# Ongoing Face Recognition Vendor Test (FRVT) <br> Part 3: Demographic Effects 

Annex 10 : Cross age false match rates with visa photos

## 1 Overview

This annex includes figures that shows false match rates across different age groups. Each page contains one figure corresponding to one algorithm. Each figure shows two heatmaps, each showing a matrix of values. The value in column $j$ is the FMR obtained when images of persons in age group $j$ are compared with images of other subjects in age group $i$.

## 2 Data

The images are the compressed visa portraits described in Annex 3.
The total number of images is 243023 . The total number of persons is 223052 . The total number of comparisons is just over 4.4 billion ( 4454571492 ) produced by cross-comparison of image-disjoint sets.

## 3 Fixed Threshold

A false match is declared if the comparison score is equal to, or exceeds, a threshold. This same value applies to all comparisons in all cells. The threshold value could be any value germane to that comparison algroithm. The threshold value was taken over all comparisons of these images as the lowest value for which FMR leq0.0001.

## 4 Plot

The plot shows cross-age false match rate as follows.
$\triangleright 0$ - The six columns shows for six countries selected to span global regions and because the dataset contains many images from those countries.
$\triangleright 1$ - In the top row, the various heatmaps correspond to comparison of women with women from the specific country.
$\triangleright 2$ - The bottom row likewise shows men with men false match rates.
$\triangleright 3$ - Any given cell restricts impostors to have the same sex and country of origin, and individuals from age group $i$ and $j$ drawn from the following list: $(12-20],(20-35],(35-50],(50-65]$, and $(65-99]$.
$\triangleright 4$ - The countries are sorted left-to-right in increasing order of maximum FMR measured in the two panels (male-male, and female-female).
$\triangleright 5$ - The name of the algorithm is included in the legend.
$\triangleright 6$ - The threshold value and the nominal FMR value that it corresponds to, are likewise, recorded in the legend. The FMR is nominal in the sense that it was computed over impostor comparisons made in a separate, domestic, dataset (Annex 1).

| Links: | EXEC. SUMMARY | False positive: Incorrect association of two subjects | $1: 1$ FMR | 1:N FPIR | T $\gg 0$ | $\rightarrow$ FMR, FPIR $\rightarrow 0$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  | TECH. SUMMARY | False negative: Failed association of one subject | $1: 1$ FNMR | $1:$ F FNIR |  | $\rightarrow$ FNMR, FNIR $\rightarrow 1$ |

Cross age FMR at threshold T $=2.740$ for algorithm 3divi_003, giving $\operatorname{FMR}(T)=0.0001$ globally . $\square$

Same sex and same region impostor pairs



Age of enrollee

Cross age FMR at threshold $T=2.857$ for algorithm 3divi_004, giving $\operatorname{FMR}(T)=0.0001$ globally .

## og 10 FMR

| -6 |
| :--- |
| - | $\begin{array}{lll}-4 & -3 & -2\end{array}$



Cross age FMR at threshold $\mathrm{T}=0.713$ for algorithm adera_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR

