

Matching System Results for the 2021 Biometric Technology Rally

Generated on April 21 2022

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Use of These Data

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2021 Biometric Technology Rally Overview

The 2021 Biometric Technology Rally tested the state of high throughput systems produced by the biometric industry with regards to two main goals:

- Performance With Respect to Masks: Systems should be able to identify people with comparable accuracy when they are wearing face masks as when they are not wearing face masks.
- Equitability: Systems should be able to identify people with comparable accuracy, regardless of their demographic group membership.

Both biometric image capture systems (“acquisition systems”) and biometric matching algorithms (“matching systems”) were tested. Acquisition systems were designed to take under 8 seconds per transaction and operate without staff. Acquisition systems attempted to capture images of 601 diverse volunteers during a data collection at the Maryland Test Facility in Autumn of 2021. Five (5) face acquisition systems and ten (10) face matching systems were tested. One (1) iris acquisition system and three (3) iris matching systems were also tested. Matching systems were evaluated based on their ability to match images from each corresponding acquisition system.

Each acquisition system collected images from volunteers under two independent test conditions: without masks and with masks. Each combination of acquisition system and matching system had performance assessed for four different demographic subsets of volunteers: overall, gender, race and skin tone. For further information about the 2021 Biometric Technology Rally acquisition system results and test design, please visit <https://mdtf.org>.

Select performance results are available below. Separate tables are presented for each test condition, each biometric modality, and each demographic subset for each test condition and modality. Note that each volunteer is counted four times in the tables—once for overall results, and once for each demographic subset. Test condition and demographic definitions for the 2021 Rally are presented with the associated tables.

To comply with information sharing agreements between DHS and the biometric system providers, all company names are aliased. If you are interested in contacting one or more of the companies that participated in the Rally, please send an e-mail to peoplescreening@hq.dhs.gov and specify the aliased systems of interest.

Data Description

- Acquisition System: The aliased acquisition system name.
- Matching System: The aliased matching system name.
- Group: Demographic group within the demographic category for the table.
- Total People: Total number of volunteers in the specified demographic group that attempted to use each acquisition system. Due to variation in volunteers' behavior during the test, some volunteers did not perform a valid transaction with some acquisition systems, creating variation in the "Total People" count between acquisition systems.
- Submitted Images: The number of people for whom at least one image was successfully submitted by the acquisition system within 20 seconds.
- Extracted Images: The number of people for whom the last image acquired within 20 seconds was able to generate a template with the matching system.
- Correct Identifications: The number of people correctly identified by the matching system using the last image acquired within 20 seconds.
- Full System TIR (%): True identification rate, expressed as the percentage of people that used the system who were correctly identified (Correct Identifications / Total People).
- Matching Focused TIR (%): True identification rate, expressed as the percentage of acquired images that were correctly identified (Correct Identifications / Submitted Images).

Face Matching System Results, Without Masks

Overall

In the first test condition of the 2021 Rally, volunteers removed their personal face masks immediately prior to using each system. Volunteers replaced their face masks after using each system. The following table presents select matching system results for face biometric systems, calculated over the full population of volunteers.

Acquisition System	Matching System	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	601	581	581	579	96.3	99.7
Granite	Chariton	601	581	577	572	95.2	98.5
Granite	Crystal	601	581	581	569	94.7	97.9
Granite	Mazon	601	581	581	577	96.0	99.3
Granite	Paint	601	581	581	579	96.3	99.7
Granite	Platte	601	581	581	577	96.0	99.3
Granite	Salt	601	581	581	581	96.7	100.0
Granite	Sun	601	581	581	519	86.4	89.3
Granite	Walnut	601	581	581	576	95.8	99.1
Granite	Yampa	601	581	581	575	95.7	99.0
Herard	Cache	598	596	591	590	98.7	99.0
Herard	Chariton	598	596	596	593	99.2	99.5
Herard	Crystal	598	596	596	584	97.7	98.0
Herard	Mazon	598	596	596	594	99.3	99.7
Herard	Paint	598	596	596	596	99.7	100.0
Herard	Platte	598	596	596	595	99.5	99.8
Herard	Salt	598	596	596	596	99.7	100.0
Herard	Sun	598	596	596	561	93.8	94.1
Herard	Walnut	598	596	596	593	99.2	99.5
Herard	Yampa	598	596	596	595	99.5	99.8
Long	Cache	600	593	591	584	97.3	98.5
Long	Chariton	600	593	592	587	97.8	99.0
Long	Crystal	600	593	593	580	96.7	97.8
Long	Mazon	600	593	593	589	98.2	99.3
Long	Paint	600	593	593	592	98.7	99.8
Long	Platte	600	593	592	590	98.3	99.5
Long	Salt	600	593	593	591	98.5	99.7
Long	Sun	600	593	593	562	93.7	94.8
Long	Walnut	600	593	593	587	97.8	99.0
Long	Yampa	600	593	593	591	98.5	99.7
Ouray	Cache	600	567	567	566	94.3	99.8
Ouray	Chariton	600	567	567	564	94.0	99.5
Ouray	Crystal	600	567	567	548	91.3	96.6
Ouray	Mazon	600	567	567	567	94.5	100.0
Ouray	Paint	600	567	567	567	94.5	100.0
Ouray	Platte	600	567	567	565	94.2	99.6
Ouray	Salt	600	567	567	567	94.5	100.0
Ouray	Sun	600	567	567	518	86.3	91.4
Ouray	Walnut	600	567	567	564	94.0	99.5
Ouray	Yampa	600	567	567	566	94.3	99.8
Tekoa	Cache	598	511	510	499	83.4	97.7
Tekoa	Chariton	598	511	510	500	83.6	97.8
Tekoa	Crystal	598	511	511	493	82.4	96.5
Tekoa	Mazon	598	511	511	499	83.4	97.7
Tekoa	Paint	598	511	511	501	83.8	98.0
Tekoa	Platte	598	511	509	500	83.6	97.8
Tekoa	Salt	598	511	511	501	83.8	98.0
Tekoa	Sun	598	511	511	477	79.8	93.3
Tekoa	Walnut	598	511	511	499	83.4	97.7
Tekoa	Yampa	598	511	511	501	83.8	98.0

Gender

The following table presents select matching system results for face biometric systems, for the without masks test condition, with volunteers divided based on their self reported gender. All volunteers selected Female or Male.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	Female	324	309	309	307	94.8	99.4
Granite	Cache	Male	277	272	272	272	98.2	100.0
Granite	Chariton	Female	324	309	309	304	93.8	98.4
Granite	Chariton	Male	277	272	268	268	96.8	98.5
Granite	Crystal	Female	324	309	309	303	93.5	98.1
Granite	Crystal	Male	277	272	272	266	96.0	97.8
Granite	Mazon	Female	324	309	309	305	94.1	98.7
Granite	Mazon	Male	277	272	272	272	98.2	100.0
Granite	Paint	Female	324	309	309	308	95.1	99.7
Granite	Paint	Male	277	272	272	271	97.8	99.6
Granite	Platte	Female	324	309	309	307	94.8	99.4
Granite	Platte	Male	277	272	272	270	97.5	99.3
Granite	Salt	Female	324	309	309	309	95.4	100.0
Granite	Salt	Male	277	272	272	272	98.2	100.0
Granite	Sun	Female	324	309	309	281	86.7	90.9
Granite	Sun	Male	277	272	272	238	85.9	87.5
Granite	Walnut	Female	324	309	309	304	93.8	98.4
Granite	Walnut	Male	277	272	272	272	98.2	100.0
Granite	Yampa	Female	324	309	309	305	94.1	98.7
Granite	Yampa	Male	277	272	272	270	97.5	99.3
Herard	Cache	Female	323	323	320	319	98.8	98.8
Herard	Cache	Male	275	273	271	271	98.5	99.3
Herard	Chariton	Female	323	323	323	320	99.1	99.1
Herard	Chariton	Male	275	273	273	273	99.3	100.0
Herard	Crystal	Female	323	323	323	316	97.8	97.8
Herard	Crystal	Male	275	273	273	268	97.5	98.2
Herard	Mazon	Female	323	323	323	321	99.4	99.4
Herard	Mazon	Male	275	273	273	273	99.3	100.0
Herard	Paint	Female	323	323	323	323	100.0	100.0
Herard	Paint	Male	275	273	273	273	99.3	100.0
Herard	Platte	Female	323	323	323	322	99.7	99.7
Herard	Platte	Male	275	273	273	273	99.3	100.0
Herard	Salt	Female	323	323	323	323	100.0	100.0
Herard	Salt	Male	275	273	273	273	99.3	100.0
Herard	Sun	Female	323	323	323	300	92.9	92.9
Herard	Sun	Male	275	273	273	261	94.9	95.6
Herard	Walnut	Female	323	323	323	320	99.1	99.1
Herard	Walnut	Male	275	273	273	273	99.3	100.0
Herard	Yampa	Female	323	323	323	322	99.7	99.7
Herard	Yampa	Male	275	273	273	273	99.3	100.0
Long	Cache	Female	323	319	318	315	97.5	98.7
Long	Cache	Male	277	274	273	269	97.1	98.2
Long	Chariton	Female	323	319	318	315	97.5	98.7
Long	Chariton	Male	277	274	274	272	98.2	99.3
Long	Crystal	Female	323	319	319	310	96.0	97.2
Long	Crystal	Male	277	274	274	270	97.5	98.5
Long	Mazon	Female	323	319	319	316	97.8	99.1
Long	Mazon	Male	277	274	274	273	98.6	99.6
Long	Paint	Female	323	319	319	319	98.8	100.0
Long	Paint	Male	277	274	274	273	98.6	99.6
Long	Platte	Female	323	319	318	318	98.5	99.7
Long	Platte	Male	277	274	274	272	98.2	99.3
Long	Salt	Female	323	319	319	318	98.5	99.7
Long	Salt	Male	277	274	274	273	98.6	99.6
Long	Sun	Female	323	319	319	299	92.6	93.7
Long	Sun	Male	277	274	274	263	94.9	96.0
Long	Walnut	Female	323	319	319	315	97.5	98.7
Long	Walnut	Male	277	274	274	272	98.2	99.3
Long	Yampa	Female	323	319	319	318	98.5	99.7
Long	Yampa	Male	277	274	274	273	98.6	99.6
Ouray	Cache	Female	324	304	304	303	93.5	99.7

