MINEX

Performance and Interoperability of the INCITS 378 Fingerprint Template

Supplement E: Matching Same-Source Templates

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Table 1: Scenarios 3 vs. 1, FNMR at FMR = 0.01, single-finger verification on POEBVA.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when $F_{ij}^{upper} < F_{ij}^{lower}$ or red when $F_{ij}^{upper} > F_{ij}^{lower}$. Template is MIN:A.
| NJ = 2 | A    | B    | C    | D    | E    | F    | G    | H    | J    | J    | K    | L    | M    | N    |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|       | 0.0011 | 0.0001 | 0.0016 | 0.0019 | 0.0014 | 0.0007 | 0.0020 | 0.0016 | 0.0007 | 0.0019 | 0.0014 | 0.0007 | 0.0020 | 0.0016 | 0.0007 |
| A     | 0.0011 | 0.0001 | 0.0016 | 0.0019 | 0.0014 | 0.0007 | 0.0020 | 0.0016 | 0.0007 | 0.0019 | 0.0014 | 0.0007 | 0.0020 | 0.0016 | 0.0007 |
| B     | 0.0014 | 0.0002 | 0.0013 | 0.0006 | 0.0002 | 0.0001 | 0.0014 | 0.0002 | 0.0001 | 0.0014 | 0.0002 | 0.0001 | 0.0014 | 0.0002 | 0.0001 |
| C     | 0.0027 | 0.0002 | 0.0025 | 0.0017 | 0.0011 | 0.0045 | 0.0049 | 0.0009 | 0.0019 | 0.0011 | 0.0045 | 0.0049 | 0.0009 | 0.0019 | 0.0011 |
| D     | 0.0052 | 0.0005 | 0.0032 | 0.0002 | 0.0016 | 0.0014 | 0.0032 | 0.0002 | 0.0016 | 0.0014 | 0.0016 | 0.0014 | 0.0016 | 0.0014 | 0.0016 |
| E     | 0.0011 | 0.0001 | 0.0016 | 0.0019 | 0.0014 | 0.0007 | 0.0020 | 0.0016 | 0.0007 | 0.0019 | 0.0014 | 0.0007 | 0.0020 | 0.0016 | 0.0007 |
| F     | 0.0025 | 0.0006 | 0.0056 | 0.0028 | 0.0045 | 0.0054 | 0.0030 | 0.0016 | 0.0020 | 0.0030 | 0.0016 | 0.0020 | 0.0030 | 0.0016 | 0.0020 |
| G     | 0.0054 | 0.0006 | 0.0032 | 0.0025 | 0.0014 | 0.0013 | 0.0032 | 0.0025 | 0.0014 | 0.0013 | 0.0032 | 0.0025 | 0.0014 | 0.0013 | 0.0032 |
| H     | 0.0021 | 0.0002 | 0.0036 | 0.0020 | 0.0026 | 0.0052 | 0.0031 | 0.0016 | 0.0020 | 0.0031 | 0.0016 | 0.0020 | 0.0031 | 0.0016 | 0.0020 |
| I     | 0.0040 | 0.0003 | 0.0085 | 0.0022 | 0.0061 | 0.0085 | 0.0030 | 0.0016 | 0.0020 | 0.0030 | 0.0016 | 0.0020 | 0.0030 | 0.0016 | 0.0020 |
| J     | 0.0195 | 0.0279 | 0.0316 | 0.0218 | 0.0370 | 0.0318 | 0.0407 | 0.0422 | 0.0282 | 1.0000 | 0.8470 | 0.0446 | 0.0441 | 0.0358 |
| K     | 0.0064 | 0.0421 | 0.0393 | 0.0143 | 0.0767 | 0.0395 | 0.0384 | 0.0422 | 0.0210 | 0.9999 | 0.0724 | 0.0413 | 0.0753 | 0.0831 |
| L     | 0.0092 | 0.0100 | 0.0139 | 0.0129 | 0.0116 | 0.0131 | 0.0076 | 0.0060 | 0.0056 | 0.0126 | 0.1170 | 0.0207 | 0.0313 | 0.0192 |
| M     | 0.0073 | 0.0184 | 0.0252 | 0.0100 | 0.0333 | 0.0249 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 |
| N     | 0.0160 | 0.0175 | 0.0205 | 0.0204 | 0.0166 | 0.0208 | 0.0116 | 0.0542 | 0.0157 | 0.0201 | 0.0157 | 0.0201 | 0.0157 | 0.0201 |
|       | 0.0027 | 0.0112 | 0.0157 | 0.0059 | 0.0276 | 0.0525 | 0.0070 | 0.0112 | 0.0157 | 0.0276 | 0.0525 | 0.0070 | 0.0112 | 0.0157 |
|       | 0.0011 | 0.0109 | 0.0218 | 0.0097 | 0.0213 | 0.0066 | 0.0795 | 0.0105 | 0.0861 | 0.1123 | 0.0113 | 0.0267 | 0.2554 |
|       | 0.0052 | 0.0045 | 0.0081 | 0.0056 | 0.0064 | 0.0082 | 0.0026 | 0.0023 | 0.0040 | 0.0138 | 0.0040 | 0.0254 | 0.0040 | 0.0254 |
|       | 0.0099 | 0.0096 | 0.0106 | 0.0049 | 0.0116 | 0.0108 | 0.0039 | 0.1007 | 0.0154 | 0.1573 | 0.1929 | 0.0247 | 0.0061 | 0.1911 |
|       | 0.0042 | 0.0055 | 0.0053 | 0.0052 | 0.0062 | 0.0055 | 0.0044 | 0.0126 | 0.0157 | 0.0215 | 0.0165 | 0.0013 | 0.0099 | 0.0087 |
|       | 0.0063 | 0.0077 | 0.0086 | 0.0042 | 0.0094 | 0.0087 | 0.0057 | 0.0368 | 0.0104 | 0.0862 | 0.0353 | 0.0169 | 0.0157 | 0.0081 |
|       | 0.0024 | 0.0050 | 0.0046 | 0.0024 | 0.0046 | 0.0047 | 0.0024 | 0.0203 | 0.0033 | 0.0205 | 0.4546 | 0.0099 | 0.0077 | 0.0057 |

