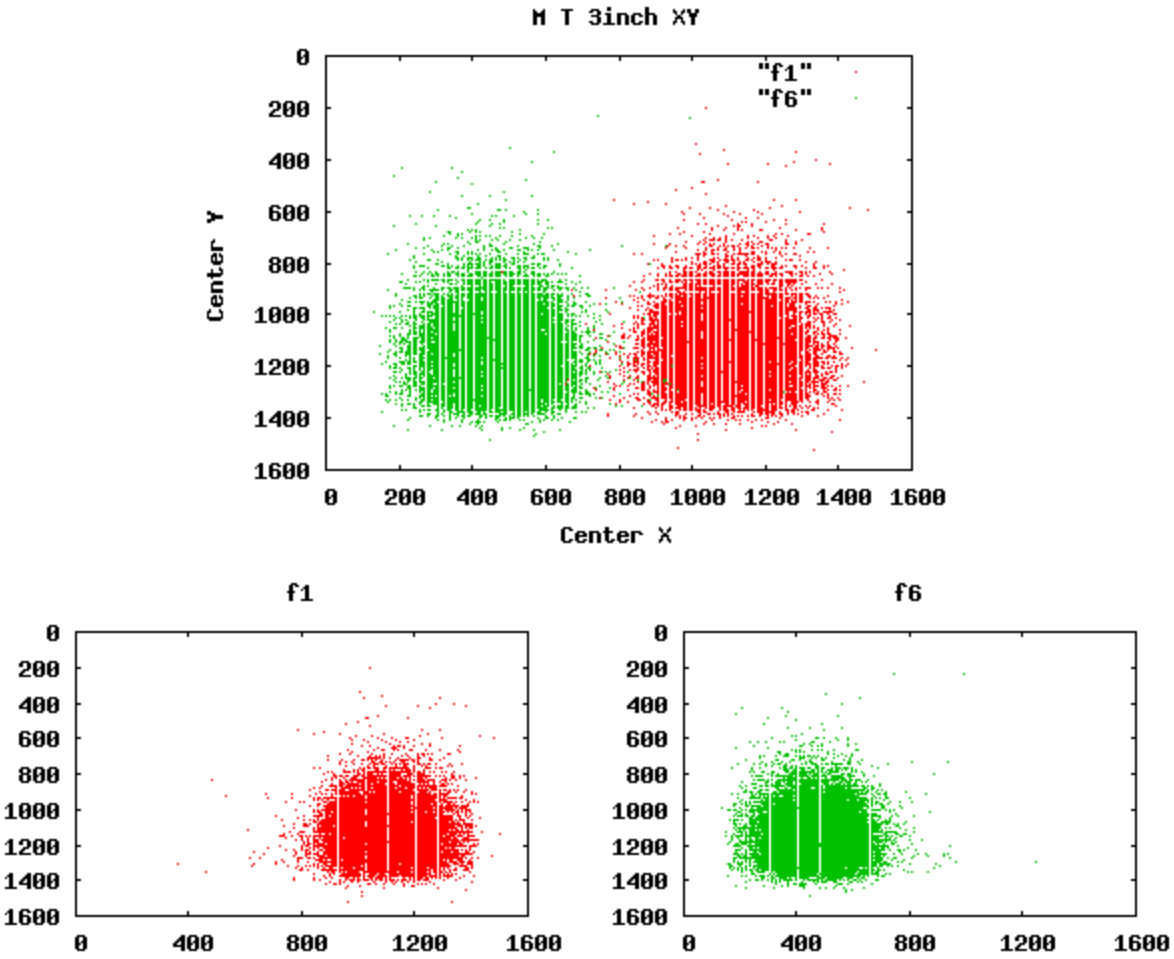
The plots in this appendix show the distribution of the segmentation box centers (x,y) for the 3-inch data. There is a combined plot for each slap image and then a smaller plot for each finger position. The individual finger plots are better for seeing the full “spread” of x,y positions detected. The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