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Ouray	Cache	Male	276	263	263	263	95.3	100.0
Ouray	Chariton	Female	324	304	304	301	92.9	99.0
Ouray	Chariton	Male	276	263	263	263	95.3	100.0
Ouray	Crystal	Female	324	304	304	293	90.4	96.4
Ouray	Crystal	Male	276	263	263	255	92.4	97.0
Ouray	Mazon	Female	324	304	304	304	93.8	100.0
Ouray	Mazon	Male	276	263	263	263	95.3	100.0
Ouray	Paint	Female	324	304	304	304	93.8	100.0
Ouray	Paint	Male	276	263	263	263	95.3	100.0
Ouray	Platte	Female	324	304	304	302	93.2	99.3
Ouray	Platte	Male	276	263	263	263	95.3	100.0
Ouray	Salt	Female	324	304	304	304	93.8	100.0
Ouray	Salt	Male	276	263	263	263	95.3	100.0
Ouray	Sun	Female	324	304	304	279	86.1	91.8
Ouray	Sun	Male	276	263	263	239	86.6	90.9
Ouray	Walnut	Female	324	304	304	301	92.9	99.0
Ouray	Walnut	Male	276	263	263	263	95.3	100.0
Ouray	Yampa	Female	324	304	304	303	93.5	99.7
Ouray	Yampa	Male	276	263	263	263	95.3	100.0
Tekoa	Cache	Female	322	276	276	271	84.2	98.2
Tekoa	Cache	Male	276	235	234	228	82.6	97.0
Tekoa	Chariton	Female	322	276	276	271	84.2	98.2
Tekoa	Chariton	Male	276	235	234	229	83.0	97.4
Tekoa	Crystal	Female	322	276	276	264	82.0	95.7
Tekoa	Crystal	Male	276	235	235	229	83.0	97.4
Tekoa	Mazon	Female	322	276	276	269	83.5	97.5
Tekoa	Mazon	Male	276	235	235	230	83.3	97.9
Tekoa	Paint	Female	322	276	276	271	84.2	98.2
Tekoa	Paint	Male	276	235	235	230	83.3	97.9
Tekoa	Platte	Female	322	276	276	272	84.5	98.6
Tekoa	Platte	Male	276	235	233	228	82.6	97.0
Tekoa	Salt	Female	322	276	276	271	84.2	98.2
Tekoa	Salt	Male	276	235	235	230	83.3	97.9
Tekoa	Sun	Female	322	276	276	260	80.7	94.2
Tekoa	Sun	Male	276	235	235	217	78.6	92.3
Tekoa	Walnut	Female	322	276	276	270	83.9	97.8
Tekoa	Walnut	Male	276	235	235	229	83.0	97.4
Tekoa	Yampa	Female	322	276	276	271	84.2	98.2
Tekoa	Yampa	Male	276	235	235	230	83.3	97.9

Race

The following table presents select matching system results for face biometric systems, for the without masks test condition, with volunteers divided based on their self reported race. Volunteers selected their race based on the 2020 census race question. Only Asian, Black and White had a sufficient number of volunteers for analysis.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	Asian	63	61	61	61	96.8	100.0
Granite	Cache	Black	291	276	276	276	94.8	100.0
Granite	Cache	White	216	215	215	213	98.6	99.1
Granite	Chariton	Asian	63	61	60	60	95.2	98.4
Granite	Chariton	Black	291	276	274	271	93.1	98.2
Granite	Chariton	White	216	215	214	213	98.6	99.1
Granite	Crystal	Asian	63	61	61	59	93.7	96.7
Granite	Crystal	Black	291	276	276	271	93.1	98.2
Granite	Crystal	White	216	215	215	210	97.2	97.7
Granite	Mazon	Asian	63	61	61	61	96.8	100.0
Granite	Mazon	Black	291	276	276	274	94.2	99.3
Granite	Mazon	White	216	215	215	214	99.1	99.5
Granite	Paint	Asian	63	61	61	61	96.8	100.0
Granite	Paint	Black	291	276	276	275	94.5	99.6
Granite	Paint	White	216	215	215	214	99.1	99.5
Granite	Platte	Asian	63	61	61	61	96.8	100.0
Granite	Platte	Black	291	276	276	275	94.5	99.6
Granite	Platte	White	216	215	215	212	98.1	98.6
Granite	Salt	Asian	63	61	61	61	96.8	100.0
Granite	Salt	Black	291	276	276	276	94.8	100.0
Granite	Salt	White	216	215	215	215	99.5	100.0
Granite	Sun	Asian	63	61	61	56	88.9	91.8
Granite	Sun	Black	291	276	276	241	82.8	87.3
Granite	Sun	White	216	215	215	194	89.8	90.2
Granite	Walnut	Asian	63	61	61	61	96.8	100.0
Granite	Walnut	Black	291	276	276	275	94.5	99.6
Granite	Walnut	White	216	215	215	213	98.6	99.1
Granite	Yampa	Asian	63	61	61	61	96.8	100.0
Granite	Yampa	Black	291	276	276	274	94.2	99.3
Granite	Yampa	White	216	215	215	212	98.1	98.6
Herard	Cache	Asian	63	62	62	62	98.4	100.0
Herard	Cache	Black	289	289	287	287	99.3	99.3
Herard	Cache	White	215	214	211	210	97.7	98.1
Herard	Chariton	Asian	63	62	62	62	98.4	100.0
Herard	Chariton	Black	289	289	289	287	99.3	99.3
Herard	Chariton	White	215	214	214	213	99.1	99.5
Herard	Crystal	Asian	63	62	62	60	95.2	96.8
Herard	Crystal	Black	289	289	289	282	97.6	97.6
Herard	Crystal	White	215	214	214	211	98.1	98.6
Herard	Mazon	Asian	63	62	62	62	98.4	100.0
Herard	Mazon	Black	289	289	289	288	99.7	99.7
Herard	Mazon	White	215	214	214	213	99.1	99.5
Herard	Paint	Asian	63	62	62	62	98.4	100.0
Herard	Paint	Black	289	289	289	289	100.0	100.0
Herard	Paint	White	215	214	214	214	99.5	100.0
Herard	Platte	Asian	63	62	62	62	98.4	100.0
Herard	Platte	Black	289	289	289	289	100.0	100.0
Herard	Platte	White	215	214	214	213	99.1	99.5
Herard	Salt	Asian	63	62	62	62	98.4	100.0
Herard	Salt	Black	289	289	289	289	100.0	100.0
Herard	Salt	White	215	214	214	214	99.5	100.0
Herard	Sun	Asian	63	62	62	60	95.2	96.8
Herard	Sun	Black	289	289	289	266	92.0	92.0
Herard	Sun	White	215	214	214	204	94.9	95.3
Herard	Walnut	Asian	63	62	62	62	98.4	100.0
Herard	Walnut	Black	289	289	289	287	99.3	99.3
Herard	Walnut	White	215	214	214	214	99.5	100.0
Herard	Yampa	Asian	63	62	62	62	98.4	100.0
Herard	Yampa	Black	289	289	289	289	100.0	100.0
Herard	Yampa	White	215	214	214	213	99.1	99.5

