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.

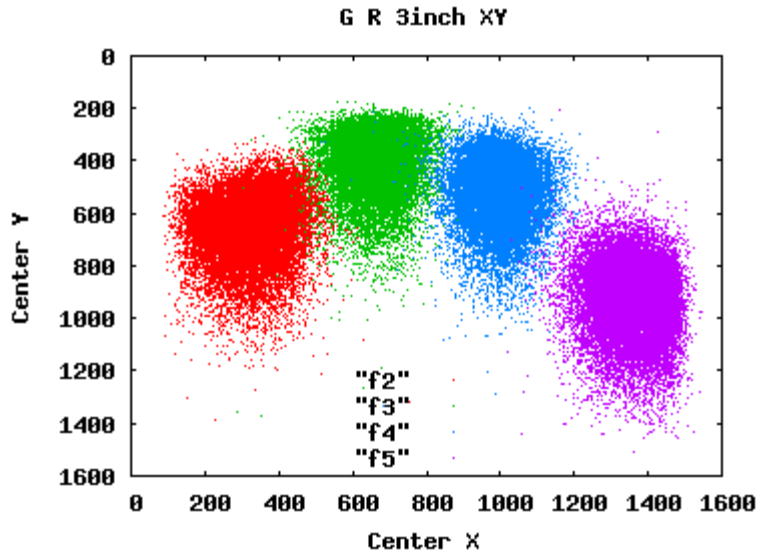
G

	R. Thumb				R. Index				R Middle				R. Ring				R. Little			
No Finger Found	**40**				**14**				**12**				**11**				**26**			
	L	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**
MN <= d < 0	-7.07	-7.59	-11.52	-19.57	-6.54	-5.57	-15.80	-17.18	-7.26	-5.71	-15.88	-17.82	-5.33	-6.82	-15.73	-17.92	-6.43	-6.64	-16.85	-17.25
#	12096	12616	17457	14475	15629	7876	20638	11678	15179	9863	19934	8839	9667	11220	20074	10471	13164	11074	20111	14043
0 <= d <= MX	6.13	8.62	4.81	35.33	5.29	6.98	6.57	16.67	5.91	6.44	6.47	20.28	6.06	6.50	6.31	22.44	5.37	6.27	6.04	19.20
