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.

H

No Finger Found (Right Hand)

	R. Thumb 4129				R. Index 44				R Middle 23				R. Ring 25				R. Little 331			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-6.85	-9.71	-12.28	-22.98	-4.32	-5.28	-8.59	-22.45	-5.53	-5.18	-8.65	-29.99	-4.04	-6.90	-8.03	-31.78	-4.24	-6.93	-7.79	-23.11
#	2677	5766	2924	1509	11959	1737	14338	539	13558	3947	13875	705	4492	6018	12800	458	2580	5981	6246	450
0 <= d <= MX	15.67	12.76	21.00	36.93	9.14	16.59	12.20	43.29	8.41	13.77	12.83	47.78	12.11	11.66	13.00	49.06	13.91	11.84	15.50	46.75
#	17541	13974	17049	17810	12839	23095	10479	24099	11222	20892	10986	23820	20372	18724	12056	23978	21861	18365	18218	23672
MN-32 <= d < MN	-42.24	-41.44	-77.29	-78.59	-39.21	-42.02	-75.93	-78.99	-38.01	-39.03	-74.56	-78.09	-39.18	-38.44	-75.95	-78.98	-42.50	-40.06	-79.29	-76.76
#	65	457	98	308	87	27	28	78	112	48	34	160	31	157	28	149	54	211	34	66
MX < d <= MX+32	#DIV/0!	74.10	67.95	142.04	77.67	75.75	73.25	136.17	#DIV/0!	82.00	77.17	142.19	88.00	#DIV/0!	77.75	142.42	78.00	76.38	69.30	142.12
#	0	10	11	141	6	4	4	24	0	2	9	85	2	0	4	104	1	34	10	65
d < MN-32	-137.11	-1397.95	-175.14	-1296.79	-294.76	-293.76	-420.48	-373.73	-327.85	-628.08	-300.00	-197.38	-322.09	-907.32	-317.70	-215.84	-136.71	-1341.71	-281.20	-858.37
#	18	4209	218	4498	61	50	23	185	53	24	38	142	45	25	64	133	58	362	128	376
d > MX+32	1034.46	259.67	881.06	224.07	201.25	377.99	436.97	426.63	429.13	346.15	193.27	339.56	683.87	342.44	351.63	267.85	1014.09	273.37	594.57	312.20
#	4121	6	4122	156	16	55	96	43	23	55	26	56	26	44	16	146	414	15	332	339
Total #	24422	24422	24422	24422	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968	24968
Average	184.84	-236.60	160.06	-212.07	1.92	15.19	1.40	39.15	0.31	10.80	0.51	44.36	9.24	6.54	1.50	47.07	28.15	-12.47	15.75	35.39
Std Dev	384.70	537.44	332.79	540.17	18.88	25.52	35.75	53.59	22.88	28.98	20.81	36.49	29.18	36.47	25.34	39.84	140.50	169.68	76.32	125.24

No Finger Found (Left Hand)