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Long	Cache	Asian	63	63	63	63	100.0	100.0
Long	Cache	Black	291	287	286	284	97.6	99.0
Long	Cache	White	215	214	213	208	96.7	97.2
Long	Chariton	Asian	63	63	63	63	100.0	100.0
Long	Chariton	Black	291	287	286	283	97.3	98.6
Long	Chariton	White	215	214	214	213	99.1	99.5
Long	Crystal	Asian	63	63	63	62	98.4	98.4
Long	Crystal	Black	291	287	287	283	97.3	98.6
Long	Crystal	White	215	214	214	207	96.3	96.7
Long	Mazon	Asian	63	63	63	63	100.0	100.0
Long	Mazon	Black	291	287	287	286	98.3	99.7
Long	Mazon	White	215	214	214	213	99.1	99.5
Long	Paint	Asian	63	63	63	63	100.0	100.0
Long	Paint	Black	291	287	287	287	98.6	100.0
Long	Paint	White	215	214	214	213	99.1	99.5
Long	Platte	Asian	63	63	63	63	100.0	100.0
Long	Platte	Black	291	287	286	286	98.3	99.7
Long	Platte	White	215	214	214	212	98.6	99.1
Long	Salt	Asian	63	63	63	63	100.0	100.0
Long	Salt	Black	291	287	287	286	98.3	99.7
Long	Salt	White	215	214	214	213	99.1	99.5
Long	Sun	Asian	63	63	63	63	100.0	100.0
Long	Sun	Black	291	287	287	265	91.1	92.3
Long	Sun	White	215	214	214	205	95.3	95.8
Long	Walnut	Asian	63	63	63	63	100.0	100.0
Long	Walnut	Black	291	287	287	285	97.9	99.3
Long	Walnut	White	215	214	214	212	98.6	99.1
Long	Yampa	Asian	63	63	63	63	100.0	100.0
Long	Yampa	Black	291	287	287	287	98.6	100.0
Long	Yampa	White	215	214	214	213	99.1	99.5
Ouray	Cache	Asian	63	59	59	59	93.7	100.0
Ouray	Cache	Black	290	272	272	272	93.8	100.0
Ouray	Cache	White	216	206	206	205	94.9	99.5
Ouray	Chariton	Asian	63	59	59	59	93.7	100.0
Ouray	Chariton	Black	290	272	272	270	93.1	99.3
Ouray	Chariton	White	216	206	206	206	95.4	100.0
Ouray	Crystal	Asian	63	59	59	57	90.5	96.6
Ouray	Crystal	Black	290	272	272	264	91.0	97.1
Ouray	Crystal	White	216	206	206	198	91.7	96.1
Ouray	Mazon	Asian	63	59	59	59	93.7	100.0
Ouray	Mazon	Black	290	272	272	272	93.8	100.0
Ouray	Mazon	White	216	206	206	206	95.4	100.0
Ouray	Paint	Asian	63	59	59	59	93.7	100.0
Ouray	Paint	Black	290	272	272	272	93.8	100.0
Ouray	Paint	White	216	206	206	206	95.4	100.0
Ouray	Platte	Asian	63	59	59	59	93.7	100.0
Ouray	Platte	Black	290	272	272	272	93.8	100.0
Ouray	Platte	White	216	206	206	204	94.4	99.0
Ouray	Salt	Asian	63	59	59	59	93.7	100.0
Ouray	Salt	Black	290	272	272	272	93.8	100.0
Ouray	Salt	White	216	206	206	206	95.4	100.0
Ouray	Sun	Asian	63	59	59	58	92.1	98.3
Ouray	Sun	Black	290	272	272	241	83.1	88.6
Ouray	Sun	White	216	206	206	190	88.0	92.2
Ouray	Walnut	Asian	63	59	59	59	93.7	100.0
Ouray	Walnut	Black	290	272	272	270	93.1	99.3
Ouray	Walnut	White	216	206	206	206	95.4	100.0
Ouray	Yampa	Asian	63	59	59	59	93.7	100.0
Ouray	Yampa	Black	290	272	272	272	93.8	100.0
Ouray	Yampa	White	216	206	206	205	94.9	99.5
Tekoa	Cache	Asian	63	52	52	51	81.0	98.1
Tekoa	Cache	Black	290	240	240	235	81.0	97.9
Tekoa	Cache	White	214	191	190	186	86.9	97.4
Tekoa	Chariton	Asian	63	52	52	51	81.0	98.1
Tekoa	Chariton	Black	290	240	239	235	81.0	97.9
Tekoa	Chariton	White	214	191	191	187	87.4	97.9

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Crystal	Asian	63	52	52	50	79.4	96.2
Tekoa	Crystal	Black	290	240	240	233	80.3	97.1
Tekoa	Crystal	White	214	191	191	184	86.0	96.3
Tekoa	Mazon	Asian	63	52	52	51	81.0	98.1
Tekoa	Mazon	Black	290	240	240	236	81.4	98.3
Tekoa	Mazon	White	214	191	191	187	87.4	97.9
Tekoa	Paint	Asian	63	52	52	51	81.0	98.1
Tekoa	Paint	Black	290	240	240	237	81.7	98.8
Tekoa	Paint	White	214	191	191	187	87.4	97.9
Tekoa	Platte	Asian	63	52	52	51	81.0	98.1
Tekoa	Platte	Black	290	240	239	236	81.4	98.3
Tekoa	Platte	White	214	191	190	186	86.9	97.4
Tekoa	Salt	Asian	63	52	52	51	81.0	98.1
Tekoa	Salt	Black	290	240	240	236	81.4	98.3
Tekoa	Salt	White	214	191	191	187	87.4	97.9
Tekoa	Sun	Asian	63	52	52	49	77.8	94.2
Tekoa	Sun	Black	290	240	240	222	76.6	92.5
Tekoa	Sun	White	214	191	191	179	83.6	93.7
Tekoa	Walnut	Asian	63	52	52	51	81.0	98.1
Tekoa	Walnut	Black	290	240	240	234	80.7	97.5
Tekoa	Walnut	White	214	191	191	187	87.4	97.9
Tekoa	Yampa	Asian	63	52	52	51	81.0	98.1
Tekoa	Yampa	Black	290	240	240	236	81.4	98.3
Tekoa	Yampa	White	214	191	191	187	87.4	97.9



Skin Tone

The following table presents select matching system results for face biometric systems, for the without masks test condition, with volunteers divided based on their skin tone. During the data collection, volunteer's skin tone was measured using a calibrated CIE-LAB color meter device. During analysis, volunteers were ordered from lightest to darkest skin tone, and split into tertiles. T1 corresponds to the volunteers with the lowest L* values, or darkest skin tone, and T3 corresponds to the volunteers with the highest L* values, or lightest skin tone.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	T1	195	184	184	184	94.4	100.0
Granite	Cache	T2	196	193	193	193	98.5	100.0
Granite	Cache	T3	202	198	198	196	97.0	99.0
Granite	Chariton	T1	195	184	182	179	91.8	97.3
Granite	Chariton	T2	196	193	192	191	97.4	99.0
Granite	Chariton	T3	202	198	197	196	97.0	99.0
Granite	Crystal	T1	195	184	184	179	91.8	97.3
Granite	Crystal	T2	196	193	193	189	96.4	97.9
Granite	Crystal	T3	202	198	198	195	96.5	98.5
Granite	Mazon	T1	195	184	184	181	92.8	98.4
Granite	Mazon	T2	196	193	193	193	98.5	100.0
Granite	Mazon	T3	202	198	198	197	97.5	99.5
Granite	Paint	T1	195	184	184	183	93.8	99.5
Granite	Paint	T2	196	193	193	193	98.5	100.0
Granite	Paint	T3	202	198	198	197	97.5	99.5
Granite	Platte	T1	195	184	184	183	93.8	99.5
Granite	Platte	T2	196	193	193	192	98.0	99.5
Granite	Platte	T3	202	198	198	196	97.0	99.0
Granite	Salt	T1	195	184	184	184	94.4	100.0
Granite	Salt	T2	196	193	193	193	98.5	100.0
Granite	Salt	T3	202	198	198	198	98.0	100.0
Granite	Sun	T1	195	184	184	157	80.5	85.3
Granite	Sun	T2	196	193	193	179	91.3	92.7
Granite	Sun	T3	202	198	198	178	88.1	89.9
Granite	Walnut	T1	195	184	184	182	93.3	98.9
Granite	Walnut	T2	196	193	193	193	98.5	100.0
Granite	Walnut	T3	202	198	198	195	96.5	98.5
Granite	Yampa	T1	195	184	184	181	92.8	98.4
Granite	Yampa	T2	196	193	193	192	98.0	99.5
Granite	Yampa	T3	202	198	198	196	97.0	99.0
Herard	Cache	T1	193	193	191	191	99.0	99.0
Herard	Cache	T2	195	193	192	192	98.5	99.5
Herard	Cache	T3	202	202	200	199	98.5	98.5
Herard	Chariton	T1	193	193	193	191	99.0	99.0
Herard	Chariton	T2	195	193	193	193	99.0	100.0
Herard	Chariton	T3	202	202	202	201	99.5	99.5
Herard	Crystal	T1	193	193	193	188	97.4	97.4
Herard	Crystal	T2	195	193	193	190	97.4	98.4
Herard	Crystal	T3	202	202	202	198	98.0	98.0
Herard	Mazon	T1	193	193	193	192	99.5	99.5
Herard	Mazon	T2	195	193	193	193	99.0	100.0
Herard	Mazon	T3	202	202	202	201	99.5	99.5
Herard	Paint	T1	193	193	193	193	100.0	100.0
Herard	Paint	T2	195	193	193	193	99.0	100.0
Herard	Paint	T3	202	202	202	202	100.0	100.0
Herard	Platte	T1	193	193	193	193	100.0	100.0
Herard	Platte	T2	195	193	193	193	99.0	100.0
Herard	Platte	T3	202	202	202	201	99.5	99.5
Herard	Salt	T1	193	193	193	193	100.0	100.0
Herard	Salt	T2	195	193	193	193	99.0	100.0
Herard	Salt	T3	202	202	202	202	100.0	100.0
Herard	Sun	T1	193	193	193	176	91.2	91.2
Herard	Sun	T2	195	193	193	186	95.4	96.4
Herard	Sun	T3	202	202	202	193	95.5	95.5
Herard	Walnut	T1	193	193	193	192	99.5	99.5
Herard	Walnut	T2	195	193	193	192	98.5	99.5
Herard	Walnut	T3	202	202	202	201	99.5	99.5
Herard	Yampa	T1	193	193	193	193	100.0	100.0