#	11914	11257	6741	8368	9269	17040	4293	13139	9749	15053	5001	15852	15268	13556	4854	14231	11722	13701	4736	10740
MN-32 <= d < MN	-39.94	-40.53	-79.98	-77.67	-38.57	-41.00	-73.93	-77.35	-38.13	-38.40	-73.92	-76.12	-39.33	-38.71	-73.09	-76.63	-40.49	-38.10	-74.89	-75.14
#	36	87	45	426	53	33	15	99	24	35	13	178	12	172	22	163	43	154	67	65
MX < d <= MX+32	70.50	76.53	77.65	144.35	#DIV/0!	#DIV/0!	#DIV/0!	143.93	#DIV/0!	72.50	#DIV/0!	140.11	69.50	86.00	#DIV/0!	140.62	80.00	82.14	#DIV/0!	144.17
#	2	66	23	328	0	0	0	15	0	2	0	27	2	1	0	34	1	7	0	18
d < MN-32	-280.06	-639.22	-353.47	-420.53	-287.55	-351.25	-527.42	-383.55	-340.50	-684.83	-303.96	-183.38	-436.90	-735.79	-304.93	-204.23	-279.41	-1081.20	-422.29	-577.61
#	36	350	48	325	11	8	13	20	7	9	13	49	5	12	7	49	17	20	34	31
d > MX+32	616.22	314.28	778.77	233.31	226.08	421.32	483.44	574.56	499.83	445.25	240.36	308.11	622.04	435.07	338.32	261.58	943.62	427.46	674.50	332.39
#	338	46	108	500	6	11	9	17	9	6	7	23	14	7	11	20	21	12	20	71
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	7.55	-8.45	-4.23	0.27	-2.28	3.02	-12.07	0.60	-2.06	1.44	-11.51	6.10	1.89	-0.03	-11.42	4.77	-0.33	-0.38	-12.66	-1.31
Std Dev	77.58	86.80	60.75	92.21	11.01	14.47	21.24	33.42	14.41	17.32	14.90	30.01	19.45	22.84	15.06	32.11	33.40	38.06	29.76	40.71

	L. Thumb				L. Index				L. Middle				L. Ring				L. Little			
No Finger Found	**31**				**12**				**13**				**8**				**30**			
	L	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**	**L**	**R**	**T**	**B**
