

Appendix B. Result tables for 2-inch slap images.

This appendix shows successful segmentation rates for the 2-inch slap images by finger position, hand, and various combinations of fingers that may be of interest to different fingerprint matching applications.

The first table shows successful segmentation percentages for each finger position.

The second table combines the right and left hand for each finger position and shows results for getting both the right and left finger, either or none.

The third table looks at the results by right and left hand. Columns show segmentation rates for correctly segmenting all 5 finger positions, any 4, any 3, down to none.

The fourth table is shows results for all ten fingers by combining right and left hands.

The last two tables show results for finger position combinations of index/middle and index/middle/ring.

All seven tables are then repeated (B) for the case where the maximum limited of the bottom (which is the bottom left and right y-positions) is ignored and then repeated (C) again ignoring the bottom (crease) completely. This was done as previous work had shown the crease is usually the most difficult edge for the segmentation algorithm to detect. The results in these tables show algorithm J definitely had difficulty detecting the crease and many other algorithms show significant increases in successfully segmenting "All 5" finger positions on a hand when the crease is ignored. Again, this is not a surprise as detecting the correct crease is a known difficulty for segmentation algorithms.

Similar to "A_32", "M+" was the same software as "M" with additional values added to the output of the segmentation algorithm. The additions to the segmentation box returned by the software were; +30 for the top and bottom edges and +15 for the left side. No change was made to the right side.

L/R -32/+64, T -64/+64, B -64/+128, Angle -/+5°

Finger Position

	RI	RM	RR	RL	LI	LM	LR	LL
A	54.75	53.70	46.18	42.36	51.74	48.91	49.65	47.81
A+32	86.61	82.75	83.86	89.21	86.99	81.61	84.94	90.76
B	95.88	96.33	96.93	97.95	96.41	95.90	96.39	97.37
C	97.42	97.67	97.98	98.87	98.53	97.85	97.97	98.73
E	97.57	97.90	97.97	98.60	97.73	97.11	96.94	98.31
F	97.25	97.93	98.26	98.76	98.28	97.55	97.54	98.84
G	95.95	96.25	96.44	97.02	97.28	95.44	95.87	96.23
H	94.49	92.20	96.00	95.95	95.39	94.60	94.30	93.33
I	95.17	95.49	95.78	97.41	95.67	95.03	95.13	97.43
J	61.99	46.08	53.49	71.75	56.93	45.92	54.81	68.36
K	93.38	95.68	97.19	96.29	83.08	77.84	87.45	87.56
L	94.82	93.89	93.02	94.67	94.57	93.09	92.05	89.27
M	88.38	87.86	86.68	90.26	90.41	88.32	87.79	89.99
M+	92.97	89.59	90.61	93.56	92.16	87.53	90.24	93.55
P	88.23	91.91	92.10	93.32	90.06	90.98	90.77	93.79
Q	91.38	94.92	95.22	96.50	93.64	94.26	93.99	96.80
R	61.53	62.05	57.51	67.38	67.44	66.89	53.67	65.86

	Index			Middle			Ring			Little		
	Both	Either	None	Both	Either	None	Both	Either	None	Both	Either	None
A	29.39	75.24	24.76	27.31	74.70	25.30	24.29	71.52	28.48	20.96	68.24	31.76
A+32	74.59	97.06	2.94	68.04	94.33	5.67	71.26	95.35	4.65	76.87	97.35	2.65
B	92.94	99.70	0.30	92.73	99.53	0.47	94.02	99.63	0.37	95.36	99.82	0.18
C	96.06	99.89	0.11	95.47	99.81	0.19	96.44	99.86	0.14	97.67	99.89	0.11
E	95.16	99.75	0.25	94.95	99.70	0.30	95.12	99.73	0.27	96.57	99.77	0.23
F	95.77	99.87	0.13	95.48	99.84	0.16	96.15	99.87	0.13	97.57	99.98	0.02
G	93.42	99.72	0.28	91.97	99.30	0.70	92.82	99.42	0.58	93.00	99.52	0.48
H	89.88	99.09	0.91	87.90	98.54	1.46	91.11	98.88	1.12	89.34	98.82	1.18
I	91.08	99.49	0.51	90.80	99.28	0.72	91.41	99.49	0.51	94.78	99.79	0.21
J	39.23	77.89	22.11	26.83	64.91	35.09	35.48	72.65	27.35	51.39	88.57	11.43
K	76.23	97.04	2.96	74.77	98.18	1.82	85.00	99.04	0.96	82.77	98.94	1.06
L	89.03	99.33	0.67	87.18	98.70	1.30	86.06	98.71	1.29	83.77	98.77	1.23
M	80.23	98.03	1.97	78.43	97.37	2.63	77.58	97.17	2.83	81.35	98.39	1.61
M+	85.72	99.17	0.83	79.32	97.20	2.80	82.61	98.22	1.78	87.25	99.13	0.87
P	80.57	97.71	2.29	83.92	98.14	1.86	84.96	98.57	1.43	88.30	99.06	0.94
Q	85.94	98.77	1.23	89.26	98.84	1.16	90.35	99.27	0.73	93.50	99.76	0.24
R	48.18	82.02	17.98	48.45	81.54	18.46	39.91	72.18	27.82	50.88	82.08	17.92