M = Aware



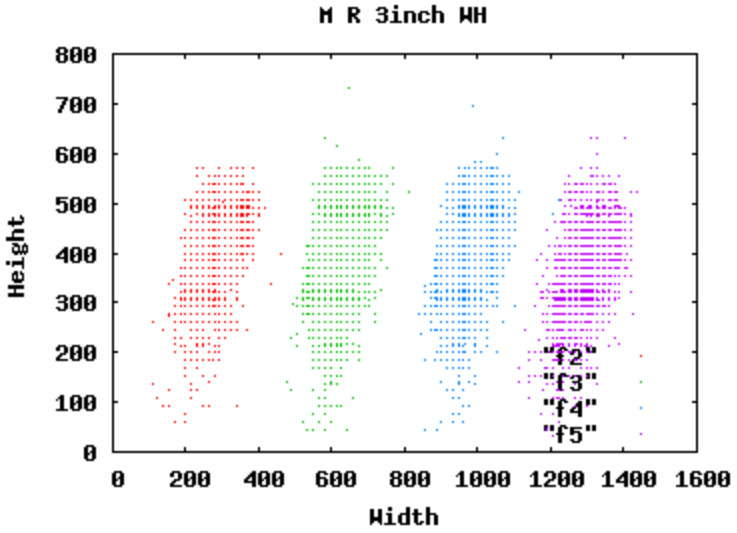
M = Aware

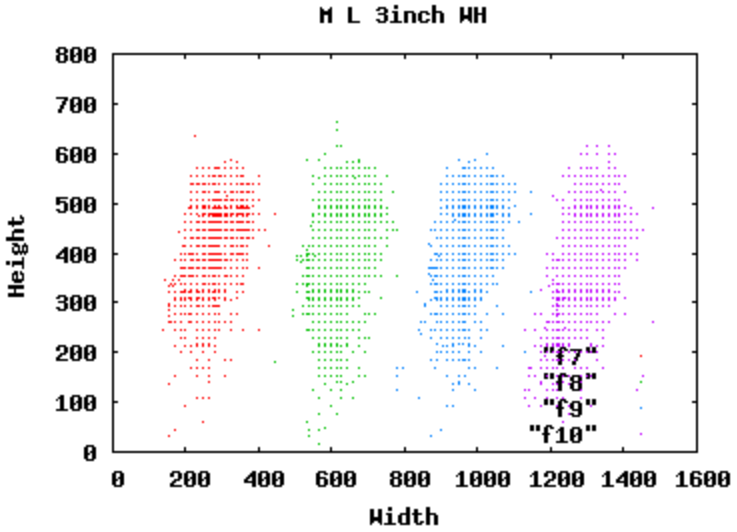

M T 3inch XY
"f1"
"f6"
Center Y
Center X
0
200
400
600
800
1000
1200
1400
1600
f1
f6

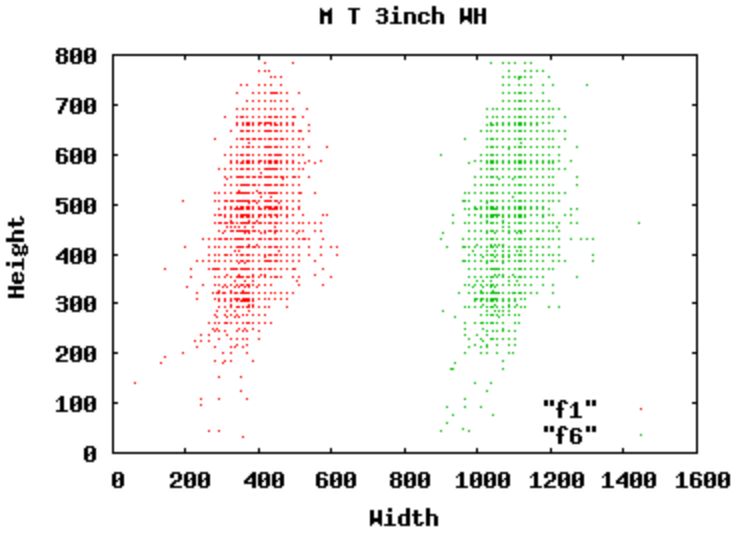
M = Aware

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.