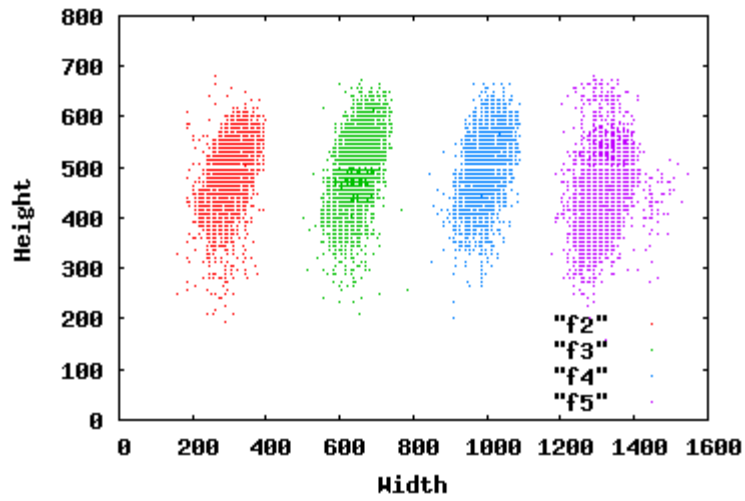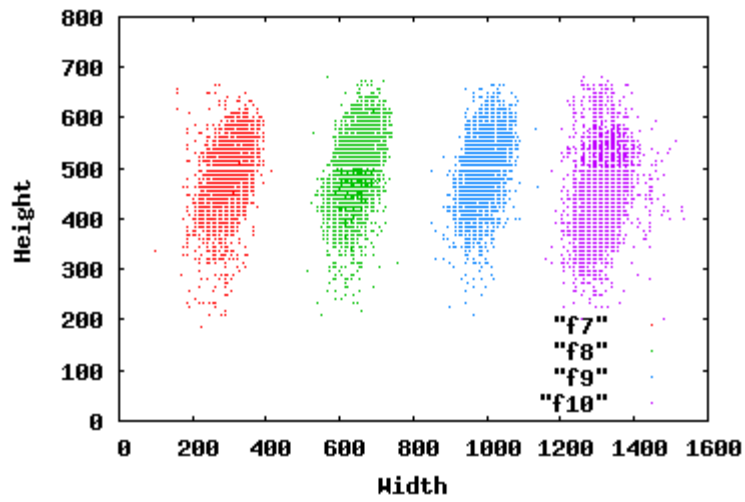|	L. Thumb 251				L. Index 67				L. Middle 24				L. Ring 17				L. Little 494			
	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B	L	R	T	B
MN <= d < 0	-9.27	-7.34	-12.43	-20.91	-2.95	-6.98	-8.37	-22.54	-4.78	-6.19	-8.89	-29.61	-4.56	-6.60	-7.82	-29.05	-5.84	-7.48	-8.23	-22.26
#	6436	2157	3651	2344	4611	5082	13715	489	8146	5734	13545	768	10527	1951	11817	491	10273	1280	5486	558
0 <= d <= MX	11.26	17.73	21.24	34.33	12.64	12.81	12.94	42.76	11.39	11.59	13.10	46.11	10.24	17.27	14.26	44.84	11.31	20.52	17.02	42.96
#	14954	19653	19455	20364	20175	19594	11045	24086	16669	19077	11294	23657	14286	22907	12996	23837	13922	22901	18643	23129
MN-32 <= d < MN	-42.64	-43.74	-77.33	-78.11	-40.95	-39.75	-75.02	-77.40	-37.91	-38.60	-77.24	-76.85	-37.41	-40.20	-75.39	-79.70	-40.47	-44.36	-78.59	-79.67
#	447	80	101	319	38	175	25	77	66	73	27	213	63	28	19	174	186	88	54	92
MX < d <= MX+32	76.71	#DIV/0!	79.08	143.48	86.50	87.50	77.06	140.94	77.58	81.00	84.13	140.74	83.50	94.00	#DIV/0!	143.77	77.85	78.83	64.83	144.19
#	42	0	401	235	1	2	9	25	6	2	8	54	9	1	0	100	124	3	3	68
d < MN-32	-849.22	-530.32	-223.72	-556.32	-103.32	-884.32	-255.77	-376.37	-422.00	-540.39	-319.73	-186.94	-292.47	-358.36	-316.60	-170.77	-156.46	-333.34	-293.13	-859.63
#	2348	277	132	919	31	110	37	234	14	66	63	187	17	65	116	172	56	606	288	571
d > MX+32	258.01	915.68	518.02	280.35	781.64	110.50	379.78	339.35	487.56	611.08	182.46	382.45	329.89	434.54	347.69	309.84	187.08	227.10	613.32	339.46
#	195	2255	682	241	108	1	133	53	63	12	27	85	62	12	16	190	403	86	490	546
Total #	24422	24422	24422	24422	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964	24964
Average	-75.78	92.01	29.30	8.81	12.87	4.47	2.72	37.91	6.96	6.19	0.44	42.34	4.49	14.56	2.42	43.44	6.66	10.99	19.40	27.16
Std Dev	259.87	271.54	120.66	170.04	58.87	71.11	35.39	56.16	31.91	39.47	23.75	40.58	22.03	26.41	29.69	41.89	29.29	61.14	95.71	154.03