L/R -32/+64, T -64/+64, B -64/+128, Angle +/-5°

	Right Hand					Left Hand				
	All 4	Any 3	Any 2	Any 1	None	All 4	Any 3	Any 2	Any 1	None
A	18.63	40.34	60.00	78.02	21.98	19.30	41.46	59.98	77.37	22.63
A+32	64.09	86.20	94.41	97.74	2.26	66.06	86.35	94.13	97.77	2.23
B	91.05	97.70	98.88	99.46	0.54	90.31	97.54	98.80	99.43	0.57
C	94.01	98.76	99.45	99.73	0.27	94.67	99.01	99.57	99.81	0.19
E	92.98	99.31	99.80	99.95	0.05	91.71	98.80	99.70	99.88	0.12
F	93.12	99.36	99.79	99.92	0.08	93.34	99.18	99.80	99.89	0.11
G	89.62	97.48	98.99	99.57	0.43	90.03	96.94	98.58	99.27	0.73
H	83.12	96.85	99.09	99.59	0.41	83.78	96.16	98.52	99.16	0.84
I	89.19	97.03	98.48	99.15	0.85	88.58	96.92	98.53	99.24	0.76
J	24.96	49.96	71.08	87.31	12.69	21.76	46.95	69.50	87.81	12.19
K	85.95	97.63	99.33	99.63	0.37	60.19	84.24	93.89	97.61	2.39
L	84.33	95.48	97.83	98.76	1.24	79.42	93.59	97.29	98.69	1.31
M	72.65	89.09	94.33	97.10	2.90	74.81	89.69	94.69	97.33	2.67
M+	78.58	92.98	96.75	98.42	1.58	77.24	91.68	96.29	98.27	1.73
P	79.39	93.61	95.99	96.57	3.43	80.05	93.36	95.77	96.41	3.59
Q	82.55	96.80	99.07	99.59	0.41	83.13	96.75	99.13	99.68	0.32
R	37.10	57.27	71.58	82.51	17.49	35.83	57.84	74.08	86.11	13.89

	Person								
	All 8	Any 7	Any 6	Any 5	Any 4	Any 3	Any 2	Any 1	None
A	4.86	13.54	25.01	39.39	57.06	73.05	84.81	93.94	6.06
A+32	43.79	68.15	81.47	89.33	95.18	97.93	99.25	99.76	0.24
B	83.43	94.89	97.35	98.53	99.67	99.91	99.96	99.98	0.02
C	89.57	97.36	98.82	99.47	99.92	99.98	99.98	99.99	0.01
E	85.12	96.81	99.15	99.74	99.94	100.00	100.00	100.00	0.00
F	87.30	97.97	99.48	99.80	99.98	100.00	100.00	100.00	0.00
G	81.56	93.47	96.85	98.31	99.44	99.73	99.88	99.94	0.06
H	70.97	90.67	96.15	97.93	98.98	99.46	99.62	99.77	0.23
I	79.50	92.98	96.39	98.00	99.58	99.84	99.90	99.94	0.06
J	8.60	22.37	37.59	52.58	68.04	80.35	91.07	96.37	3.63
K	51.63	77.13	89.55	95.25	98.78	99.70	99.94	99.98	0.02
L	67.56	86.23	93.02	96.26	98.94	99.67	99.90	99.97	0.03
M	56.84	77.50	86.90	92.03	96.98	98.85	99.56	99.88	0.12
M+	62.63	82.85	90.54	95.02	98.41	99.41	99.82	99.95	0.05
P	65.74	84.82	91.10	93.12	98.19	99.24	99.48	99.54	0.46
Q	70.29	90.36	96.78	98.67	99.66	99.93	99.99	0.00	0.00
R	21.11	36.34	50.12	60.69	72.97	81.40	88.34	94.28	5.72