$-5$
$-4$

| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -6.0 | $-6.0$ | -6.0 | -6.0 | -6.0 | -6.0 | -6.0 | -5.3 | -5.6 | -4.9 | -4.4 | -3.9 | -3.6 | -3.2 |
| $-6.0$ | $-6.0$ | $-6.0$ | $-6.0$ | $-6.0$ | -5.9 | $-6.0$ | -5.5 | -5.5 | $-4.9$ | $-4.1$ | $-3.9$ | $-3.7$ | $-3.7$ |
| $-6.0$ | -6.0 | -6.0 | -6.0 | -5.5 | -5.2 | -5.0 | -4.7 | -4.5 | -4.2 | $-3.8$ | $-3.7$ | $-3.7$ | -3.9 |
| $-6.0$ | -6.0 | -5.7 | -5.3 | -4.9 | -4.5 | $-4.3$ | -4.2 | -4.1 | $-3.9$ | $-3.7$ | $-3.8$ | -4.0 | $-4.3$ |
| -5.9 | -5.2 | -4.8 | -4.4 | -4.2 | -4.0 | $-3.9$ | $-3.8$ | $-3.8$ | $-3.8$ | $-4.0$ | -4.2 | -4.7 | -5.9 |
| -6.0 | -5.0 | -4.5 | -4.1 | $-3.8$ | $-3.6$ | $-3.6$ | $-3.6$ | $-3.6$ | $-3.8$ | -4.0 | -4.4 | $-4.9$ | -5.7 |
| $-6.0$ | -5.0 | -4.2 | $-3.9$ | $-3.5$ | $-3.4$ | -3.4 | -3.5 | $-3.6$ | $-3.8$ | $-4.1$ | -4.6 | -5.1 | $-6.0$ |
| $-6.0$ | -4.6 | -4.0 | $-3.7$ | $-3.2$ | -3.1 | $-3.2$ | $-3.4$ | $-3.6$ | $-3.9$ | -4.2 | $-4.8$ | -5.3 | -5.6 |
| $-6.0$ | -4.4 | -3.9 | $-3.5$ | $-3.1$ | $-3.0$ | $-3.2$ | $-3.4$ | $-3.7$ | $-4.0$ | $-4.4$ | -5.0 | $-6.0$ | $-6.0$ |
| $-6.0$ | -4.6 | $-3.8$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.5$ | $-3.7$ | -4.0 | $-4.3$ | $-4.8$ | -5.7 | $-6.0$ | $-6.0$ |
| $-6.0$ | $-4.3$ | $-3.6$ | $-3.3$ | $-3.5$ | $-3.6$ | $-3.9$ | -4.1 | -4.2 | $-4.5$ | -5.1 | -5.5 | $-6.0$ | $-6.0$ |
| -3.9 | $-2.9$ | $-2.8$ | $-3.4$ | $-3.6$ | -3.9 | -4.1 | -4.3 | -4.6 | $-4.9$ | $-6.0$ | -6.0 | -6.0 | -6.0 |
| $-2.2$ | $-2.0$ | $-2.9$ | -4.3 | -4.4 | -4.5 | $-4.8$ | -5.2 | -5.2 | -5.4 | -5.7 | $-6.0$ | $-6.0$ | $-6.0$ |
| -1.0 | $-2.1$ | -3.7 | -5.8 | -5.4 | $-6.0$ | -6.0 | -5.8 | -6.0 | -6.0 | -6.0 | -6.0 | -6.0 | -6.0 |
|  |  |  |  |  |  |  |  |  |  |  |  | ( | $120^{\circ}$ |

Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.702$ for algorithm alchera_000, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally. $\quad \log 10 \mathrm{FMR}$



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.713$ for algorithm alchera_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\quad \log 10$ FMR



Cross age FMR at threshold $T=0.433$ for algorithm allgovision_000, giving $\operatorname{FMR}(T)=0.0001$ globally. log10 FMR


Cross age FMR at threshold T $=0.396$ for algorithm alphaface_001, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
-5



Cross age FMR at threshold $\mathrm{T}=3.640$ for algorithm amplifiedgroup_001, giving $\operatorname{MR}(T)=0.0001$ globally .