MN <= d < 0	-7.46	-6.74	-12.94	-19.02	-6.24	-7.30	-16.09	-17.25	-7.74	-6.68	-15.97	-18.38	-7.79	-6.20	-15.79	-18.70	-7.47	-7.19	-16.67	-18.21
#	13070	11703	18953	13174	13252	8533	20054	11636	15378	7484	19142	8999	14868	5185	18235	11293	13754	6722	18141	14167
0 <= d <= MX	9.84	6.64	4.41	34.18	6.23	6.92	5.92	16.41	5.72	7.61	5.52	18.89	6.10	8.54	6.01	18.76	6.35	7.71	5.62	17.32
#	10764	12306	5266	9423	11685	16194	4876	13200	9548	17396	5787	15605	10042	19700	6704	13349	11095	18077	6675	10555
MN-32 <= d < MN	-41.60	-43.49	-77.00	-76.29	-40.36	-39.04	-73.75	-75.35	-39.24	-36.69	-72.08	-76.34	-37.86	-37.73	-73.60	-78.38	-39.66	-40.30	-74.01	-75.18
#	62	49	74	324	14	226	20	85	17	65	12	246	36	60	10	207	58	119	72	87
MX < d <= MX+32	76.77	76.67	78.60	144.15	84.00	#DIV/0!	#DIV/0!	143.50	66.67	74.00	76.50	144.12	90.00	76.50	#DIV/0!	142.19	84.70	78.50	#DIV/0!	144.00