L/R -32/+64, T -64/+64, B -64/+128, Angle -/+5°

	Right Index/Middle			Left Index/Middle		
	Both	Either	None	Both	Either	None
A	38.35	70.10	29.90	33.94	66.72	33.28
A+32	75.11	94.25	5.75	75.33	93.27	6.73
B	93.60	98.60	1.40	93.67	98.63	1.37
C	95.72	99.37	0.63	96.85	99.52	0.48
E	95.69	99.77	0.23	95.26	99.58	0.42
F	95.44	99.74	0.26	96.13	99.70	0.30
G	93.12	99.09	0.91	94.00	98.71	1.29
H	88.06	98.63	1.37	91.49	98.51	1.49
I	92.31	98.35	1.65	92.30	98.39	1.61
J	36.86	71.21	28.79	35.86	66.99	33.01
K	90.05	99.01	0.99	68.55	92.37	7.63
L	90.46	98.25	1.75	89.61	98.05	1.95
M	81.37	94.88	5.12	83.38	95.36	4.64
M+	85.64	96.92	3.08	83.48	96.21	3.79
P	84.51	95.62	4.38	85.83	95.21	4.79
Q	87.70	98.60	1.40	89.23	98.66	1.34
R	50.57	73.00	27.00	54.66	79.67	20.33

	Right Index/Middle/Ring				Left Index/Middle/Ring			
	All 3	Any 2	Any 1	None	All 3	Any 2	Any 1	None
A	26.61	53.01	75.01	24.99	25.65	51.29	73.37	26.63
A+32	67.96	88.91	96.35	3.65	69.56	88.41	95.57	4.43
B	92.05	97.98	99.11	0.89	91.72	97.89	99.09	0.91
C	94.53	98.95	99.58	0.42	95.48	99.18	99.68	0.32
E	94.11	99.45	99.88	0.12	92.92	99.07	99.80	0.20
F	94.09	99.49	99.87	0.13	94.17	99.33	99.86	0.14
G	91.15	98.08	99.42	0.58	91.83	97.64	99.12	0.88
H	85.57	97.73	99.39	0.61	87.94	97.37	98.98	1.02
I	90.14	97.53	98.76	1.24	89.52	97.39	98.91	1.09
J	28.86	54.84	77.86	22.14	28.80	53.16	75.70	24.30
K	88.34	98.37	99.54	0.46	64.95	87.54	95.88	4.12
L	86.59	96.51	98.64	1.36	85.35	95.87	98.50	1.50
M	75.58	91.13	96.21	3.79	78.28	91.85	96.40	3.60
M+	81.00	94.32	97.85	2.15	79.49	93.00	97.43	2.57
P	81.27	94.56	96.40	3.60	81.71	94.01	96.08	3.92
Q	84.46	97.67	99.39	0.61	85.01	97.45	99.43	0.57
R	40.52	62.29	78.27	21.73	40.19	65.26	82.55	17.45

L/R -32/+64, T -64/+64, B -64/+128, Angle -/+5°

Finger Position

	RI	RM	RR	RL	LI	LM	LR	LL
A	70.63	69.35	65.19	55.36	63.80	57.49	60.08	53.38
A+32	92.78	89.90	92.47	95.52	92.42	87.29	91.12	94.11
B	96.52	96.87	97.67	98.41	97.26	97.15	97.63	97.79
C	97.71	98.02	98.49	99.08	98.84	98.67	98.94	98.95
E	98.52	98.61	98.84	99.43	99.09	98.77	98.62	99.27
F	98.20	98.62	98.90	99.37	98.98	98.87	98.69	99.29
G	96.90	97.27	97.44	97.55	97.98	96.84	97.31	96.94
H	95.77	93.00	97.21	97.20	96.47	95.90	96.27	95.49
I	96.57	96.98	97.23	97.85	96.98	97.24	97.44	97.79
J	78.59	69.47	78.31	81.87	81.98	76.71	80.52	83.07
K	97.14	97.15	98.51	98.04	88.25	80.38	89.86	89.20
L	96.59	94.83	94.13	96.01	96.79	95.06	94.16	90.70
M	92.34	92.63	92.89	93.56	93.53	93.20	93.17	92.38
M+	95.06	92.45	93.77	95.19	94.61	91.20	93.34	95.06
P	89.95	94.05	94.74	93.99	91.98	94.04	94.72	94.60
Q	93.07	97.04	97.89	97.14	95.50	97.43	97.99	97.64
R	70.21	73.85	76.58	74.47	79.19	81.65	76.94	74.75