## $\log 10$ FMR



| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -5.0 | -4.8 | -5.2 | -5.3 | -5.3 | -4.5 | $-4.3$ | $-3.9$ | $-3.7$ | $-3.3$ | -3.1 | $-2.9$ | $-3.0$ |
| -6.0 | $-5.3$ | -4.7 | -5.2 | $-4.8$ | -4.5 | -4.1 | $-3.7$ | $-3.4$ | -3.1 | $-2.9$ | $-2.8$ | $-2.7$ | $-2.9$ |
| $-5.3$ | -4.6 | -4.4 | -4.5 | -4.5 | -4.0 | $-3.7$ | $-3.4$ | $-3.2$ | $-2.9$ | $-2.8$ | $-2.8$ | $-2.8$ | -3.1 |
| -5.7 | $-4.7$ | $-4.2$ | -4.2 | -4.1 | $-3.7$ | $-3.4$ | $-3.2$ | $-3.0$ | $-2.8$ | $-2.8$ | $-2.9$ | -3.1 | $-3.5$ |
| -4.6 | $-3.9$ | $-3.5$ | -3.5 | $-3.4$ | $-3.2$ | $-3.0$ | $-2.8$ | $-2.7$ | $-2.6$ | $-2.8$ | $-3.0$ | $-3.2$ | $-3.7$ |
| -4.5 | $-3.6$ | $-3.3$ | $-3.2$ | $-3.1$ | $-3.0$ | $-2.9$ | $-2.8$ | $-2.7$ | $-2.7$ | $-2.9$ | $-3.2$ | $-3.5$ | $-4.0$ |
| -4.5 | $-3.6$ | $-3.2$ | -3.2 | -3.1 | -3.0 | $-2.9$ | $-2.8$ | $-2.7$ | $-2.8$ | $-3.0$ | $-3.3$ | $-3.5$ | -4.4 |
| -4.4 | $-3.5$ | $-3.1$ | $-3.1$ | $-3.1$ | $-3.1$ | $-3.0$ | $-3.0$ | $-2.9$ | $-3.0$ | $-3.3$ | $-3.7$ | -4.1 | -5.0 |
| $-4.3$ | $-3.3$ | $-3.0$ | -2.9 | -2.9 | $-3.0$ | $-3.0$ | $-3.0$ | $-3.0$ | -3.2 | $-3.6$ | -4.1 | -4.4 | -5.4 |
| -4.2 | $-3.3$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.9$ | -4.5 | $-4.9$ | $-6.0$ |
| -3.6 | $-2.7$ | $-2.4$ | $-2.5$ | $-2.6$ | $-2.7$ | $-2.8$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.8$ | -4.3 | -4.6 | -6.0 |
| -3.2 | $-2.5$ | $-2.3$ | -2.6 | $-2.7$ | $-2.8$ | $-3.0$ | $-3.2$ | $-3.3$ | -3.5 | -4.0 | -4.5 | -4.8 | -6.0 |
| $-2.7$ | $-2.3$ | $-2.4$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.4$ | $-3.5$ | $-3.6$ | $-3.8$ | -4.1 | -4.5 | -4.8 | -6.0 |
| $-2.6$ | $-2.7$ | $-3.1$ | $-3.7$ | -4.0 | -4.1 | -4.1 | -4.3 | $-4.7$ | -4.6 | -4.7 | -5.0 | -5.2 | -5.2 |
| $\left.(0,)^{1}\right)^{\prime}$ | 0) | $61^{\prime}$ | $01$ |  |  |  |  | A0' | $8{ }^{1}$ | $5{ }^{\circ}$ | 64) | $721^{1}$ | $200^{\circ}$ |

Age of enrollee

Cross age FMR at threshold $T=0.397$ for algorithm anke_003, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . $\square$


Cross age FMR at threshold $T=0.397$ for algorithm anke_004, giving $\operatorname{FMR}(T)=0.0001$ globally.


Age of enrollee

Cross age FMR at threshold $T=1.526$ for algorithm anyvision_002, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR


Cross age FMR at threshold $\mathrm{T}=1.375$ for algorithm anyvision_004, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR


Cross age FMR at threshold $T=3.868$ for algorithm aware_003, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally
$\log 10$ FMR

$\begin{array}{ll}-5 & -4\end{array}$
$-3$


Age of enrollee

Cross age FMR at threshold $T=5.084$ for algorithm aware_004, giving $\operatorname{FMR}(T)=0.0001$ globally.
$\log 10$ FMR
$-6$
$\begin{array}{ll}-5 & -4\end{array}$
$-3$
$-2$



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.799$ for algorithm awiros 001 , giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR

$-5 \quad-4$


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.919$ for algorithm ayonix 000 , iving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR

$-5 \quad-4$
$-3$
$-2$


Cross age FMR at threshold $\mathrm{T}=0.731$ for algorithm bm_001, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR