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.
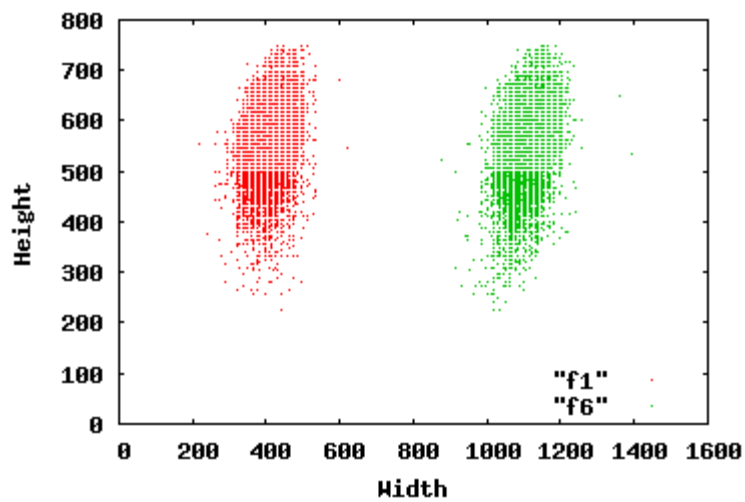
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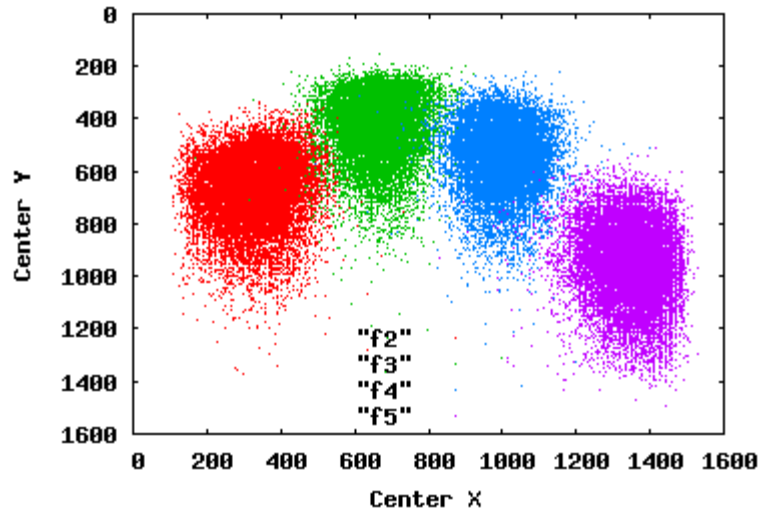
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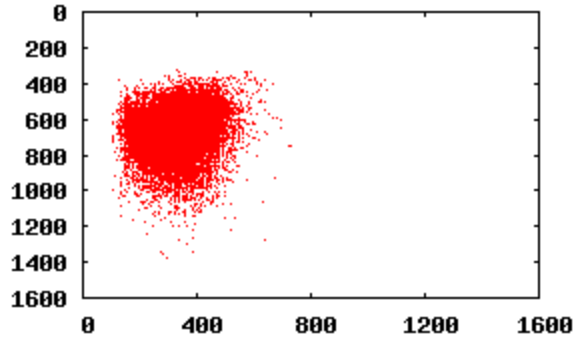
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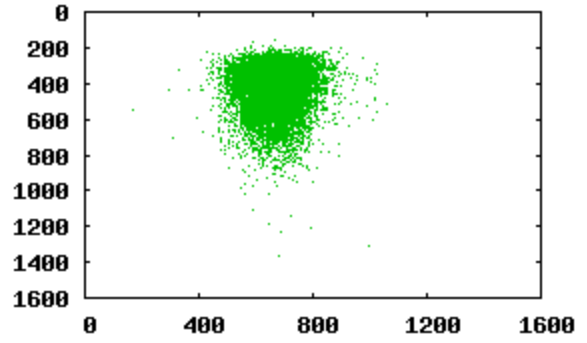