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Herard	Yampa	T2	195	193	193	193	99.0	100.0
Herard	Yampa	T3	202	202	202	201	99.5	99.5
Long	Cache	T1	195	191	191	189	96.9	99.0
Long	Cache	T2	196	195	193	193	98.5	99.0
Long	Cache	T3	201	200	200	195	97.0	97.5
Long	Chariton	T1	195	191	191	187	95.9	97.9
Long	Chariton	T2	196	195	194	194	99.0	99.5
Long	Chariton	T3	201	200	200	199	99.0	99.5
Long	Crystal	T1	195	191	191	187	95.9	97.9
Long	Crystal	T2	196	195	195	192	98.0	98.5
Long	Crystal	T3	201	200	200	194	96.5	97.0
Long	Mazon	T1	195	191	191	188	96.4	98.4
Long	Mazon	T2	196	195	195	195	99.5	100.0
Long	Mazon	T3	201	200	200	199	99.0	99.5
Long	Paint	T1	195	191	191	191	97.9	100.0
Long	Paint	T2	196	195	195	195	99.5	100.0
Long	Paint	T3	201	200	200	199	99.0	99.5
Long	Platte	T1	195	191	191	191	97.9	100.0
Long	Platte	T2	196	195	194	194	99.0	99.5
Long	Platte	T3	201	200	200	198	98.5	99.0
Long	Salt	T1	195	191	191	191	97.9	100.0
Long	Salt	T2	196	195	195	194	99.0	99.5
Long	Salt	T3	201	200	200	199	99.0	99.5
Long	Sun	T1	195	191	191	173	88.7	90.6
Long	Sun	T2	196	195	195	193	98.5	99.0
Long	Sun	T3	201	200	200	190	94.5	95.0
Long	Walnut	T1	195	191	191	190	97.4	99.5
Long	Walnut	T2	196	195	195	193	98.5	99.0
Long	Walnut	T3	201	200	200	197	98.0	98.5
Long	Yampa	T1	195	191	191	190	97.4	99.5
Long	Yampa	T2	196	195	195	195	99.5	100.0
Long	Yampa	T3	201	200	200	199	99.0	99.5
Ouray	Cache	T1	194	180	180	180	92.8	100.0
Ouray	Cache	T2	196	184	184	184	93.9	100.0
Ouray	Cache	T3	202	195	195	194	96.0	99.5
Ouray	Chariton	T1	194	180	180	177	91.2	98.3
Ouray	Chariton	T2	196	184	184	184	93.9	100.0
Ouray	Chariton	T3	202	195	195	195	96.5	100.0
Ouray	Crystal	T1	194	180	180	173	89.2	96.1
Ouray	Crystal	T2	196	184	184	178	90.8	96.7
Ouray	Crystal	T3	202	195	195	189	93.6	96.9
Ouray	Mazon	T1	194	180	180	180	92.8	100.0
Ouray	Mazon	T2	196	184	184	184	93.9	100.0
Ouray	Mazon	T3	202	195	195	195	96.5	100.0
Ouray	Paint	T1	194	180	180	180	92.8	100.0
Ouray	Paint	T2	196	184	184	184	93.9	100.0
Ouray	Paint	T3	202	195	195	195	96.5	100.0
Ouray	Paint	T4	202	195	195	195	96.5	100.0
Ouray	Platte	T1	194	180	180	180	92.8	100.0
Ouray	Platte	T2	196	184	184	184	93.9	100.0
Ouray	Platte	T3	202	195	195	193	95.5	99.0
Ouray	Salt	T1	194	180	180	180	92.8	100.0
Ouray	Salt	T2	196	184	184	184	93.9	100.0
Ouray	Salt	T3	202	195	195	195	96.5	100.0
Ouray	Sun	T1	194	180	180	157	80.9	87.2
Ouray	Sun	T2	196	184	184	174	88.8	94.6
Ouray	Sun	T3	202	195	195	180	89.1	92.3
Ouray	Walnut	T1	194	180	180	180	92.8	100.0
Ouray	Walnut	T2	196	184	184	182	92.9	98.9
Ouray	Walnut	T3	202	195	195	194	96.0	99.5
Ouray	Yampa	T1	194	180	180	180	92.8	100.0
Ouray	Yampa	T2	196	184	184	184	93.9	100.0
Ouray	Yampa	T3	202	195	195	194	96.0	99.5
Tekoa	Cache	T1	195	161	161	156	80.0	96.9
Tekoa	Cache	T2	196	165	165	161	82.1	97.6
Tekoa	Cache	T3	199	179	178	176	88.4	98.3
Tekoa	Chariton	T1	195	161	160	156	80.0	96.9

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Chariton	T2	196	165	165	161	82.1	97.6
Tekoa	Chariton	T3	199	179	179	177	88.9	98.9
Tekoa	Crystal	T1	195	161	161	153	78.5	95.0
Tekoa	Crystal	T2	196	165	165	159	81.1	96.4
Tekoa	Crystal	T3	199	179	179	175	87.9	97.8
Tekoa	Mazon	T1	195	161	161	155	79.5	96.3
Tekoa	Mazon	T2	196	165	165	161	82.1	97.6
Tekoa	Mazon	T3	199	179	179	177	88.9	98.9
Tekoa	Paint	T1	195	161	161	158	81.0	98.1
Tekoa	Paint	T2	196	165	165	161	82.1	97.6
Tekoa	Paint	T3	199	179	179	176	88.4	98.3
Tekoa	Platte	T1	195	161	160	157	80.5	97.5
Tekoa	Platte	T2	196	165	165	161	82.1	97.6
Tekoa	Platte	T3	199	179	178	176	88.4	98.3
Tekoa	Salt	T1	195	161	161	157	80.5	97.5
Tekoa	Salt	T2	196	165	165	161	82.1	97.6
Tekoa	Salt	T3	199	179	179	177	88.9	98.9
Tekoa	Sun	T1	195	161	161	145	74.4	90.1
Tekoa	Sun	T2	196	165	165	159	81.1	96.4
Tekoa	Sun	T3	199	179	179	168	84.4	93.9
Tekoa	Walnut	T1	195	161	161	157	80.5	97.5
Tekoa	Walnut	T2	196	165	165	160	81.6	97.0
Tekoa	Walnut	T3	199	179	179	176	88.4	98.3
Tekoa	Yampa	T1	195	161	161	157	80.5	97.5
Tekoa	Yampa	T2	196	165	165	161	82.1	97.6
Tekoa	Yampa	T3	199	179	179	177	88.9	98.9

Iris Matching System Results, Without Masks

Overall

In the first test condition of the 2021 Rally, volunteers removed their personal face masks immediately prior to using each system. Volunteers replaced their face masks after using each system. The following table presents select matching system results for iris biometric systems, calculated over the full population of volunteers.

Acquisition System	Matching System	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	598	466	466	404	67.6	86.7
Tekoa	Charles	598	466	465	455	76.1	97.6
Tekoa	Hudson	598	466	466	445	74.4	95.5

Gender

The following table presents select matching system results for iris biometric systems, for the without masks test condition, with volunteers divided based on their self reported gender. All volunteers selected Female or Male.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	Female	322	256	256	229	71.1	89.5
Tekoa	Bayou	Male	276	210	210	175	63.4	83.3
Tekoa	Charles	Female	322	256	255	251	78.0	98.0
Tekoa	Charles	Male	276	210	210	204	73.9	97.1
Tekoa	Hudson	Female	322	256	256	244	75.8	95.3
Tekoa	Hudson	Male	276	210	210	201	72.8	95.7

Race

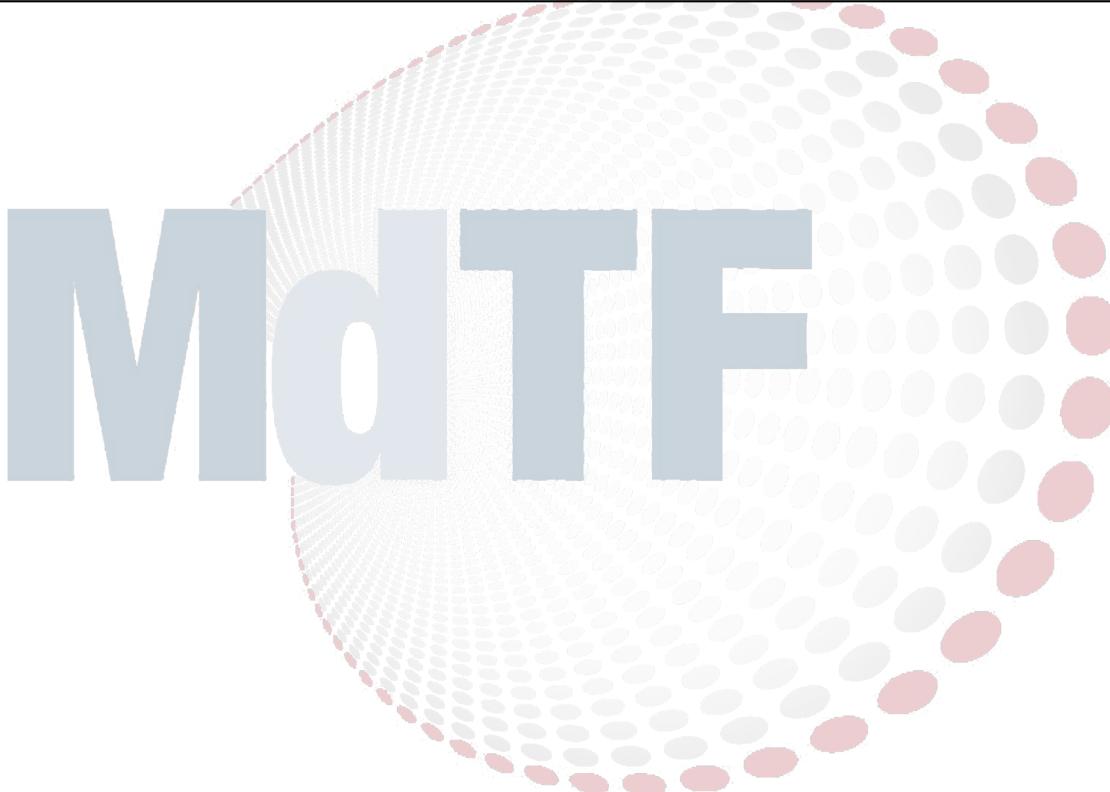
The following table presents select matching system results for iris biometric systems, for the without masks test condition, with volunteers divided based on their self reported race. Volunteers selected their race based on the 2020 census race question. Only Asian, Black and White had a sufficient number of volunteers for analysis.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	Asian	63	50	50	41	65.1	82.0
Tekoa	Bayou	Black	290	229	229	199	68.6	86.9
Tekoa	Bayou	White	214	162	162	141	65.9	87.0
Tekoa	Charles	Asian	63	50	49	46	73.0	92.0
Tekoa	Charles	Black	290	229	229	225	77.6	98.3
Tekoa	Charles	White	214	162	162	159	74.3	98.1
Tekoa	Hudson	Asian	63	50	50	44	69.8	88.0
Tekoa	Hudson	Black	290	229	229	220	75.9	96.1
Tekoa	Hudson	White	214	162	162	156	72.9	96.3