#	142	3	5	505	3	0	0	14	3	1	3	26	1	2	0	32	20	4	0	16
d < MN-32	-609.11	-447.46	-276.29	-367.31	-876.50	-697.81	-508.75	-297.53	-521.83	-874.41	-367.00	-197.61	-437.75	-576.33	-516.39	-178.47	-470.58	-273.77	-356.31	-626.18
#	317	53	61	232	2	8	8	18	6	11	14	52	10	6	9	60	6	33	48	42
d > MX+32	219.88	641.40	743.33	225.49	603.94	836.67	462.75	542.73	627.33	620.86	248.50	345.22	376.43	545.14	462.83	411.20	183.26	423.00	669.02	314.73
#	67	308	63	764	8	3	6	11	12	7	6	36	7	11	6	23	31	9	28	97
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	-6.61	7.16	-8.08	8.46	-0.29	1.52	-11.88	0.49	-2.42	3.00	-11.13	4.67	-2.31	5.46	-10.02	1.05	-1.20	3.26	-10.76	-3.01
Std Dev	74.74	79.28	47.54	84.45	16.92	20.36	17.62	29.21	19.51	24.83	16.08	32.69	14.57	18.00	18.17	33.89	14.53	17.79	31.60	44.17

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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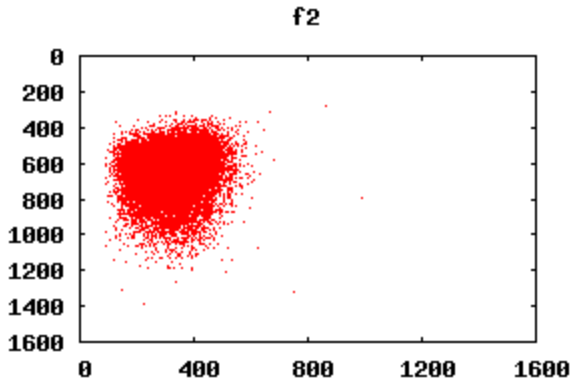
"f3"
"f4"
"f5"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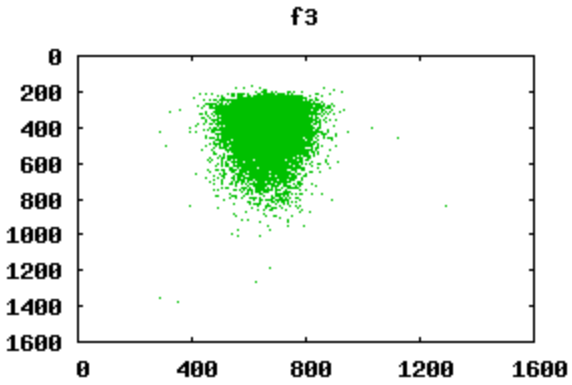
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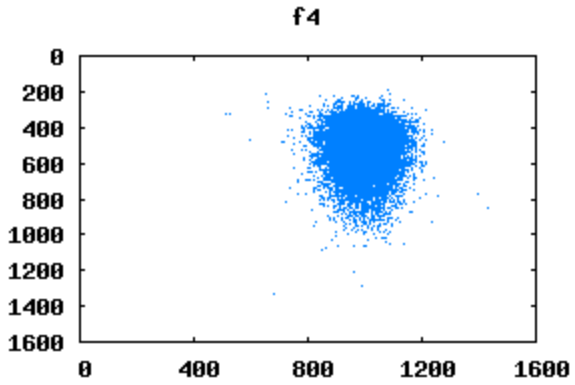
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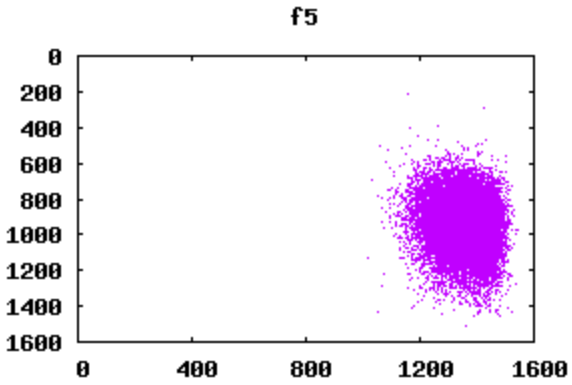
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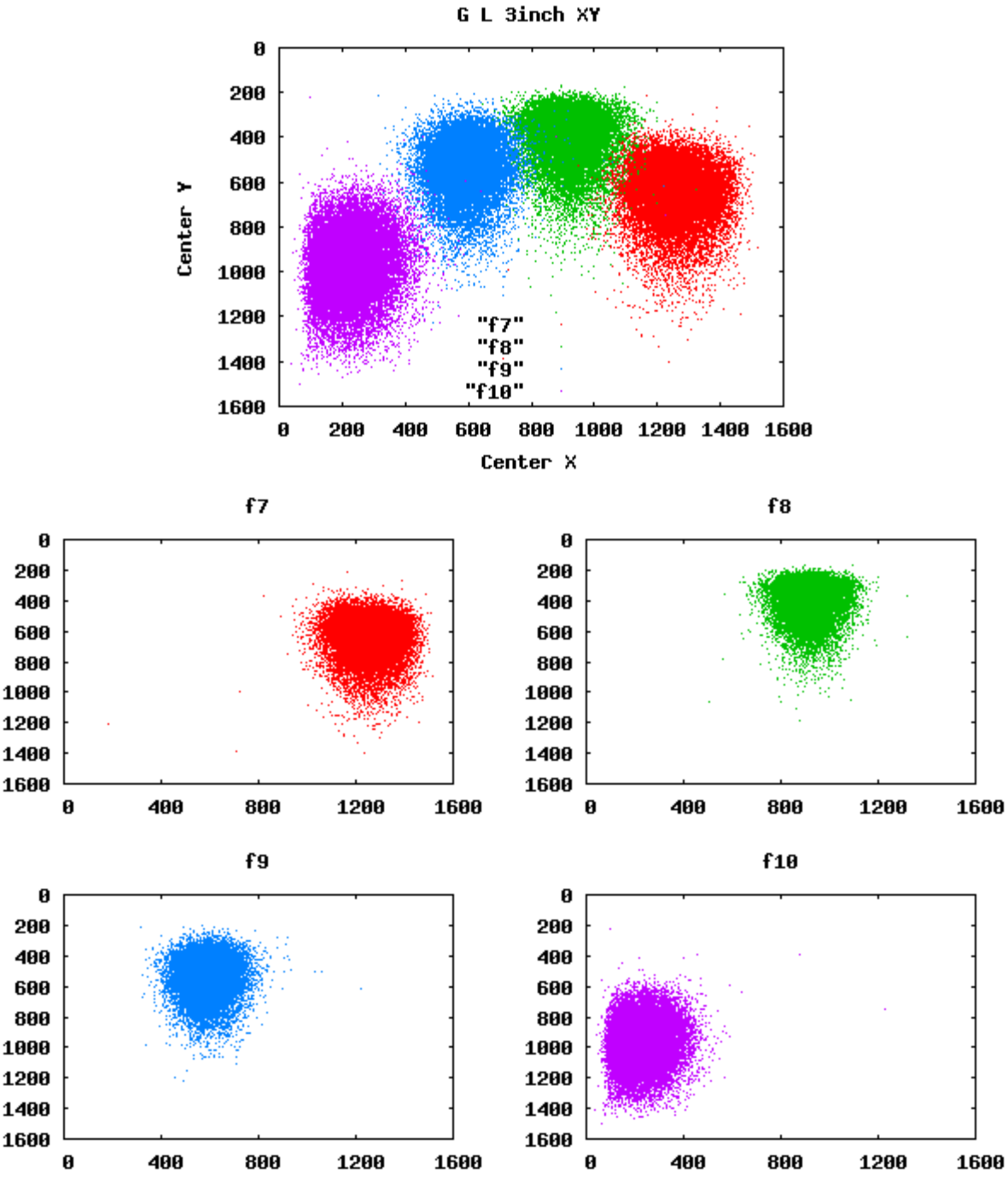
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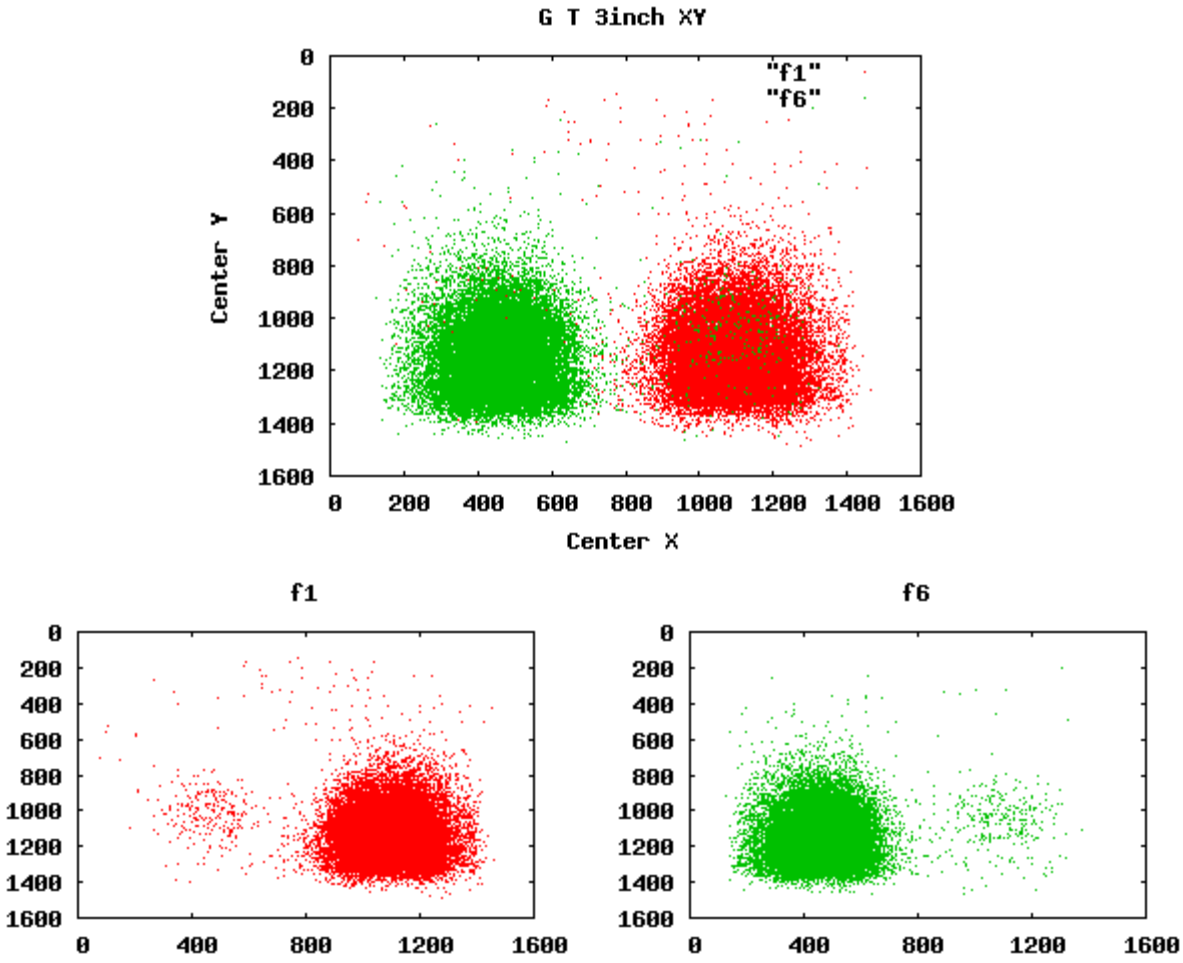