Table 2: Scenarios 3 vs. 1, FNMR at FMR = 0.01, two-finger verification on POEBA.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when $F_{ij} < F_{ij}^* < F_{ij}$ or red when $F_{ij}^* < F_{ij}$. Template is MN:A.
Table 3: Scenarios 3 vs. 1, FMR at FMR = 0.01, single-finger verification on DHS2.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when \( F_{ij}^{\text{enroll}} < F_{ij}^{\text{auth}} \) or red when \( F_{ij}^{\text{enroll}} > F_{ij}^{\text{auth}} \). Template is MN:A.
| NF | A | B | C | D | E | F | G | H | J | K | L | M | N | Median | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 0.0062 | 0.0062 | 0.0065 | 0.0061 | 0.0062 | 0.0065 | 0.0061 | 0.0062 | 0.0065 | 0.0061 | 0.0062 | 0.0065 | 0.0061 | 0.1977 | 1 |
| 3 | 0.0062 | 0.0163 | 0.0190 | 0.0131 | 0.0371 | 0.0192 | 0.0169 | 0.0664 | 0.0855 | 0.0998 | 0.0371 | 0.0848 | 0.2002 | 0.0292 | 5 |
| 4 | 0.0062 | 0.0065 | 0.0054 | 0.0077 | 0.0052 | 0.0051 | 0.0128 | 0.0308 | 0.0252 | 0.0527 | 0.0077 | 0.0074 | 0.0081 | 0.0070 | 3 |
| 5 | 0.0041 | 0.0055 | 0.0116 | 0.0077 | 0.0248 | 0.0115 | 0.0095 | 0.0730 | 0.0866 | 0.0891 | 0.0829 | 0.0788 | 0.1794 | 0.0121 | 6 |
| 6 | 0.0123 | 0.0179 | 0.0114 | 0.0141 | 0.0339 | 0.0115 | 0.0178 | 0.1133 | 0.1043 | 0.2232 | 0.1182 | 0.0947 | 0.1857 | 0.0209 | 5 |
| 7 | 0.0057 | 0.0069 | 0.0067 | 0.0068 | 0.0247 | 0.0068 | 0.0012 | 0.0061 | 0.0044 | 0.0246 | 0.1946 | 0.0073 | 0.0069 | 0.0064 | 0.0062 | 1 |
| 8 | 0.0078 | 0.0093 | 0.0086 | 0.0049 | 0.0141 | 0.0095 | 0.0093 | 0.0293 | 0.1135 | 0.1212 | 0.1738 | 0.1030 | 0.1133 | 0.2087 | 0.0305 | 10 |
| 9 | 0.0094 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 0.0114 | 7 |
| 10 | 0.0012 | 0.0177 | 0.0115 | 0.0139 | 0.0341 | 0.0114 | 0.0174 | 0.1133 | 0.1045 | 0.2222 | 0.1194 | 0.0948 | 0.1857 | 0.0205 | 9 |
| 11 | 0.0037 | 0.0045 | 0.0411 | 0.0445 | 0.0358 | 0.0414 | 0.0336 | 0.0609 | 0.0403 | 0.0947 | 0.0854 | 0.0500 | 0.0522 | 0.0423 | 0.0433 | 11 |
| 12 | 0.0063 | 0.0762 | 0.0857 | 0.0747 | 0.0821 | 0.0856 | 0.0772 | 0.1153 | 0.0986 | 0.6291 | 0.1149 | 0.1144 | 0.0835 | 0.0845 | 8 |
| 13 | 0.0529 | 0.0806 | 0.0960 | 0.0535 | 0.1154 | 0.0969 | 0.0597 | 0.1153 | 0.1388 | 1.0000 | 0.1242 | 0.1450 | 0.2820 | 0.1302 | 7 |
| 14 | 0.1151 | 0.1968 | 0.1705 | 0.1825 | 0.1961 | 0.1728 | 0.1420 | 0.2398 | 0.1693 | 0.3011 | 0.4223 | 0.2093 | 0.2094 | 0.1745 | 0.1893 | 5 |
| 15 | 0.0939 | 0.1348 | 0.1260 | 0.1164 | 0.1806 | 0.1258 | 0.0982 | 0.2067 | 0.1693 | 0.2939 | 0.2294 | 0.1836 | 0.3050 | 0.1390 | 3 |
| 16 | 0.0019 | 0.0114 | 0.0183 | 0.0183 | 0.0183 | 0.0183 | 0.0410 | 0.0702 | 0.0205 | 0.0295 | 0.0275 | 0.0269 | 0.0255 | 0.0265 | 9 |
| 17 | 0.0028 | 0.0169 | 0.0164 | 0.0109 | 0.0369 | 0.0165 | 0.0144 | 0.0707 | 0.0845 | 0.1153 | 0.0295 | 0.0937 | 0.2065 | 0.0300 | 2 |
| 18 | 0.0968 | 0.1179 | 0.1069 | 0.1118 | 0.1262 | 0.1069 | 0.0852 | 0.1527 | 0.1042 | 0.1942 | 0.4994 | 0.1363 | 0.1374 | 0.1048 | 12 |
| 19 | 0.0629 | 0.0810 | 0.0817 | 0.0743 | 0.1117 | 0.0818 | 0.0636 | 0.1543 | 0.1447 | 0.2069 | 0.1663 | 0.1363 | 0.2529 | 0.0826 | 14 |
| 20 | 0.2631 | 0.2913 | 0.2841 | 0.2826 | 0.2841 | 0.2346 | 0.2346 | 0.3621 | 0.2682 | 0.3817 | 0.5669 | 0.3289 | 0.3294 | 0.2670 | 4 |
| 21 | 0.1818 | 0.1992 | 0.1822 | 0.1815 | 0.2189 | 0.1540 | 0.3087 | 0.2703 | 0.4276 | 0.4013 | 0.2694 | 0.3294 | 0.1809 | 1 |