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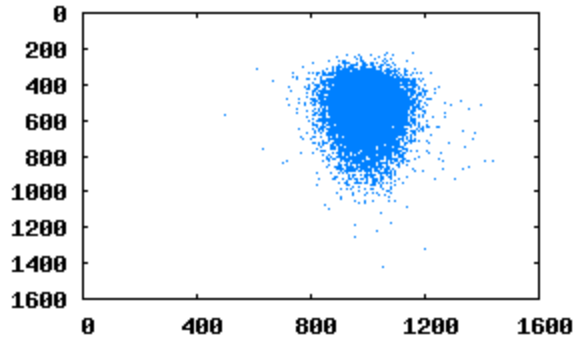
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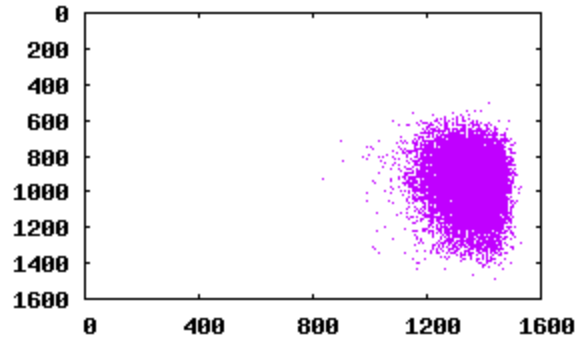
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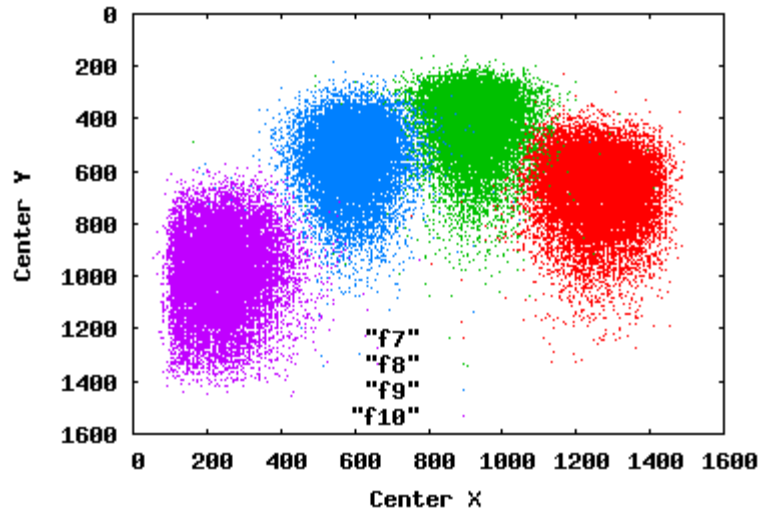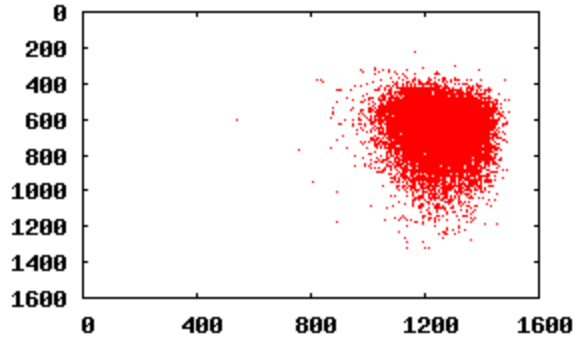
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H T 3inch XY