Skin Tone

The following table presents select matching system results for iris biometric systems, for the without masks test condition, with volunteers divided based on their skin tone. During the data collection, volunteer's skin tone was measured using a calibrated CIE-LAB color meter device. During analysis, volunteers were ordered from lightest to darkest skin tone, and split into tertiles. T1 corresponds to the volunteers with the lowest L* values, or darkest skin tone, and T3 corresponds to the volunteers with the highest L* values, or lightest skin tone.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	T1	195	156	156	139	71.3	89.1
Tekoa	Bayou	T2	196	148	148	125	63.8	84.5
Tekoa	Bayou	T3	199	156	156	134	67.3	85.9
Tekoa	Charles	T1	195	156	156	155	79.5	99.4
Tekoa	Charles	T2	196	148	148	144	73.5	97.3
Tekoa	Charles	T3	199	156	155	150	75.4	96.2
Tekoa	Hudson	T1	195	156	156	152	77.9	97.4
Tekoa	Hudson	T2	196	148	148	140	71.4	94.6
Tekoa	Hudson	T3	199	156	156	147	73.9	94.2



Face Matching System Results, With Masks

Overall

In the second test condition, volunteers wore their personal face masks while interacting with each acquisition system. The following table presents select matching system results for face biometric systems, calculated over the full population of volunteers.

Acquisition System	Matching System	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	599	541	538	537	89.6	99.3
Granite	Chariton	599	541	496	471	78.6	87.1
Granite	Crystal	599	541	538	524	87.5	96.9
Granite	Mazon	599	541	539	529	88.3	97.8
Granite	Paint	599	541	541	537	89.6	99.3
Granite	Platte	599	541	529	479	80.0	88.5
Granite	Salt	599	541	539	532	88.8	98.3
Granite	Sun	599	541	535	92	15.4	17.0
Granite	Walnut	599	541	541	525	87.6	97.0
Granite	Yampa	599	541	539	518	86.5	95.7
Herard	Cache	599	546	538	531	88.6	97.3
Herard	Chariton	599	546	517	496	82.8	90.8
Herard	Crystal	599	546	545	522	87.1	95.6
Herard	Mazon	599	546	546	530	88.5	97.1
Herard	Paint	599	546	546	544	90.8	99.6
Herard	Platte	599	546	544	490	81.8	89.7
Herard	Salt	599	546	546	539	90.0	98.7
Herard	Sun	599	546	536	96	16.0	17.6
Herard	Walnut	599	546	546	529	88.3	96.9
Herard	Yampa	599	546	546	525	87.6	96.2
Long	Cache	601	568	566	548	91.2	96.5
Long	Chariton	601	568	542	529	88.0	93.1
Long	Crystal	601	568	566	540	89.9	95.1
Long	Mazon	601	568	567	559	93.0	98.4
Long	Paint	601	568	568	555	92.3	97.7
Long	Platte	601	568	556	524	87.2	92.3
Long	Salt	601	568	568	558	92.8	98.2
Long	Sun	601	568	553	96	16.0	16.9
Long	Walnut	601	568	568	545	90.7	96.0
Long	Yampa	601	568	568	550	91.5	96.8
Ouray	Cache	601	523	523	517	86.0	98.9
Ouray	Chariton	601	523	518	502	83.5	96.0
Ouray	Crystal	601	523	521	495	82.4	94.6
Ouray	Mazon	601	523	523	508	84.5	97.1
Ouray	Paint	601	523	523	515	85.7	98.5
Ouray	Platte	601	523	522	474	78.9	90.6
Ouray	Salt	601	523	523	517	86.0	98.9
Ouray	Sun	601	523	515	87	14.5	16.6
Ouray	Walnut	601	523	523	509	84.7	97.3
Ouray	Yampa	601	523	523	506	84.2	96.7
Tekoa	Cache	595	526	525	492	82.7	93.5
Tekoa	Chariton	595	526	508	464	78.0	88.2
Tekoa	Crystal	595	526	524	476	80.0	90.5
Tekoa	Mazon	595	526	525	481	80.8	91.4
Tekoa	Paint	595	526	526	491	82.5	93.3
Tekoa	Platte	595	526	516	449	75.5	85.4
Tekoa	Salt	595	526	526	490	82.4	93.2
Tekoa	Sun	595	526	516	90	15.1	17.1
Tekoa	Walnut	595	526	526	487	81.8	92.6
Tekoa	Yampa	595	526	526	474	79.7	90.1

Gender

The following table presents select matching system results for face biometric systems, for the with masks test condition, with volunteers divided based on their self reported gender. All volunteers selected Female or Male.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	Female	323	298	295	294	91.0	98.7
Granite	Cache	Male	276	243	243	243	88.0	100.0
Granite	Chariton	Female	323	298	277	263	81.4	88.3
Granite	Chariton	Male	276	243	219	208	75.4	85.6
Granite	Crystal	Female	323	298	295	287	88.9	96.3
Granite	Crystal	Male	276	243	243	237	85.9	97.5
Granite	Mazon	Female	323	298	296	290	89.8	97.3
Granite	Mazon	Male	276	243	243	239	86.6	98.4
Granite	Paint	Female	323	298	298	295	91.3	99.0
Granite	Paint	Male	276	243	243	242	87.7	99.6
Granite	Platte	Female	323	298	291	264	81.7	88.6
Granite	Platte	Male	276	243	238	215	77.9	88.5
Granite	Salt	Female	323	298	296	292	90.4	98.0
Granite	Salt	Male	276	243	243	240	87.0	98.8
Granite	Sun	Female	323	298	295	49	15.2	16.4
Granite	Sun	Male	276	243	240	43	15.6	17.7
Granite	Walnut	Female	323	298	298	285	88.2	95.6
Granite	Walnut	Male	276	243	243	240	87.0	98.8
Granite	Yampa	Female	323	298	296	284	87.9	95.3
Granite	Yampa	Male	276	243	243	234	84.8	96.3
Herard	Cache	Female	323	290	287	283	87.6	97.6
Herard	Cache	Male	276	256	251	248	89.9	96.9
Herard	Chariton	Female	323	290	279	270	83.6	93.1
Herard	Chariton	Male	276	256	238	226	81.9	88.3
Herard	Crystal	Female	323	290	290	277	85.8	95.5
Herard	Crystal	Male	276	256	255	245	88.8	95.7
Herard	Mazon	Female	323	290	290	279	86.4	96.2
Herard	Mazon	Male	276	256	256	251	90.9	98.0
Herard	Paint	Female	323	290	290	289	89.5	99.7
Herard	Paint	Male	276	256	256	255	92.4	99.6
Herard	Platte	Female	323	290	289	261	80.8	90.0
Herard	Platte	Male	276	256	255	229	83.0	89.5
Herard	Salt	Female	323	290	290	286	88.5	98.6
Herard	Salt	Male	276	256	256	253	91.7	98.8
Herard	Sun	Female	323	290	285	46	14.2	15.9
Herard	Sun	Male	276	256	251	50	18.1	19.5
Herard	Walnut	Female	323	290	290	281	87.0	96.9
Herard	Walnut	Male	276	256	256	248	89.9	96.9
Herard	Yampa	Female	323	290	290	281	87.0	96.9
Herard	Yampa	Male	276	256	256	244	88.4	95.3
Long	Cache	Female	324	303	302	294	90.7	97.0
Long	Cache	Male	277	265	264	254	91.7	95.8
Long	Chariton	Female	324	303	295	290	89.5	95.7
Long	Chariton	Male	277	265	247	239	86.3	90.2
Long	Crystal	Female	324	303	302	288	88.9	95.0
Long	Crystal	Male	277	265	264	252	91.0	95.1
Long	Mazon	Female	324	303	302	297	91.7	98.0
Long	Mazon	Male	277	265	265	262	94.6	98.9
Long	Paint	Female	324	303	303	297	91.7	98.0
Long	Paint	Male	277	265	265	258	93.1	97.4
Long	Platte	Female	324	303	299	281	86.7	92.7
Long	Platte	Male	277	265	257	243	87.7	91.7
Long	Salt	Female	324	303	303	300	92.6	99.0
Long	Salt	Male	277	265	265	258	93.1	97.4
Long	Sun	Female	324	303	297	48	14.8	15.8
Long	Sun	Male	277	265	256	48	17.3	18.1
Long	Walnut	Female	324	303	303	292	90.1	96.4
Long	Walnut	Male	277	265	265	253	91.3	95.5
Long	Yampa	Female	324	303	303	298	92.0	98.3
Long	Yampa	Male	277	265	265	252	91.0	95.1
Ouray	Cache	Female	324	269	269	266	82.1	98.9