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and compared the scenarios. Cells are colored green when $F_{ij}^{upper} < F_{ij}^{lower}$ or red when $F_{ij}^{upper} > F_{ij}^{lower}$. Template is MIN:A.
### Table 5: Scenarios vs. 1, FNMR at FMR = 0.01, single-finger verification on POE.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when \( F_{ij}^{upper} < F_{ij}^{lower} \) or red when \( F_{ij}^{upper} > F_{ij}^{lower} \). Template is MIN:A.
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<td>13</td>
<td>14</td>
<td>10</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 6: Scenarios 3 vs. 1, FNMR at FMR = 0.01, two-finger verification on POE.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when $F_{\text{upper}} < F_{\text{lower}}$ or red when $F_{\text{upper}} > F_{\text{lower}}$. Template is MIN:A.

March 21, 2006
<table>
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<th>2</th>
<th>11</th>
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<th>13</th>
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<td>0.0455</td>
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</table>

Table 7: Scenarios 3 vs. 1, FNMR at FMR = 0.01, single-finger verification on DOS.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when $P_{ij}^{upper} < P_{ij}^{lower}$ or red when $P_{ij}^{upper} > P_{ij}^{lower}$. Template is Min:N:A.
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<th>5</th>
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<th>7</th>
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</tr>
</thead>
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<td>0.0091</td>
<td>0.0141</td>
<td>0.0174</td>
<td>0.0100</td>
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<td>0.0762</td>
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<td>0.0091</td>
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<td>0.0174</td>
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<td>0.0129</td>
<td>0.0762</td>
</tr>
</tbody>
</table>

Table 8: Scenarios 3 vs. 1, FNMR at FMR = 0.01, two-finger verification on DOS.

The top value in each cell corresponds to scenario 3 for which the row vendor produced both enrollment and authentication templates, while the column vendor performed just the comparison. The bottom value in each cell is for scenario 1: the row vendor produced the enrollment template while the column vendor produced the authentication template and performed the comparison. Cells are colored green when $F_{ij}\text{upper} < F_{ij}\text{lower}$ or red when $F_{ij}\text{upper} > F_{ij}\text{lower}$. Template is MIN:A.