f10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Center X
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200
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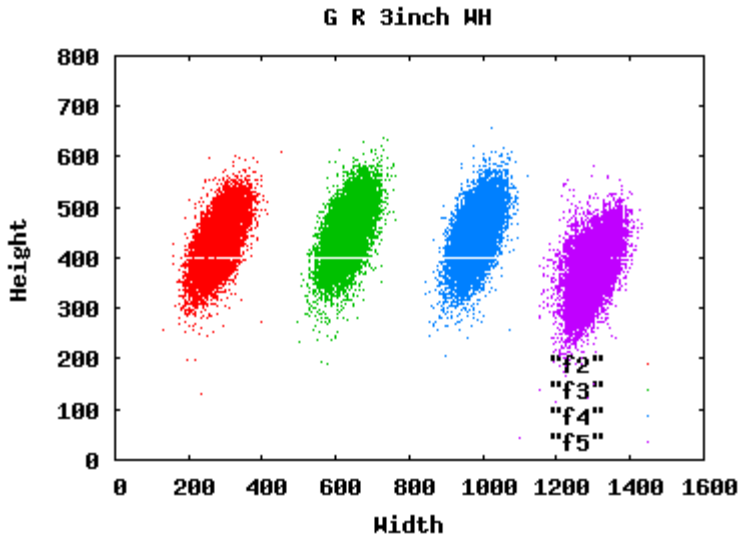
600
800
1000
1200
1400
1600
f1
f6

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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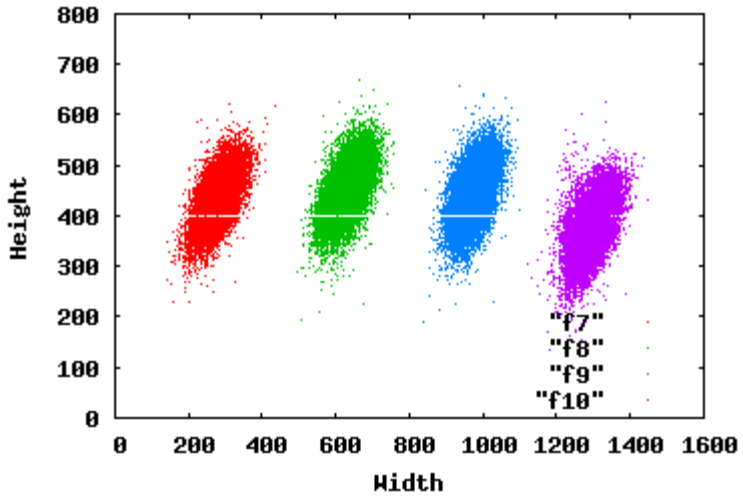
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Height
Width
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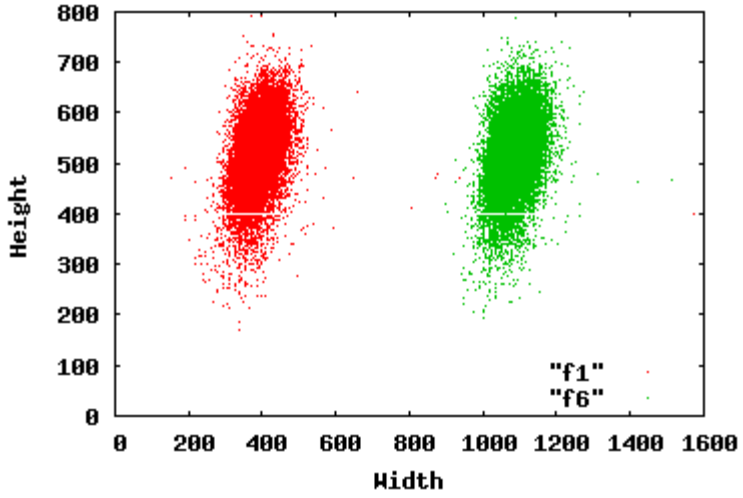
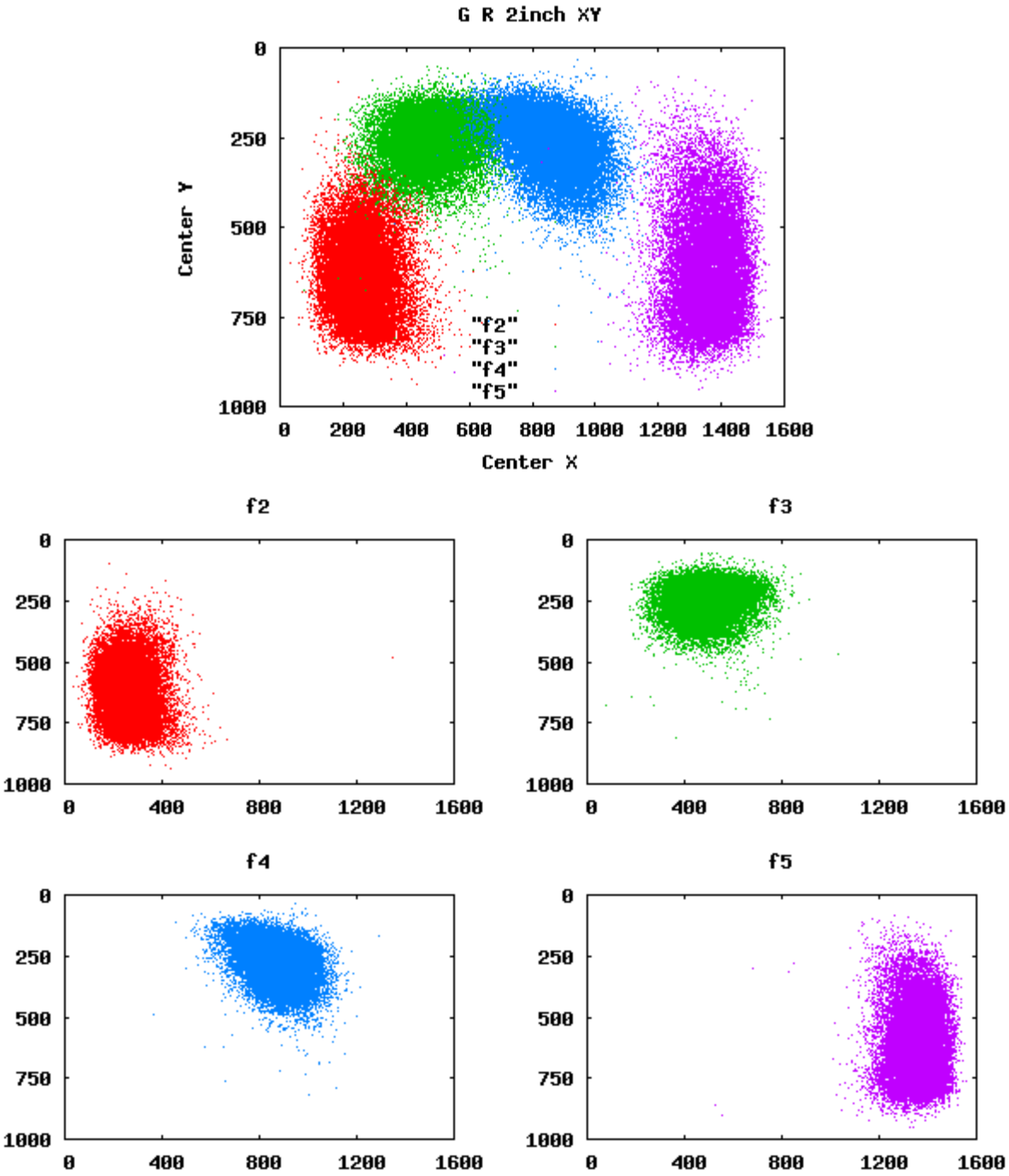

G T 3inch WH
Height
Width
"f1"
"f6"

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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1000