	Index			Middle			Ring			Little		
	Both	Either	None	Both	Either	None	Both	Either	None	Both	Either	None
A	44.82	87.03	12.97	40.53	85.69	14.31	39.09	85.13	14.87	30.18	76.91	23.09
A+32	84.35	98.86	1.14	78.05	96.97	3.03	82.46	98.27	1.73	84.73	98.56	1.44
B	94.36	99.80	0.20	94.51	99.66	0.34	95.79	99.83	0.17	96.29	99.87	0.13
C	96.65	99.90	0.10	96.76	99.86	0.14	97.73	99.94	0.06	98.19	99.92	0.08
E	97.77	99.97	0.03	97.49	99.90	0.10	97.76	99.91	0.09	98.79	99.99	0.01
F	97.31	99.97	0.03	97.61	99.95	0.05	97.94	99.94	0.06	98.73	99.99	0.01
G	94.86	99.80	0.20	94.27	99.56	0.44	95.04	99.64	0.36	94.20	99.61	0.39
H	92.25	99.30	0.70	89.73	98.86	1.14	94.17	99.19	0.81	92.60	99.19	0.81
I	93.65	99.72	0.28	94.60	99.74	0.26	95.03	99.78	0.22	95.73	99.85	0.15
J	67.27	93.84	6.16	57.16	90.00	10.00	67.29	92.68	7.32	71.19	94.01	5.99
K	85.52	99.34	0.66	78.97	99.13	0.87	88.86	99.77	0.23	86.74	99.34	0.66
L	93.43	99.73	0.27	90.16	99.12	0.88	89.33	99.14	0.86	86.47	99.27	0.73
M	86.53	99.02	0.98	86.70	99.06	0.94	87.29	99.15	0.85	86.43	99.16	0.84
M+	90.06	99.50	0.50	85.12	98.33	1.67	88.13	99.13	0.87	90.27	99.50	0.50
P	83.98	98.33	1.67	89.15	99.06	0.94	90.74	99.31	0.69	89.66	99.22	0.78
Q	89.44	99.18	0.82	94.68	99.68	0.32	96.33	99.87	0.13	95.00	99.83	0.17
R	61.62	88.74	11.26	66.67	90.42	9.58	65.84	88.76	11.24	62.90	86.95	13.05

L/R -32/+64, T -64/+64, B -64/+128, Angle +/-5°

	Right Hand					Left Hand				
	All 4	Any 3	Any 2	Any 1	None	All 4	Any 3	Any 2	Any 1	None
A	35.86	59.96	76.16	88.54	11.46	28.15	51.64	69.31	85.66	14.34
A+32	80.71	93.44	97.49	99.02	0.98	78.14	91.73	96.45	98.62	1.38
B	93.14	97.93	98.94	99.47	0.53	93.56	97.96	98.88	99.43	0.57
C	95.22	98.88	99.47	99.73	0.27	96.67	99.29	99.62	99.82	0.18
E	96.04	99.58	99.82	99.95	0.05	96.47	99.57	99.82	99.90	0.10
F	95.78	99.57	99.81	99.92	0.08	96.55	99.55	99.84	99.90	0.10
G	92.48	98.00	99.10	99.58	0.42	93.32	97.66	98.77	99.32	0.68
H	86.68	97.63	99.24	99.63	0.37	88.91	97.22	98.76	99.24	0.76
I	93.18	97.62	98.64	99.20	0.80	93.58	97.84	98.75	99.29	0.71
J	56.44	76.14	84.77	90.90	9.10	64.24	79.60	86.79	91.65	8.35
K	92.67	99.01	99.51	99.65	0.35	67.03	87.83	95.02	97.80	2.20
L	88.65	96.20	97.93	98.77	1.23	84.91	95.27	97.74	98.79	1.21
M	83.68	93.27	96.33	98.13	1.87	84.36	93.50	96.37	98.05	1.95
M+	85.16	94.98	97.56	98.76	1.24	84.43	94.03	97.20	98.55	1.45
P	85.13	94.79	96.21	96.61	3.39	87.79	95.03	96.10	96.43	3.57
Q	88.34	97.88	99.27	99.64	0.36	91.07	98.36	99.41	99.71	0.29
R	58.91	71.05	79.24	85.91	14.09	64.20	75.01	83.52	89.80	10.20