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Ouray	Cache	Male	277	254	254	251	90.6	98.8
Ouray	Chariton	Female	324	269	267	262	80.9	97.4
Ouray	Chariton	Male	277	254	251	240	86.6	94.5
Ouray	Crystal	Female	324	269	268	253	78.1	94.1
Ouray	Crystal	Male	277	254	253	242	87.4	95.3
Ouray	Mazon	Female	324	269	269	260	80.2	96.7
Ouray	Mazon	Male	277	254	254	248	89.5	97.6
Ouray	Paint	Female	324	269	269	264	81.5	98.1
Ouray	Paint	Male	277	254	254	251	90.6	98.8
Ouray	Platte	Female	324	269	269	242	74.7	90.0
Ouray	Platte	Male	277	254	253	232	83.8	91.3
Ouray	Salt	Female	324	269	269	267	82.4	99.3
Ouray	Salt	Male	277	254	254	250	90.3	98.4
Ouray	Sun	Female	324	269	266	40	12.3	14.9
Ouray	Sun	Male	277	254	249	47	17.0	18.5
Ouray	Walnut	Female	324	269	269	262	80.9	97.4
Ouray	Walnut	Male	277	254	254	247	89.2	97.2
Ouray	Yampa	Female	324	269	269	262	80.9	97.4
Ouray	Yampa	Male	277	254	254	244	88.1	96.1
Tekoa	Cache	Female	320	292	292	274	85.6	93.8
Tekoa	Cache	Male	275	234	233	218	79.3	93.2
Tekoa	Chariton	Female	320	292	284	259	80.9	88.7
Tekoa	Chariton	Male	275	234	224	205	74.5	87.6
Tekoa	Crystal	Female	320	292	290	263	82.2	90.1
Tekoa	Crystal	Male	275	234	234	213	77.5	91.0
Tekoa	Mazon	Female	320	292	292	265	82.8	90.8
Tekoa	Mazon	Male	275	234	233	216	78.5	92.3
Tekoa	Paint	Female	320	292	292	272	85.0	93.2
Tekoa	Paint	Male	275	234	234	219	79.6	93.6
Tekoa	Platte	Female	320	292	289	250	78.1	85.6
Tekoa	Platte	Male	275	234	227	199	72.4	85.0
Tekoa	Salt	Female	320	292	292	271	84.7	92.8
Tekoa	Salt	Male	275	234	234	219	79.6	93.6
Tekoa	Sun	Female	320	292	287	48	15.0	16.4
Tekoa	Sun	Male	275	234	229	42	15.3	17.9
Tekoa	Walnut	Female	320	292	292	268	83.8	91.8
Tekoa	Walnut	Male	275	234	234	219	79.6	93.6
Tekoa	Yampa	Female	320	292	292	262	81.9	89.7
Tekoa	Yampa	Male	275	234	234	212	77.1	90.6

Race

The following table presents select matching system results for face biometric systems, for the with masks test condition, with volunteers divided based on their self reported race. Volunteers selected their race based on the 2020 census race question. Only Asian, Black and White had a sufficient number of volunteers for analysis.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	Asian	63	60	60	60	95.2	100.0
Granite	Cache	Black	290	254	253	252	86.9	99.2
Granite	Cache	White	215	198	196	196	91.2	99.0
Granite	Chariton	Asian	63	60	60	59	93.7	98.3
Granite	Chariton	Black	290	254	223	206	71.0	81.1
Granite	Chariton	White	215	198	184	178	82.8	89.9
Granite	Crystal	Asian	63	60	60	58	92.1	96.7
Granite	Crystal	Black	290	254	253	247	85.2	97.2
Granite	Crystal	White	215	198	196	190	88.4	96.0
Granite	Mazon	Asian	63	60	60	60	95.2	100.0
Granite	Mazon	Black	290	254	254	246	84.8	96.9
Granite	Mazon	White	215	198	196	194	90.2	98.0
Granite	Paint	Asian	63	60	60	60	95.2	100.0
Granite	Paint	Black	290	254	254	254	87.6	100.0
Granite	Paint	White	215	198	198	194	90.2	98.0
Granite	Platte	Asian	63	60	60	59	93.7	98.3
Granite	Platte	Black	290	254	244	215	74.1	84.6
Granite	Platte	White	215	198	196	176	81.9	88.9
Granite	Salt	Asian	63	60	60	60	95.2	100.0
Granite	Salt	Black	290	254	254	250	86.2	98.4
Granite	Salt	White	215	198	196	193	89.8	97.5
Granite	Sun	Asian	63	60	60	13	20.6	21.7
Granite	Sun	Black	290	254	253	39	13.4	15.4
Granite	Sun	White	215	198	193	33	15.3	16.7
Granite	Walnut	Asian	63	60	60	59	93.7	98.3
Granite	Walnut	Black	290	254	254	245	84.5	96.5
Granite	Walnut	White	215	198	198	192	89.3	97.0
Granite	Yampa	Asian	63	60	60	58	92.1	96.7
Granite	Yampa	Black	290	254	254	243	83.8	95.7
Granite	Yampa	White	215	198	196	188	87.4	94.9
Herard	Cache	Asian	63	62	62	61	96.8	98.4
Herard	Cache	Black	290	256	253	248	85.5	96.9
Herard	Cache	White	215	197	192	191	88.8	97.0
Herard	Chariton	Asian	63	62	62	60	95.2	96.8
Herard	Chariton	Black	290	256	232	219	75.5	85.5
Herard	Chariton	White	215	197	193	187	87.0	94.9
Herard	Crystal	Asian	63	62	62	61	96.8	98.4
Herard	Crystal	Black	290	256	255	242	83.4	94.5
Herard	Crystal	White	215	197	197	189	87.9	95.9
Herard	Mazon	Asian	63	62	62	61	96.8	98.4
Herard	Mazon	Black	290	256	256	247	85.2	96.5
Herard	Mazon	White	215	197	197	191	88.8	97.0
Herard	Paint	Asian	63	62	62	62	98.4	100.0
Herard	Paint	Black	290	256	256	255	87.9	99.6
Herard	Paint	White	215	197	197	196	91.2	99.5
Herard	Platte	Asian	63	62	62	59	93.7	95.2
Herard	Platte	Black	290	256	254	220	75.9	85.9
Herard	Platte	White	215	197	197	182	84.7	92.4
Herard	Salt	Asian	63	62	62	61	96.8	98.4
Herard	Salt	Black	290	256	256	253	87.2	98.8
Herard	Salt	White	215	197	197	194	90.2	98.5
Herard	Sun	Asian	63	62	61	15	23.8	24.2
Herard	Sun	Black	290	256	250	37	12.8	14.5
Herard	Sun	White	215	197	195	37	17.2	18.8
Herard	Walnut	Asian	63	62	62	61	96.8	98.4
Herard	Walnut	Black	290	256	256	244	84.1	95.3
Herard	Walnut	White	215	197	197	193	89.8	98.0
Herard	Yampa	Asian	63	62	62	59	93.7	95.2
Herard	Yampa	Black	290	256	256	245	84.5	95.7
Herard	Yampa	White	215	197	197	190	88.4	96.4

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Long	Cache	Asian	63	61	61	59	93.7	96.7
Long	Cache	Black	291	270	269	261	89.7	96.7
Long	Cache	White	216	206	205	197	91.2	95.6
Long	Chariton	Asian	63	61	60	60	95.2	98.4
Long	Chariton	Black	291	270	250	241	82.8	89.3
Long	Chariton	White	216	206	201	197	91.2	95.6
Long	Crystal	Asian	63	61	61	58	92.1	95.1
Long	Crystal	Black	291	270	268	255	87.6	94.4
Long	Crystal	White	216	206	206	197	91.2	95.6
Long	Mazon	Asian	63	61	61	61	96.8	100.0
Long	Mazon	Black	291	270	269	264	90.7	97.8
Long	Mazon	White	216	206	206	203	94.0	98.5
Long	Paint	Asian	63	61	61	60	95.2	98.4
Long	Paint	Black	291	270	270	263	90.4	97.4
Long	Paint	White	216	206	206	201	93.1	97.6
Long	Platte	Asian	63	61	61	60	95.2	98.4
Long	Platte	Black	291	270	261	241	82.8	89.3
Long	Platte	White	216	206	203	192	88.9	93.2
Long	Salt	Asian	63	61	61	61	96.8	100.0
Long	Salt	Black	291	270	270	264	90.7	97.8
Long	Salt	White	216	206	206	202	93.5	98.1
Long	Sun	Asian	63	61	61	15	23.8	24.6
Long	Sun	Black	291	270	259	38	13.1	14.1
Long	Sun	White	216	206	202	35	16.2	17.0
Long	Walnut	Asian	63	61	61	60	95.2	98.4
Long	Walnut	Black	291	270	270	257	88.3	95.2
Long	Walnut	White	216	206	206	197	91.2	95.6
Long	Yampa	Asian	63	61	61	61	96.8	100.0
Long	Yampa	Black	291	270	270	257	88.3	95.2
Long	Yampa	White	216	206	206	201	93.1	97.6
Ouray	Cache	Asian	63	51	51	51	81.0	100.0
Ouray	Cache	Black	291	245	245	239	82.1	97.6
Ouray	Cache	White	216	198	198	198	91.7	100.0
Ouray	Chariton	Asian	63	51	51	50	79.4	98.0
Ouray	Chariton	Black	291	245	242	233	80.1	95.1
Ouray	Chariton	White	216	198	196	190	88.0	96.0
Ouray	Crystal	Asian	63	51	51	50	79.4	98.0
Ouray	Crystal	Black	291	245	243	230	79.0	93.9
Ouray	Crystal	White	216	198	198	186	86.1	93.9
Ouray	Mazon	Asian	63	51	51	51	81.0	100.0
Ouray	Mazon	Black	291	245	245	235	80.8	95.9
Ouray	Mazon	White	216	198	198	193	89.4	97.5
Ouray	Paint	Asian	63	51	51	51	81.0	100.0
Ouray	Paint	Black	291	245	245	241	82.8	98.4
Ouray	Paint	White	216	198	198	194	89.8	98.0
Ouray	Platte	Asian	63	51	51	50	79.4	98.0
Ouray	Platte	Black	291	245	244	214	73.5	87.3
Ouray	Platte	White	216	198	198	181	83.8	91.4
Ouray	Salt	Asian	63	51	51	51	81.0	100.0
Ouray	Salt	Black	291	245	245	240	82.5	98.0
Ouray	Salt	White	216	198	198	197	91.2	99.5
Ouray	Sun	Asian	63	51	51	12	19.0	23.5
Ouray	Sun	Black	291	245	240	34	11.7	13.9
Ouray	Sun	White	216	198	195	34	15.7	17.2
Ouray	Walnut	Asian	63	51	51	50	79.4	98.0
Ouray	Walnut	Black	291	245	245	236	81.1	96.3
Ouray	Walnut	White	216	198	198	194	89.8	98.0
Ouray	Yampa	Asian	63	51	51	50	79.4	98.0
Ouray	Yampa	Black	291	245	245	236	81.1	96.3
Ouray	Yampa	White	216	198	198	191	88.4	96.5
Tekoa	Cache	Asian	62	51	51	51	82.3	100.0
Tekoa	Cache	Black	289	253	252	234	81.0	92.5
Tekoa	Cache	White	214	196	196	185	86.4	94.4
Tekoa	Chariton	Asian	62	51	50	50	80.6	98.0
Tekoa	Chariton	Black	289	253	239	213	73.7	84.2
Tekoa	Chariton	White	214	196	193	179	83.6	91.3