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"f5"
f2
f3
f4
f5
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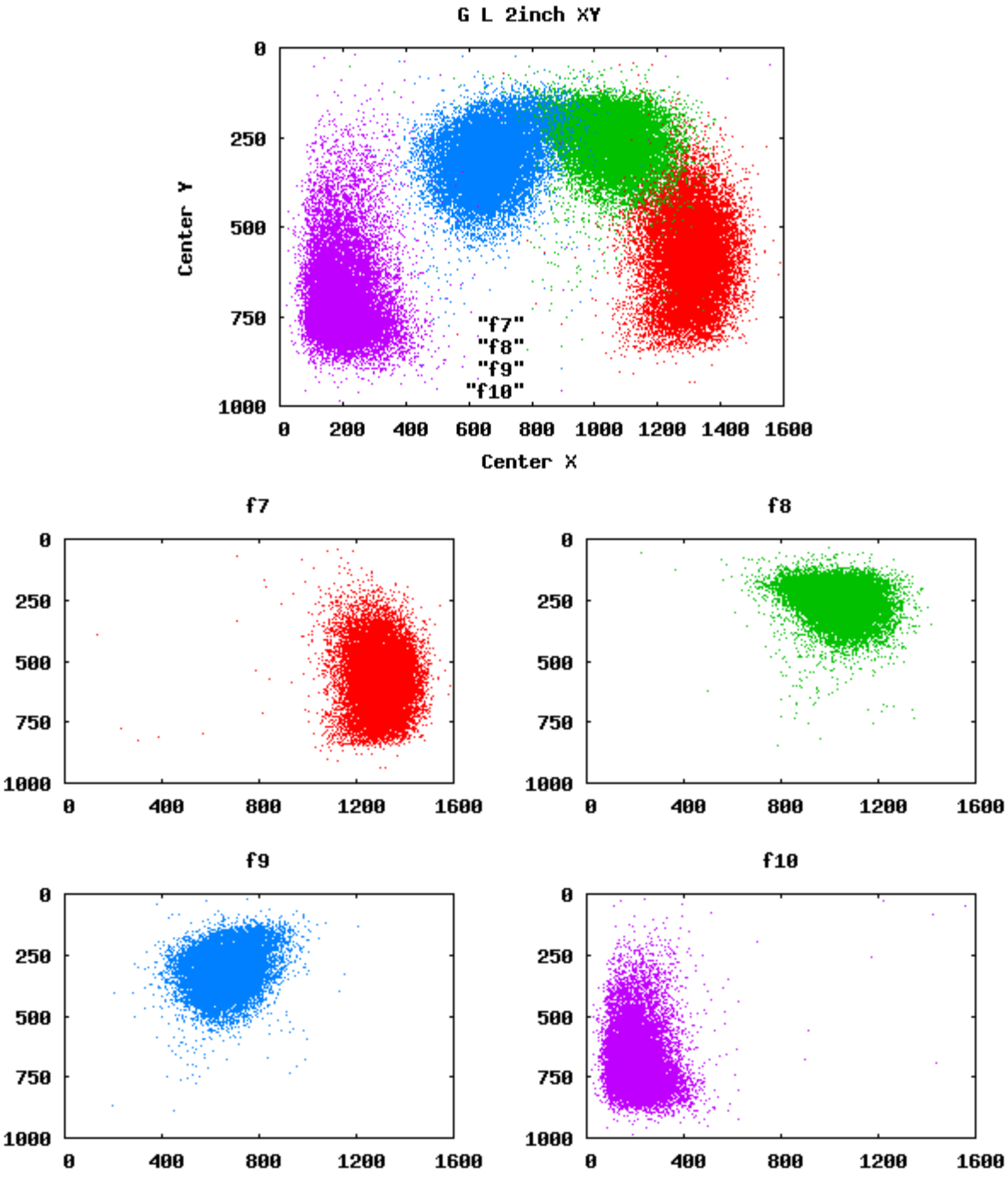
1200
1600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Center Y
Center X
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750
1000
0
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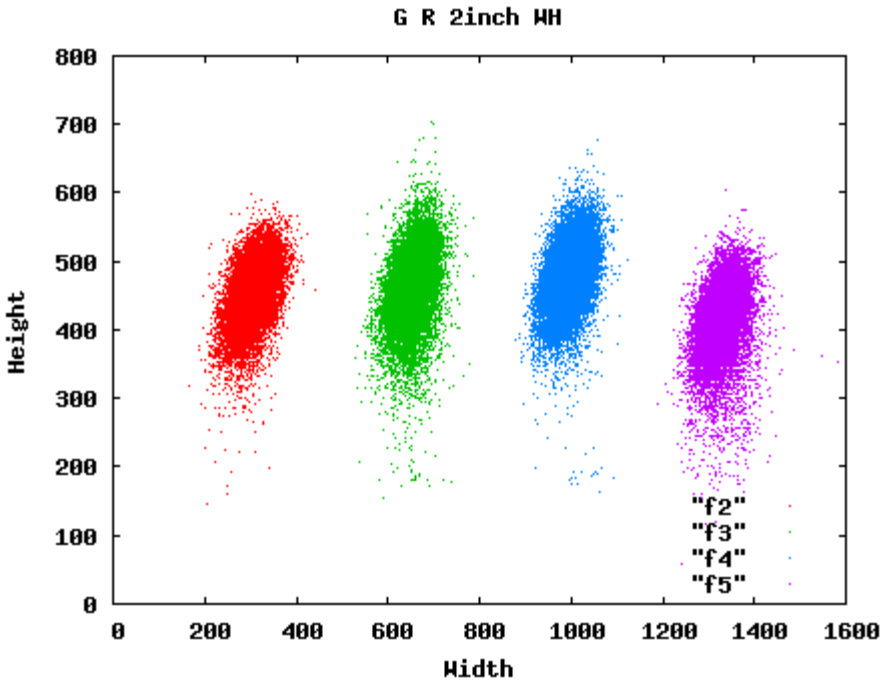
400
600
800
1000
1200
1400
1600
"f7"
"f8"
"f9"
"f10"
f7
f8
f9
f10

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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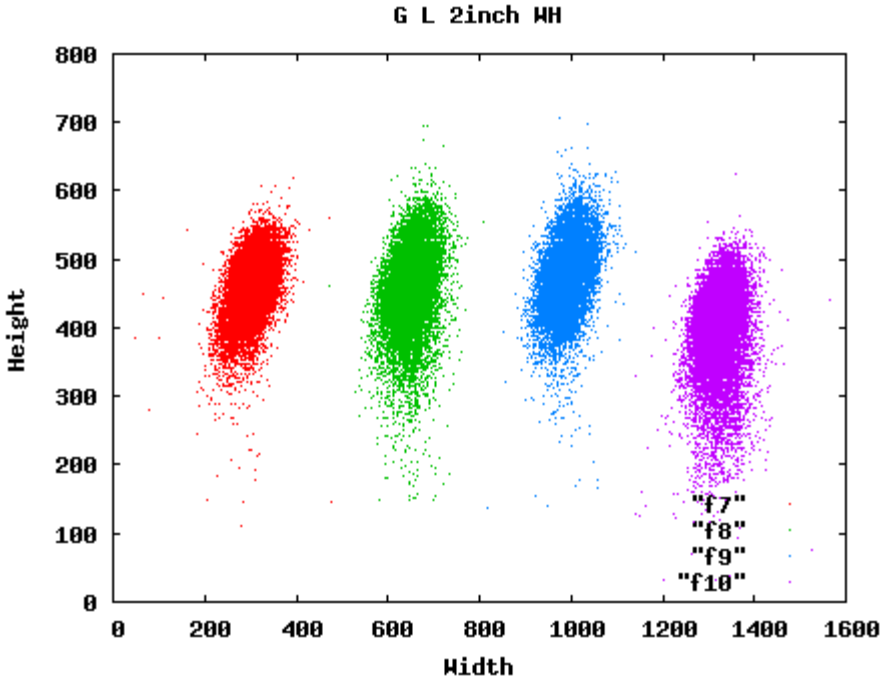
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Width
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