| -5.2 | -4.3 | $-4.3$ | -4.1 | Same sex and same region impostor pairs |  |  |  |  |  | $-3.2$ | $-2.9$ | $-2.9$ | -2.7 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | -4.1 | -4.0 | $-3.8$ | -3.6 | -3.5 | $-3.4$ |  |  |  |  |
| $-4.5$ | -4.1 | -4.0 | $-3.7$ | $-3.8$ | $-3.7$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.3$ | $-3.1$ | $-2.9$ | $-2.9$ | $-2.8$ |
| -4.7 | $-4.3$ | -4.3 | -4.0 | -4.0 | $-3.8$ | $-3.6$ | $-3.5$ | -3.4 | -3.3 | -3.2 | $-3.0$ | $-3.0$ | -3.1 |
| $-4.8$ | $-4.2$ | -4.1 | $-3.8$ | $-3.7$ | $-3.6$ | $-3.5$ | $-3.3$ | -3.2 | -3.2 | $-3.1$ | $-3.0$ | $-3.1$ | -3.1 |
| -5.1 | -4.2 | $-3.9$ | $-3.6$ | $-3.6$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.2$ | $-3.1$ | -3.1 | $-3.1$ | $-3.2$ |
| -5.0 | $-4.2$ | $-3.9$ | $-3.6$ | -3.6 | -3.5 | $-3.4$ | $-3.3$ | $-3.3$ | $-3.3$ | $-3.3$ | $-3.3$ | $-3.4$ | -3.5 |
| -4.9 | $-4.2$ | $-3.8$ | $-3.6$ | $-3.6$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.3$ | $-3.3$ | $-3.4$ | $-3.4$ | $-3.4$ | $-3.5$ |
| -5.0 | $-4.0$ | $-3.8$ | $-3.6$ | $-3.6$ | $-3.5$ | $-3.4$ | $-3.4$ | -3.4 | -3.5 | $-3.5$ | $-3.6$ | $-3.7$ | $-3.7$ |
| -5.0 | $-4.1$ | $-3.8$ | $-3.7$ | -3.6 | -3.5 | $-3.5$ | $-3.4$ | -3.5 | $-3.5$ | $-3.6$ | $-3.7$ | $-3.8$ | -3.9 |
| -5.4 | $-4.2$ | $-3.9$ | $-3.7$ | -3.7 | -3.6 | $-3.6$ | $-3.6$ | $-3.6$ | $-3.7$ | $-3.8$ | -3.9 | -4.0 | -4.2 |
| -4.6 | $-3.8$ | $-3.5$ | $-3.6$ | $-3.7$ | $-3.7$ | $-3.7$ | $-3.7$ | $-3.8$ | -3.9 | -4.0 | -4.0 | $-4.3$ | -4.3 |
| $-3.9$ | $-3.2$ | -3.1 | -3.5 | -3.6 | -3.6 | $-3.6$ | $-3.5$ | -3.5 | $-3.7$ | $-3.7$ | $-3.8$ | $-3.8$ | -3.9 |
| $-3.0$ | $-2.6$ | $-3.0$ | $-3.9$ | -4.0 | -4.1 | $-4.1$ | -4.2 | -4.1 | -4.2 | -4.2 | -4.2 | -4.2 | -4.1 |
| -2.6 | $-2.9$ | $-3.6$ | -4.6 | -4.7 | $-4.8$ | $-4.9$ | $-4.9$ | -4.9 | -4.9 | -4.9 | -4.6 | -4.7 | -4.5 |
| $(0,4)^{\prime}$ |  |  |  |  | 81 |  | $6)$ | 01 | $8{ }^{1}$ | 601 | (b) | 1 |  |

Age of enrollee

Cross age FMR at threshold $T=0.388$ for algorithm camvi_002, giving $\operatorname{FMR}(T)=0.0001$ globally . og 10 FMR

$\begin{array}{ll}-5 & -4\end{array}$


Cross age FMR at threshold $T=0.377$ for algorithm camvi_004, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR

$\begin{array}{ll}-5 & -4\end{array}$
$-3$


Age of enrollee

Cross age FMR at threshold $T=0.436$ for algorithm ceiec_001, giving $\operatorname{FMR}(T)=0.0001$ globally.