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Crystal	Asian	62	51	51	50	80.6	98.0
Tekoa	Crystal	Black	289	253	252	230	79.6	90.9
Tekoa	Crystal	White	214	196	195	174	81.3	88.8
Tekoa	Mazon	Asian	62	51	51	51	82.3	100.0
Tekoa	Mazon	Black	289	253	252	228	78.9	90.1
Tekoa	Mazon	White	214	196	196	180	84.1	91.8
Tekoa	Paint	Asian	62	51	51	51	82.3	100.0
Tekoa	Paint	Black	289	253	253	233	80.6	92.1
Tekoa	Paint	White	214	196	196	185	86.4	94.4
Tekoa	Platte	Asian	62	51	51	50	80.6	98.0
Tekoa	Platte	Black	289	253	245	206	71.3	81.4
Tekoa	Platte	White	214	196	194	172	80.4	87.8
Tekoa	Salt	Asian	62	51	51	51	82.3	100.0
Tekoa	Salt	Black	289	253	253	232	80.3	91.7
Tekoa	Salt	White	214	196	196	185	86.4	94.4
Tekoa	Sun	Asian	62	51	51	13	21.0	25.5
Tekoa	Sun	Black	289	253	247	33	11.4	13.0
Tekoa	Sun	White	214	196	192	36	16.8	18.4
Tekoa	Walnut	Asian	62	51	51	51	82.3	100.0
Tekoa	Walnut	Black	289	253	253	231	79.9	91.3
Tekoa	Walnut	White	214	196	196	183	85.5	93.4
Tekoa	Yampa	Asian	62	51	51	50	80.6	98.0
Tekoa	Yampa	Black	289	253	253	223	77.2	88.1
Tekoa	Yampa	White	214	196	196	179	83.6	91.3



Skin Tone

The following table presents select matching system results for face biometric systems, for the with masks test condition, with volunteers divided based on their skin tone. During the data collection, volunteer's skin tone was measured using a calibrated CIE-LAB color meter device. During analysis, volunteers were ordered from lightest to darkest skin tone, and split into tertiles. T1 corresponds to the volunteers with the lowest L* values, or darkest skin tone, and T3 corresponds to the volunteers with the highest L* values, or lightest skin tone.

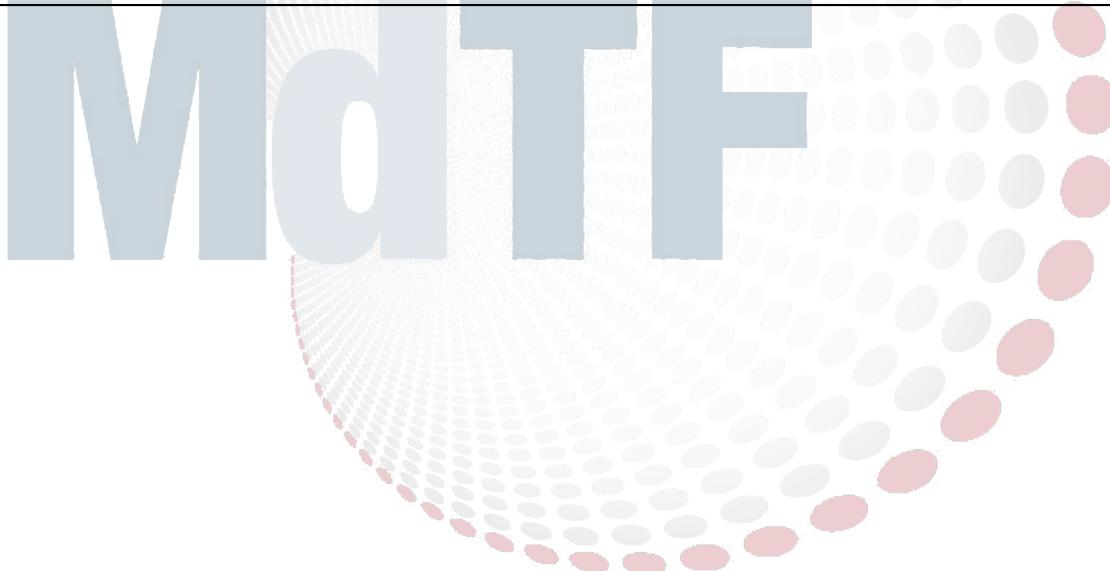
Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Granite	Cache	T1	194	161	160	160	82.5	99.4
Granite	Cache	T2	195	186	186	185	94.9	99.5
Granite	Cache	T3	202	186	184	184	91.1	98.9
Granite	Chariton	T1	194	161	137	127	65.5	78.9
Granite	Chariton	T2	195	186	177	170	87.2	91.4
Granite	Chariton	T3	202	186	175	168	83.2	90.3
Granite	Crystal	T1	194	161	160	155	79.9	96.3
Granite	Crystal	T2	195	186	186	180	92.3	96.8
Granite	Crystal	T3	202	186	184	182	90.1	97.8
Granite	Mazon	T1	194	161	161	156	80.4	96.9
Granite	Mazon	T2	195	186	186	184	94.4	98.9
Granite	Mazon	T3	202	186	184	182	90.1	97.8
Granite	Paint	T1	194	161	161	161	83.0	100.0
Granite	Paint	T2	195	186	186	186	95.4	100.0
Granite	Paint	T3	202	186	186	182	90.1	97.8
Granite	Platte	T1	194	161	155	135	69.6	83.9
Granite	Platte	T2	195	186	183	171	87.7	91.9
Granite	Platte	T3	202	186	184	168	83.2	90.3
Granite	Salt	T1	194	161	161	159	82.0	98.8
Granite	Salt	T2	195	186	186	184	94.4	98.9
Granite	Salt	T3	202	186	184	182	90.1	97.8
Granite	Sun	T1	194	161	160	23	11.9	14.3
Granite	Sun	T2	195	186	186	40	20.5	21.5
Granite	Sun	T3	202	186	182	28	13.9	15.1
Granite	Walnut	T1	194	161	161	156	80.4	96.9
Granite	Walnut	T2	195	186	186	180	92.3	96.8
Granite	Walnut	T3	202	186	186	181	89.6	97.3
Granite	Yampa	T1	194	161	161	154	79.4	95.7
Granite	Yampa	T2	195	186	186	180	92.3	96.8
Granite	Yampa	T3	202	186	184	177	87.6	95.2
Herard	Cache	T1	194	168	166	163	84.0	97.0
Herard	Cache	T2	195	185	181	178	91.3	96.2
Herard	Cache	T3	202	185	183	182	90.1	98.4
Herard	Chariton	T1	194	168	145	135	69.6	80.4
Herard	Chariton	T2	195	185	183	179	91.8	96.8
Herard	Chariton	T3	202	185	181	174	86.1	94.1
Herard	Crystal	T1	194	168	167	156	80.4	92.9
Herard	Crystal	T2	195	185	185	179	91.8	96.8
Herard	Crystal	T3	202	185	185	179	88.6	96.8
Herard	Mazon	T1	194	168	168	162	83.5	96.4
Herard	Mazon	T2	195	185	185	181	92.8	97.8
Herard	Mazon	T3	202	185	185	179	88.6	96.8
Herard	Paint	T1	194	168	168	168	86.6	100.0
Herard	Paint	T2	195	185	185	184	94.4	99.5
Herard	Paint	T3	202	185	185	184	91.1	99.5
Herard	Platte	T1	194	168	166	138	71.1	82.1
Herard	Platte	T2	195	185	185	176	90.3	95.1
Herard	Platte	T3	202	185	185	168	83.2	90.8
Herard	Salt	T1	194	168	168	167	86.1	99.4
Herard	Salt	T2	195	185	185	182	93.3	98.4
Herard	Salt	T3	202	185	185	182	90.1	98.4
Herard	Sun	T1	194	168	161	22	11.3	13.1
Herard	Sun	T2	195	185	184	42	21.5	22.7
Herard	Sun	T3	202	185	183	31	15.3	16.8
Herard	Walnut	T1	194	168	168	159	82.0	94.6
Herard	Walnut	T2	195	185	185	182	93.3	98.4
Herard	Walnut	T3	202	185	185	180	89.1	97.3
Herard	Yampa	T1	194	168	168	161	83.0	95.8