	Person								
	All 8	Any 7	Any 6	Any 5	Any 4	Any 3	Any 2	Any 1	None
A	11.38	25.78	41.47	58.12	74.98	86.43	93.49	97.73	2.27
A+32	61.66	80.57	89.35	94.22	97.77	99.09	99.67	99.92	0.08
B	88.38	95.77	97.64	98.66	99.77	99.94	99.98	99.98	0.02
C	92.60	97.93	98.99	99.53	99.93	99.98	99.98	100.00	0.00
E	93.12	98.99	99.62	99.88	99.98	100.00	100.00	100.00	0.00
F	92.93	98.99	99.69	99.86	99.98	100.00	100.00	100.00	0.00
G	86.77	95.03	97.41	98.58	99.59	99.77	99.90	99.94	0.06
H	78.31	93.33	97.13	98.38	99.14	99.54	99.68	99.78	0.22
I	87.66	95.30	97.27	98.33	99.79	99.88	99.92	99.94	0.06
J	41.98	61.33	72.27	80.23	89.66	93.76	96.37	97.84	2.16
K	62.38	85.28	93.73	97.06	99.42	99.86	99.95	99.98	0.02
L	76.06	90.11	94.62	96.90	99.30	99.77	99.91	99.97	0.03
M	71.89	86.06	91.99	95.34	98.70	99.59	99.82	99.95	0.05
M+	73.48	88.19	93.36	96.42	99.07	99.67	99.88	99.98	0.02
P	76.67	89.47	92.54	93.64	98.65	99.38	99.53	99.55	0.45
Q	81.79	95.00	98.21	99.21	99.84	99.98	99.99	0.00	0.00
R	47.41	59.72	68.66	75.06	84.05	88.46	92.54	96.02	3.98

L/R -32/+64, T -64/+64, B -64/+128, Angle -/+5°

	Right Index/Middle			Left Index/Middle		
	Both	Either	None	Both	Either	None
A	57.08	82.89	17.11	43.93	77.36	22.64
A+32	85.55	97.13	2.87	83.74	95.98	4.02
B	94.73	98.66	1.34	95.62	98.79	1.21
C	96.34	99.39	0.61	97.92	99.59	0.41
E	97.28	99.85	0.15	98.06	99.80	0.20
F	97.01	99.81	0.19	98.07	99.79	0.21
G	94.92	99.25	0.75	95.88	98.94	1.06
H	89.93	98.84	1.16	93.63	98.73	1.27
I	94.95	98.60	1.40	95.47	98.75	1.25
J	62.89	85.17	14.83	71.58	87.11	12.89
K	94.84	99.45	0.55	74.73	93.89	6.11
L	92.95	98.47	1.53	93.46	98.39	1.61
M	88.20	96.77	3.23	89.82	96.92	3.08
M+	89.70	97.81	2.19	88.54	97.27	2.73
P	87.99	96.01	3.99	90.23	95.79	4.21
Q	91.12	98.99	1.01	93.71	99.21	0.79
R	65.14	78.92	21.08	74.12	86.72	13.28

	Right Index/Middle/Ring				Left Index/Middle/Ring			
	All 3	Any 2	Any 1	None	All 3	Any 2	Any 1	None
A	47.22	71.25	86.70	13.30	35.68	62.46	83.24	16.76
A+32	82.26	94.53	98.36	1.64	80.45	92.96	97.43	2.57
B	93.78	98.14	99.14	0.86	94.66	98.23	99.15	0.85
C	95.59	99.03	99.60	0.40	97.32	99.40	99.73	0.27
E	96.43	99.65	99.89	0.11	96.96	99.64	99.88	0.12
F	96.20	99.65	99.88	0.12	97.03	99.63	99.89	0.11
G	93.64	98.49	99.49	0.51	94.69	98.24	99.21	0.79
H	88.28	98.23	99.46	0.54	91.47	98.03	99.13	0.87
I	93.90	98.01	98.88	1.13	94.36	98.25	99.05	0.95
J	58.91	79.03	88.44	11.56	67.31	82.40	89.50	10.50
K	93.98	99.20	99.61	0.39	71.66	90.32	96.51	3.49
L	89.85	97.00	98.70	1.30	90.38	96.96	98.67	1.33
M	85.41	94.68	97.76	2.24	87.19	95.08	97.63	2.37
M+	86.86	95.97	98.45	1.55	86.06	95.05	98.04	1.96
P	86.73	95.48	96.53	3.47	89.08	95.43	96.24	3.76
Q	89.97	98.49	99.54	0.46	92.52	98.82	99.58	0.42
R	62.02	74.62	84.00	16.00	67.64	81.18	88.95	11.05