Cross age FMR at threshold $T=0.325$ for algorithm ceiec_002, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
g $\begin{array}{lllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=106.748$ for algorithm chtface_001, giving


Cross age FMR at threshold $T=2972.000$ for algorithm cogent_003, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
$\qquad$ $\begin{array}{lllll}-5 & -4 & -3 & -2\end{array}$


Cross age FMR at threshold $T=3156.000$ for algorithm cogent_004, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR


Cross age FMR at threshold $T=0.565$ for algorithm cognitec_000, giving $\operatorname{FMR}(T)=0.0001$ globally log 10 FMR


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -5.4 | -5.0 | -4.9 | -5.1 | -5.0 | -4.7 | -5.0 | -4.2 | -3.9 | -3.4 | -3.0 | $-2.6$ | -2.4 |
| $-5.9$ | -5.2 | $-4.8$ | -5.3 | $-4.8$ | -4.5 | -4.5 | $-4.3$ | $-3.9$ | $-3.5$ | $-3.0$ | $-2.7$ | $-2.6$ | $-2.6$ |
| -5.5 | -4.9 | -4.7 | -4.6 | -4.4 | -4.1 | -4.0 | $-3.8$ | $-3.6$ | $-3.3$ | $-2.9$ | $-2.7$ | $-2.7$ | $-2.8$ |
| -5.5 | -4.8 | -4.6 | -4.2 | -4.0 | $-3.7$ | $-3.6$ | $-3.5$ | $-3.3$ | -3.1 | $-2.9$ | $-2.9$ | $-3.0$ | $-3.2$ |
| $-5.3$ | -4.6 | -4.3 | -4.0 | $-3.8$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.2$ | -3.1 | $-3.3$ | -3.6 | -4.0 |
| -5.2 | -4.4 | -4.0 | $-3.7$ | -3.5 | $-3.3$ | $-3.2$ | $-3.2$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.1 |
| $-4.7$ | -4.1 | $-3.8$ | $-3.6$ | $-3.2$ | $-3.0$ | $-3.0$ | -3.1 | $-3.1$ | $-3.2$ | $-3.4$ | -3.7 | -4.1 | -4.4 |
| -4.6 | $-3.9$ | $-3.6$ | $-3.4$ | $-2.9$ | $-2.7$ | $-2.8$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.4$ | $-3.8$ | -4.3 | -4.7 |
| -4.5 | $-3.8$ | $-3.5$ | $-3.2$ | -2.9 | -2.7 | -2.9 | -3.1 | -3.2 | -3.4 | -3.6 | -3.9 | -4.5 | -5.0 |
| -4.6 | $-3.8$ | $-3.4$ | $-3.2$ | -3.1 | $-3.0$ | $-3.2$ | $-3.4$ | -3.6 | $-3.8$ | -4.0 | -4.3 | -4.8 | -5.3 |
| $-4.3$ | $-3.3$ | $-2.8$ | $-2.9$ | -3.1 | -3.2 | $-3.4$ | $-3.6$ | $-3.7$ | -4.0 | -4.2 | -4.6 | $-5.3$ | -5.2 |
| $-3.3$ | $-2.4$ | $-2.2$ | $-3.0$ | $-3.3$ | $-3.4$ | -3.7 | -3.9 | -4.0 | -4.2 | -4.5 | -4.8 | -5.0 | -5.3 |
| $-2.2$ | $-1.8$ | $-2.2$ | -3.5 | $-3.7$ | $-3.8$ | -4.2 | -4.3 | -4.4 | $-4.6$ | -4.9 | -5.1 | -5.3 | -5.6 |
| -1.6 | $-2.1$ | -3.1 | -4.3 | -4.3 | -4.1 | -4.5 | -4.7 | $-4.8$ | -5.1 | -5.2 | -4.9 | $-6.0$ | -6.0 |
| $\left.(0,)^{\prime}\right)^{\prime}$ | $(10)$ |  |  |  |  |  |  |  | ,$^{88)}$ | 561 | $6^{44]}$ | 12) | $200^{1}$ |

Age of enrollee

Cross age FMR at threshold $T=0.565$ for algorithm cognitec_001, giving $\operatorname{FMR}(T)=0.0001$ globally log 10 FMR