M R 3inch WH
Height
Width
0
100
200
300
400
500
600
700
800
0
200
400
600
800
1000
1200
1400
1600
"f2"
"f3"
"f4"
"f5"

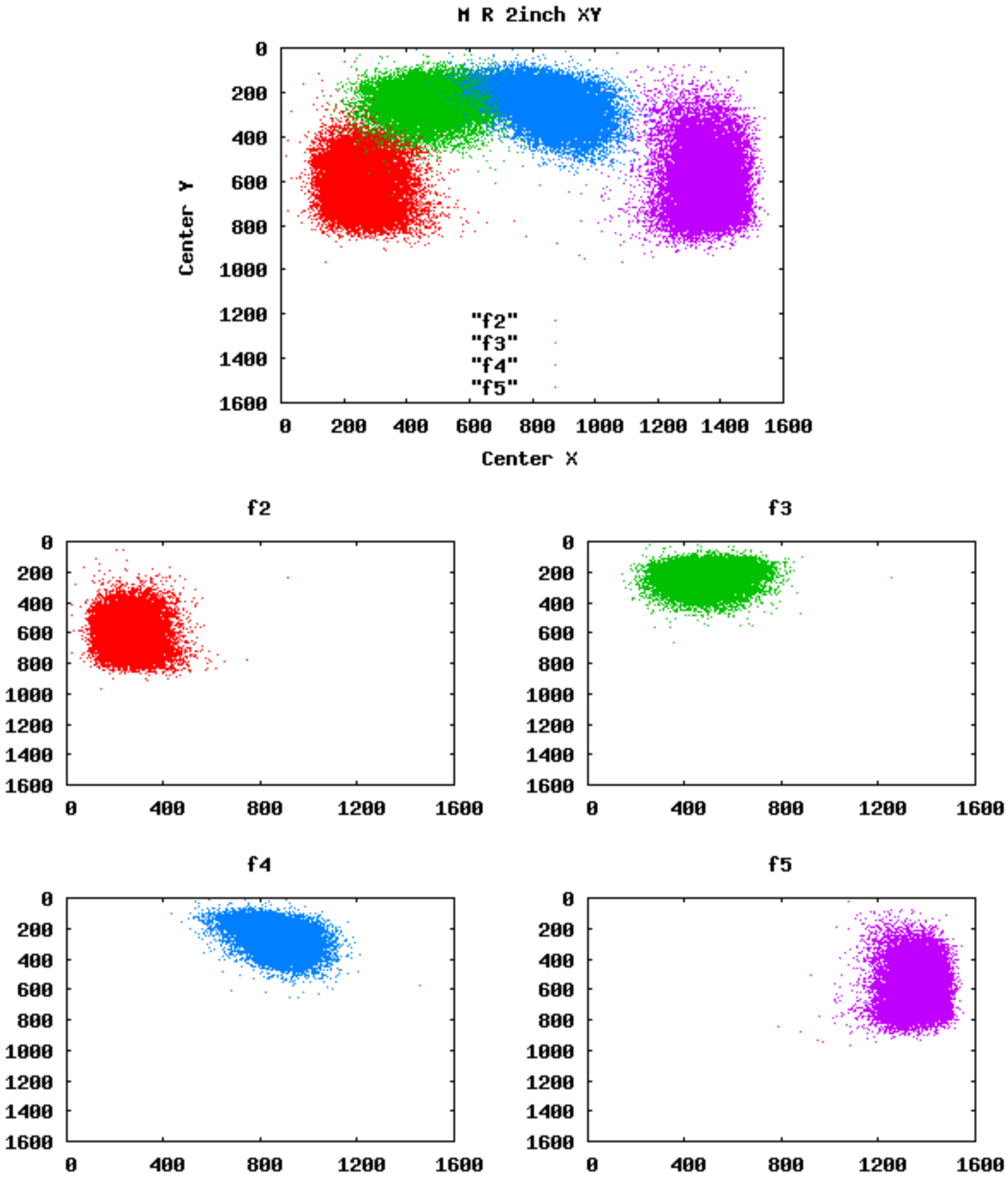

M L 3inch WH
Height
Width
0
100
200
300
400
500
600
700
800
0
200
400
600
800
1000
1200
1400
1600
"f7"
"f8"
"f9"
"f10"


M T 3inch WH
Height
Width
0
100
200
300
400
500
600
700
800
0
200
400
600
800
1000
1200
1400
1600
"f1"
"f6"