Center Y / Center X

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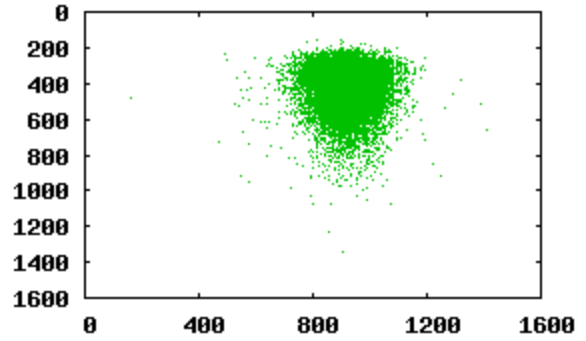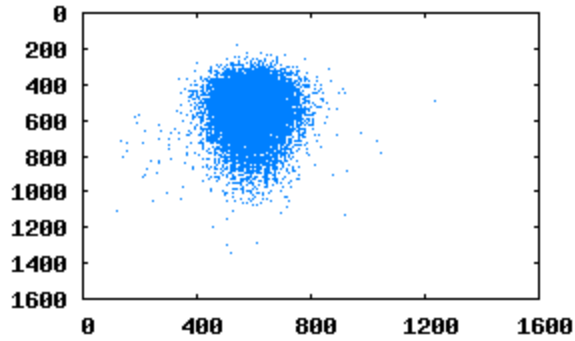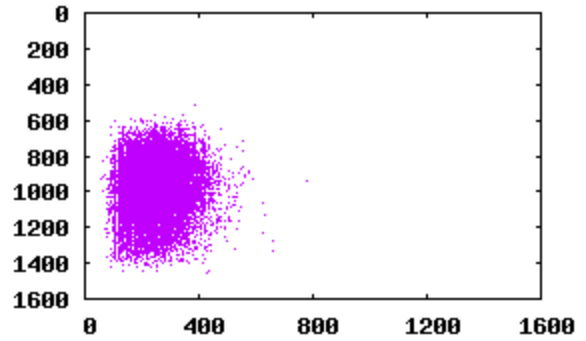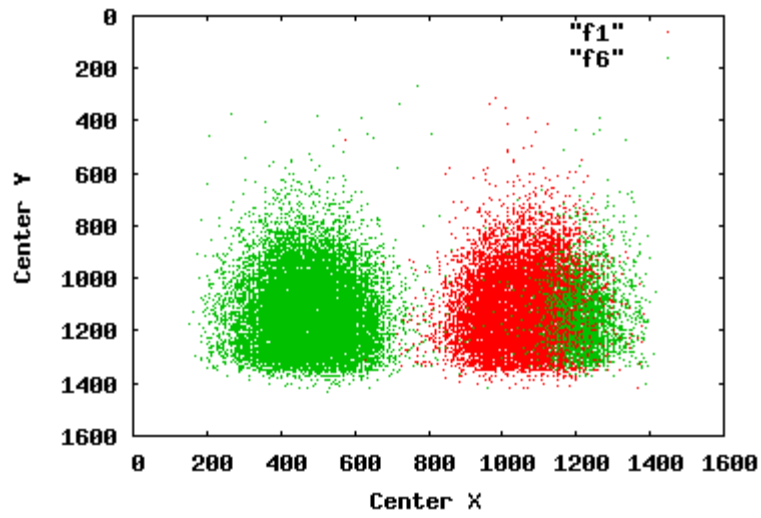
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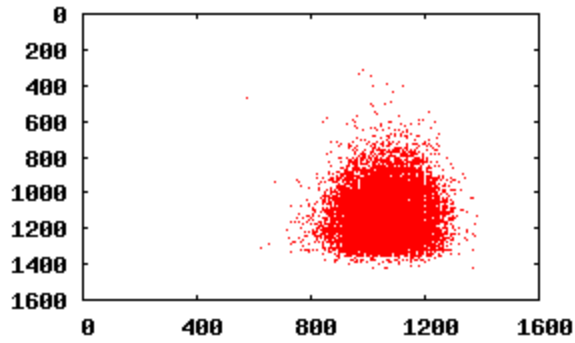
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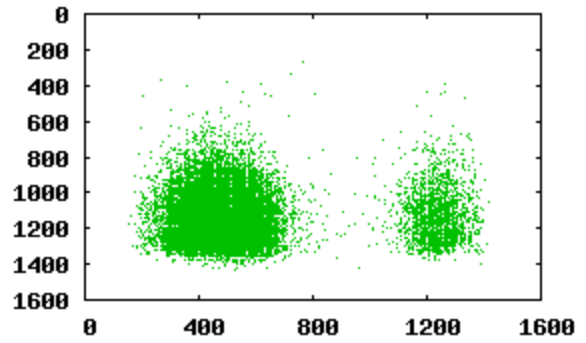
Appendix E.   Plots of 3-inch segmentation box widths and heights.