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -5.4 | -5.0 | -5.2 | -5.1 | -5.0 | -4.7 | -5.0 | -4.2 | -3.9 | $-3.4$ | -3.0 | -2.6 | -2.4 |
| $-5.9$ | -5.4 | -4.8 | -5.4 | -4.8 | -4.6 | -4.4 | -4.2 | $-3.9$ | -3.5 | $-3.0$ | $-2.7$ | $-2.6$ | $-2.6$ |
| $-5.4$ | $-4.9$ | -4.7 | -4.6 | -4.4 | -4.1 | $-3.9$ | $-3.8$ | $-3.6$ | $-3.3$ | $-2.9$ | $-2.7$ | $-2.7$ | $-2.8$ |
| -5.5 | $-4.8$ | -4.6 | -4.2 | -4.0 | -3.7 | -3.6 | -3.5 | $-3.3$ | -3.1 | $-2.9$ | $-2.9$ | -3.0 | -3.2 |
| -5.5 | $-4.6$ | -4.3 | -4.0 | $-3.8$ | -3.5 | $-3.4$ | $-3.3$ | -3.2 | -3.1 | -3.1 | -3.3 | -3.6 | -4.0 |
| -5.2 | -4.4 | -4.0 | $-3.8$ | -3.5 | $-3.3$ | $-3.2$ | $-3.2$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.1 |
| -4.7 | -4.1 | $-3.8$ | $-3.6$ | -3.2 | $-3.0$ | $-3.0$ | -3.1 | $-3.1$ | -3.2 | $-3.4$ | -3.7 | -4.1 | -4.5 |
| -4.6 | -3.9 | $-3.6$ | $-3.4$ | $-2.9$ | $-2.7$ | $-2.8$ | -3.0 | -3.1 | $-3.3$ | $-3.4$ | $-3.8$ | -4.3 | -4.6 |
| -4.5 | $-3.8$ | -3.5 | -3.2 | $-2.8$ | $-2.7$ | -2.9 | $-3.1$ | $-3.2$ | $-3.4$ | $-3.6$ | $-3.9$ | -4.5 | -5.0 |
| -4.6 | $-3.8$ | -3.4 | $-3.2$ | -3.1 | $-3.0$ | $-3.2$ | $-3.4$ | $-3.6$ | $-3.8$ | $-4.0$ | -4.4 | -4.8 | -5.3 |
| $-4.3$ | $-3.3$ | $-2.8$ | $-2.9$ | -3.1 | -3.2 | $-3.4$ | $-3.6$ | $-3.7$ | -4.0 | $-4.2$ | -4.7 | -5.3 | -5.2 |
| $-3.3$ | $-2.4$ | $-2.2$ | $-3.0$ | $-3.3$ | $-3.4$ | $-3.7$ | $-3.8$ | -4.0 | -4.2 | -4.5 | -4.9 | -5.1 | -5.1 |
| $-2.2$ | $-1.8$ | $-2.2$ | -3.5 | $-3.7$ | $-3.8$ | -4.2 | -4.3 | -4.5 | -4.6 | $-4.9$ | -5.1 | -5.4 | -5.6 |
| -1.6 | $-2.1$ | -3.1 | -4.3 | -4.2 | -4.2 | -4.5 | -4.7 | $-4.8$ | -5.1 | -5.2 | -4.9 | $-6.0$ | -6.0 |
| $(0,4)^{\prime}$ | 0) | $, 161$ | $, 20^{\circ}$ | $2(4)$ | 8) | $32{ }^{1}$ | $36]^{\circ}$ | 4, 01 | $88^{1}$ | $56)^{\circ}$ | 644' | 721 | $1200^{\circ}$ |

Age of enrollee

Cross age FMR at threshold $T=3.730$ for algorithm ctbcbank_000, giving $\operatorname{MR}(\mathrm{T})=0.0001$ globally. $\log 10$ FMR
-6 $\begin{array}{ll}-5 & -4\end{array}$


Age of enrollee

Cross age FMR at threshold $T=0.762$ for algorithm cyberextruder_001, giving $\operatorname{FMR}(T)=0.0001$ globally log 10 FMR

$\square$


Cross age FMR at threshold $T=0.500$ for algorithm cyberextruder_002, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR


Cross age FMR at threshold $T=1.409$ for algorithm cyberlink_002, giving $\operatorname{FMR}(T)=0.0001$ globally
$-6$ $\begin{array}{ll}-5 & -4\end{array}$ $2-1$


Cross age FMR at threshold $T=1.409$ for algorithm cyberlink_003, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally.
-6
$-5 \quad-4$ $\square$ -


Cross age FMR at threshold $T=6696.000$ for algorithm dahua_002, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=6034.000$ for algorithm dahua_003, giving $\operatorname{FMR}(T)=0.0001$ globally .