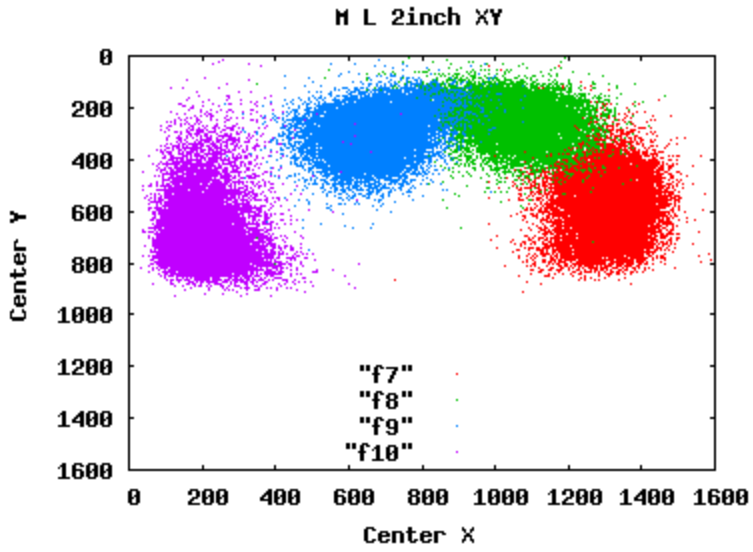
M = Aware

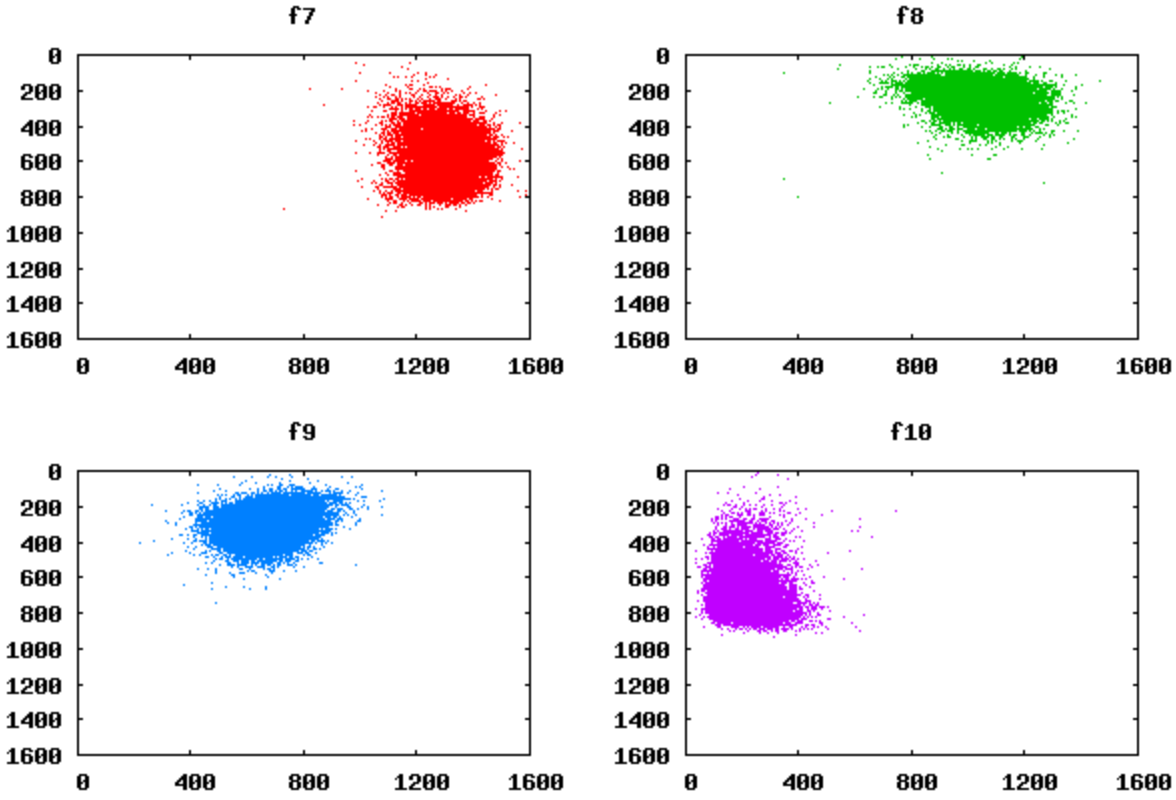
Appendix F. Plots of 2-inch segmentation box centers.