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.

H R 3inch WH

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H L 3inch WH

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H T 3inch WH

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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.
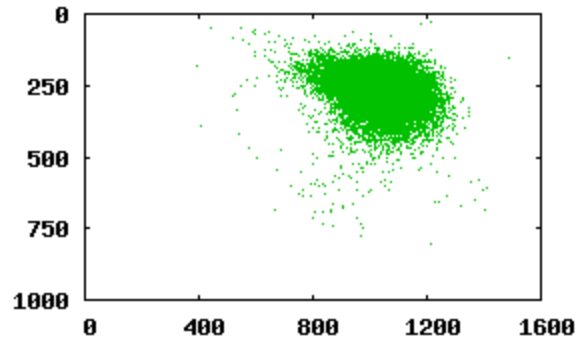
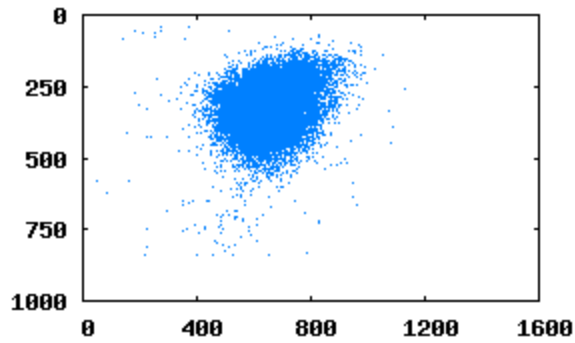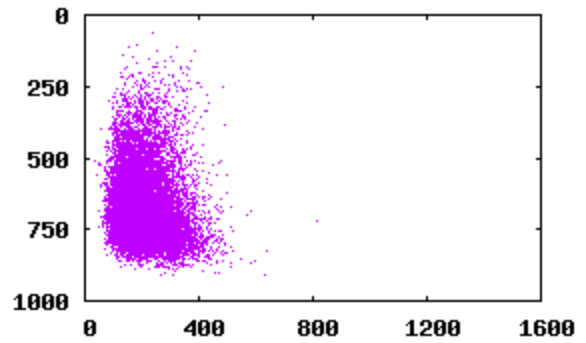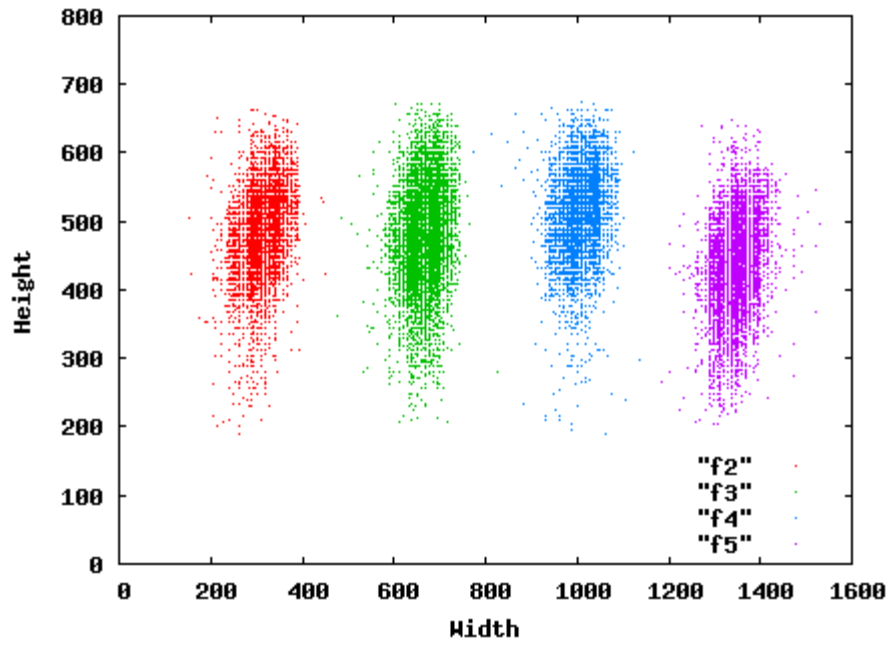# H R 2inch XY
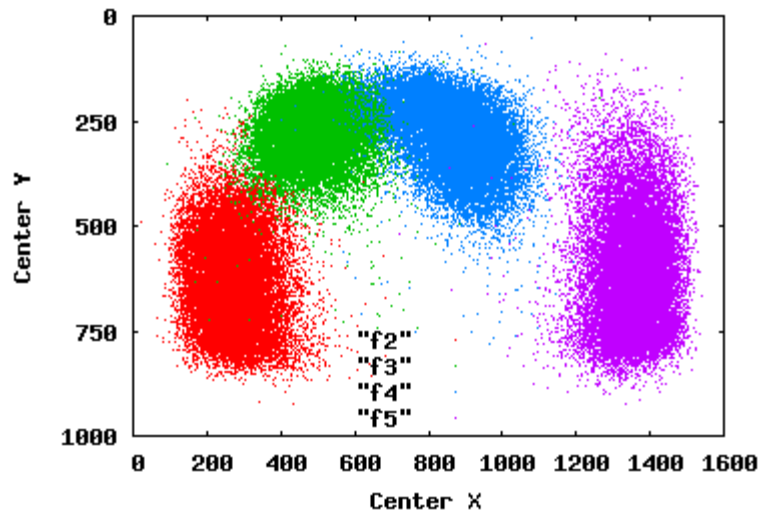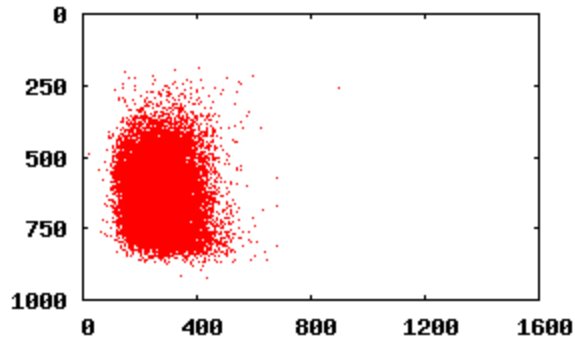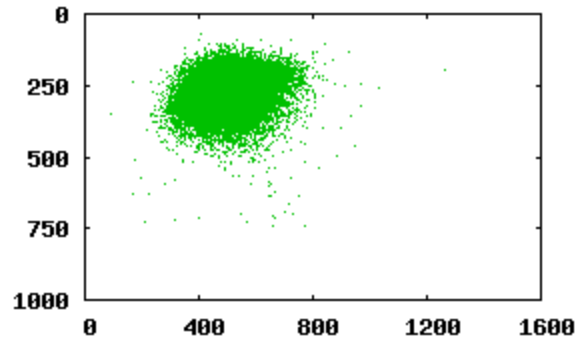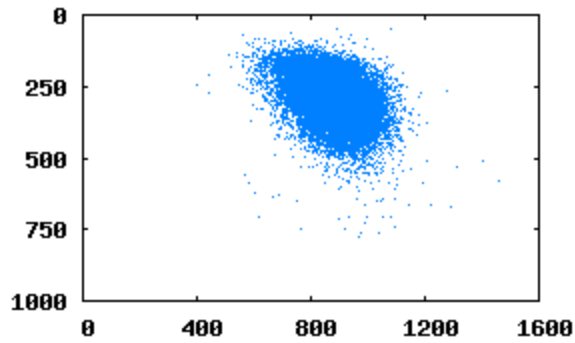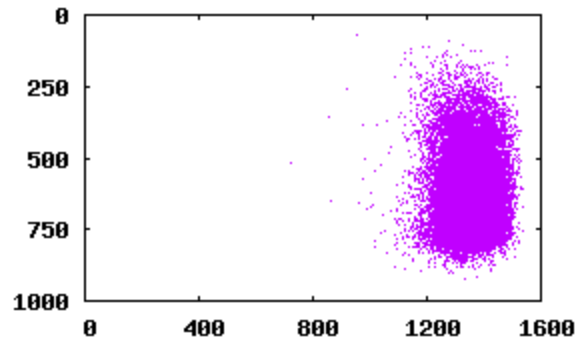