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Herard	Yampa	T2	195	185	185	179	91.8	96.8
Herard	Yampa	T3	202	185	185	177	87.6	95.7
Long	Cache	T1	195	178	177	170	87.2	95.5
Long	Cache	T2	196	190	190	187	95.4	98.4
Long	Cache	T3	202	192	191	183	90.6	95.3
Long	Chariton	T1	195	178	162	155	79.5	87.1
Long	Chariton	T2	196	190	185	183	93.4	96.3
Long	Chariton	T3	202	192	187	183	90.6	95.3
Long	Crystal	T1	195	178	176	166	85.1	93.3
Long	Crystal	T2	196	190	190	181	92.3	95.3
Long	Crystal	T3	202	192	192	185	91.6	96.4
Long	Mazon	T1	195	178	177	173	88.7	97.2
Long	Mazon	T2	196	190	190	189	96.4	99.5
Long	Mazon	T3	202	192	192	189	93.6	98.4
Long	Paint	T1	195	178	178	173	88.7	97.2
Long	Paint	T2	196	190	190	187	95.4	98.4
Long	Paint	T3	202	192	192	187	92.6	97.4
Long	Platte	T1	195	178	170	153	78.5	86.0
Long	Platte	T2	196	190	189	184	93.9	96.8
Long	Platte	T3	202	192	189	179	88.6	93.2
Long	Salt	T1	195	178	178	173	88.7	97.2
Long	Salt	T2	196	190	190	189	96.4	99.5
Long	Salt	T3	202	192	192	188	93.1	97.9
Long	Sun	T1	195	178	171	24	12.3	13.5
Long	Sun	T2	196	190	187	41	20.9	21.6
Long	Sun	T3	202	192	187	30	14.9	15.6
Long	Walnut	T1	195	178	178	168	86.2	94.4
Long	Walnut	T2	196	190	190	186	94.9	97.9
Long	Walnut	T3	202	192	192	183	90.6	95.3
Long	Yampa	T1	195	178	178	168	86.2	94.4
Long	Yampa	T2	196	190	190	188	95.9	98.9
Long	Yampa	T3	202	192	192	187	92.6	97.4
Ouray	Cache	T1	195	162	162	156	80.0	96.3
Ouray	Cache	T2	196	173	173	173	88.3	100.0
Ouray	Cache	T3	202	181	181	181	89.6	100.0
Ouray	Chariton	T1	195	162	160	152	77.9	93.8
Ouray	Chariton	T2	196	173	172	170	86.7	98.3
Ouray	Chariton	T3	202	181	179	173	85.6	95.6
Ouray	Crystal	T1	195	162	160	149	76.4	92.0
Ouray	Crystal	T2	196	173	173	167	85.2	96.5
Ouray	Crystal	T3	202	181	181	172	85.1	95.0
Ouray	Mazon	T1	195	162	162	152	77.9	93.8
Ouray	Mazon	T2	196	173	173	173	88.3	100.0
Ouray	Mazon	T3	202	181	181	176	87.1	97.2
Ouray	Paint	T1	195	162	162	158	81.0	97.5
Ouray	Paint	T2	196	173	173	173	88.3	100.0
Ouray	Paint	T3	202	181	181	177	87.6	97.8
Ouray	Platte	T1	195	162	161	137	70.3	84.6
Ouray	Platte	T2	196	173	173	166	84.7	96.0
Ouray	Platte	T3	202	181	181	165	81.7	91.2
Ouray	Salt	T1	195	162	162	157	80.5	96.9
Ouray	Salt	T2	196	173	173	173	88.3	100.0
Ouray	Salt	T3	202	181	181	180	89.1	99.4
Ouray	Sun	T1	195	162	157	21	10.8	13.0
Ouray	Sun	T2	196	173	173	38	19.4	22.0
Ouray	Sun	T3	202	181	178	28	13.9	15.5
Ouray	Walnut	T1	195	162	162	153	78.5	94.4
Ouray	Walnut	T2	196	173	173	172	87.8	99.4
Ouray	Walnut	T3	202	181	181	177	87.6	97.8
Ouray	Yampa	T1	195	162	162	154	79.0	95.1
Ouray	Yampa	T2	196	173	173	171	87.2	98.8
Ouray	Yampa	T3	202	181	181	174	86.1	96.1
Tekoa	Cache	T1	193	170	169	160	82.9	94.1
Tekoa	Cache	T2	196	166	166	152	77.6	91.6
Tekoa	Cache	T3	198	184	184	174	87.9	94.6
Tekoa	Chariton	T1	193	170	160	144	74.6	84.7

(continued)

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Chariton	T2	196	166	162	147	75.0	88.6
Tekoa	Chariton	T3	198	184	180	167	84.3	90.8
Tekoa	Crystal	T1	193	170	169	159	82.4	93.5
Tekoa	Crystal	T2	196	166	166	146	74.5	88.0
Tekoa	Crystal	T3	198	184	183	165	83.3	89.7
Tekoa	Mazon	T1	193	170	169	155	80.3	91.2
Tekoa	Mazon	T2	196	166	166	151	77.0	91.0
Tekoa	Mazon	T3	198	184	184	169	85.4	91.8
Tekoa	Paint	T1	193	170	170	159	82.4	93.5
Tekoa	Paint	T2	196	166	166	152	77.6	91.6
Tekoa	Paint	T3	198	184	184	174	87.9	94.6
Tekoa	Platte	T1	193	170	165	138	71.5	81.2
Tekoa	Platte	T2	196	166	163	146	74.5	88.0
Tekoa	Platte	T3	198	184	182	159	80.3	86.4
Tekoa	Salt	T1	193	170	170	158	81.9	92.9
Tekoa	Salt	T2	196	166	166	152	77.6	91.6
Tekoa	Salt	T3	198	184	184	174	87.9	94.6
Tekoa	Sun	T1	193	170	166	22	11.4	12.9
Tekoa	Sun	T2	196	166	165	37	18.9	22.3
Tekoa	Sun	T3	198	184	179	30	15.2	16.3
Tekoa	Walnut	T1	193	170	170	158	81.9	92.9
Tekoa	Walnut	T2	196	166	166	151	77.0	91.0
Tekoa	Walnut	T3	198	184	184	172	86.9	93.5
Tekoa	Yampa	T1	193	170	170	151	78.2	88.8
Tekoa	Yampa	T2	196	166	166	149	76.0	89.8
Tekoa	Yampa	T3	198	184	184	168	84.8	91.3



Iris Matching System Results, With Masks

Overall

In the second test condition, volunteers wore their personal face masks while interacting with each acquisition system. The following table presents select matching system results for iris biometric systems, calculated over the full population of volunteers.

Acquisition System	Matching System	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	595	481	481	407	68.4	84.6
Tekoa	Charles	595	481	480	465	78.2	96.7
Tekoa	Hudson	595	481	481	460	77.3	95.6

Gender

The following table presents select matching system results for iris biometric systems, for the with masks test condition, with volunteers divided based on their self reported gender. All volunteers selected Female or Male.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	Female	320	264	264	229	71.6	86.7
Tekoa	Bayou	Male	275	217	217	178	64.7	82.0
Tekoa	Charles	Female	320	264	263	256	80.0	97.0
Tekoa	Charles	Male	275	217	217	209	76.0	96.3
Tekoa	Hudson	Female	320	264	264	254	79.4	96.2
Tekoa	Hudson	Male	275	217	217	206	74.9	94.9

Race

The following table presents select matching system results for iris biometric systems, for the with masks test condition, with volunteers divided based on their self reported race. Volunteers selected their race based on the 2020 census race question. Only Asian, Black and White had a sufficient number of volunteers for analysis.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	Asian	62	53	53	46	74.2	86.8
Tekoa	Bayou	Black	289	233	233	193	66.8	82.8
Tekoa	Bayou	White	214	173	173	149	69.6	86.1
Tekoa	Charles	Asian	62	53	53	53	85.5	100.0
Tekoa	Charles	Black	289	233	232	223	77.2	95.7
Tekoa	Charles	White	214	173	173	167	78.0	96.5
Tekoa	Hudson	Asian	62	53	53	53	85.5	100.0
Tekoa	Hudson	Black	289	233	233	219	75.8	94.0
Tekoa	Hudson	White	214	173	173	166	77.6	96.0

Skin Tone

The following table presents select matching system results for iris biometric systems, for the with masks test condition, with volunteers divided based on their skin tone. During the data collection, volunteer's skin tone was measured using a calibrated CIE-LAB color meter device. During analysis, volunteers were ordered from lightest to darkest skin tone, and split into tertiles. T1 corresponds to the volunteers with the lowest L* values, or darkest skin tone, and T3 corresponds to the volunteers with the highest L* values, or lightest skin tone.

Acquisition System	Matching System	Group	Total People	Submitted Images	Extracted Images	Correct Identifications	Full System TIR (%)	Matching Focused TIR (%)
Tekoa	Bayou	T1	193	162	162	138	71.5	85.2
Tekoa	Bayou	T2	196	149	149	124	63.3	83.2
Tekoa	Bayou	T3	198	164	164	140	70.7	85.4
Tekoa	Charles	T1	193	162	162	158	81.9	97.5
Tekoa	Charles	T2	196	149	149	144	73.5	96.6
Tekoa	Charles	T3	198	164	163	157	79.3	95.7
Tekoa	Hudson	T1	193	162	162	156	80.8	96.3
Tekoa	Hudson	T2	196	149	149	142	72.4	95.3
Tekoa	Hudson	T3	198	164	164	156	78.8	95.1