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.



M = Aware

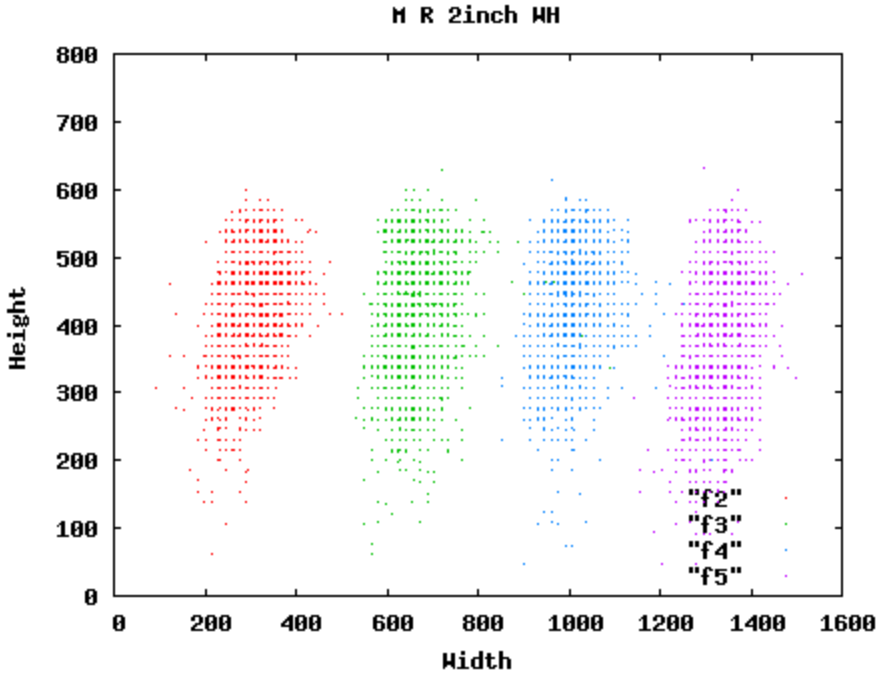


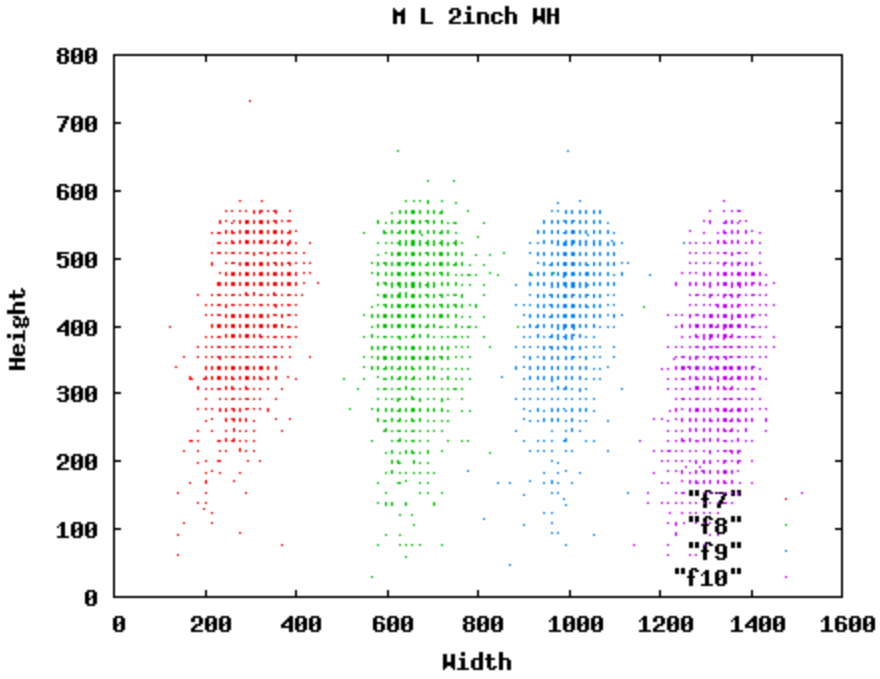


M = Aware

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.


M R 2inch WH
Height
Width
"f2"
"f3"
"f4"
"f5"


M L 2inch WH
Height
Width
"f7"
"f8"
"f9"
"f10"

M = Aware