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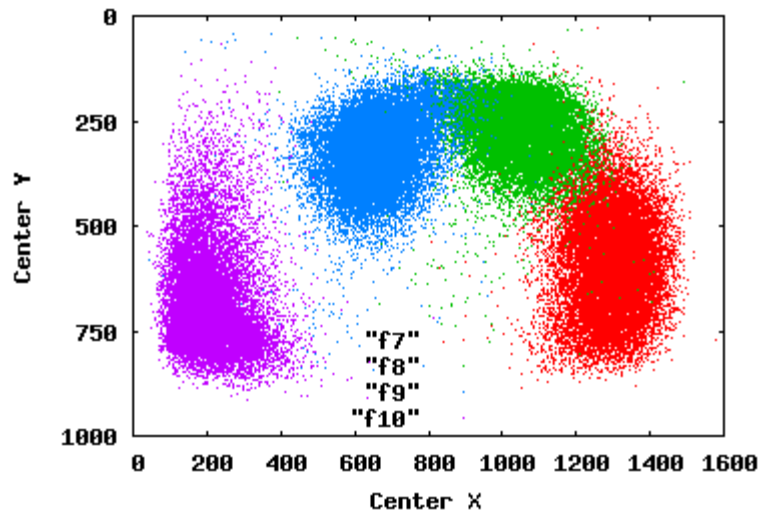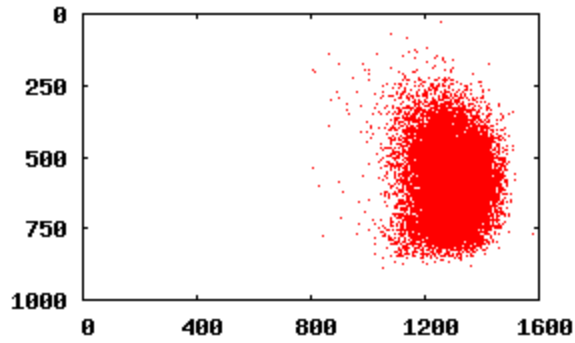
f7 f8 f9 f10

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.

H R 2inch WH

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H L 2inch WH

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