Cross age FMR at threshold $T=1.359$ for algorithm deepglint_001, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR


Cross age FMR at threshold $\mathrm{T}=1.371$ for algorithm deepsea_001, giving $\operatorname{FMR}(T)=0.0001$ globally log 10 FMR


Cross age FMR at threshold $\mathrm{T}=79.344$ for algorithm dermalog_005, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
, $\begin{array}{llllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=79.670$ for algorithm dermalog_006, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -6.0 | -6.0 | -5.5 | -5.7 | -5.0 | -4.7 | -4.6 | -4.2 | -4.0 | -3.4 | -3.0 | -2.7 | -2.5 |
| $-6.0$ | -6.0 | $-4.9$ | -5.0 | -4.9 | $-4.8$ | -4.5 | -4.2 | $-4.1$ | -3.7 | -3.1 | $-2.8$ | -2.6 | $-2.7$ |
| -5.8 | -5.8 | -5.7 | -4.8 | -4.5 | -4.4 | -4.2 | -4.0 | $-3.7$ | $-3.4$ | $-3.0$ | $-2.8$ | $-2.7$ | $-2.9$ |
| -5.8 | -5.5 | $-4.8$ | -4.3 | -4.1 | $-3.9$ | $-3.8$ | $-3.6$ | $-3.4$ | $-3.2$ | $-2.9$ | $-2.9$ | -3.0 | -3.3 |
| -5.4 | -5.4 | $-4.5$ | -4.1 | -3.9 | $-3.7$ | -3.5 | $-3.4$ | $-3.3$ | $-3.3$ | $-3.3$ | -3.4 | $-3.7$ | -4.0 |
| -5.1 | $-4.7$ | $-4.2$ | $-3.8$ | $-3.6$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-4.0$ | -4.2 |
| -5.2 | -4.5 | -4.0 | $-3.6$ | $-3.4$ | $-3.2$ | $-3.2$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.8$ | $-4.3$ | -4.7 |
| -5.0 | $-4.3$ | $-3.7$ | $-3.4$ | $-3.2$ | $-3.1$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.7$ | -4.1 | $-4.4$ | -4.7 |
| $-4.8$ | $-4.0$ | $-3.6$ | $-3.3$ | $-3.2$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.9$ | $-4.3$ | $-4.6$ | $-4.9$ |
| -4.6 | $-3.9$ | $-3.4$ | $-3.2$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.8$ | -4.1 | -4.5 | -4.7 | -5.3 |
| -4.4 | $-3.5$ | $-3.0$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.7$ | -4.0 | -4.4 | $-4.8$ | -5.3 | -5.5 |
| -3.1 | $-2.5$ | $-2.5$ | $-3.0$ | $-3.2$ | $-3.4$ | $-3.7$ | $-3.8$ | -4.1 | $-4.3$ | -4.7 | -5.1 | -5.0 | -5.3 |
| $-2.1$ | -1.9 | $-2.4$ | -3.5 | $-3.8$ | -4.1 | $-4.3$ | -4.4 | -4.6 | $-4.8$ | -5.2 | -5.7 | -5.6 | $-6.0$ |
| -1.2 | -1.9 | $-3.0$ | -4.3 | -4.7 | $-4.8$ | -5.3 | $-4.8$ | -5.3 | $-6.0$ | -5.6 | $-6.0$ | -5.5 | -6.0 |
| $0, A^{\prime}$ | $10^{\prime}$ | $, 161$ | $, 201$ | 4) | $88^{\circ}$ |  |  | $40{ }^{1}$ | $8{ }^{1}$ |  |  | 12) | $120^{\circ}$ |

Cross age FMR at threshold $T=0.430$ for algorithm df_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
-6

All impostor pairs



Cross age FMR at threshold $\mathrm{T}=0.331$ for algorithm didiglobalface_001, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.675$ for algorithm digitalbarriers_002, giving $\operatorname{FMR}(T)=0.0001$ globally log 10 FMR
$\begin{array}{llllll}-6 & -5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $\mathrm{T}=1.061$ for algorithm dsk_000, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally .
-



Cross age FMR at threshold $T=53.280$ for algorithm einetworks_000, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR

| -6 |
| :--- |
| - | $-5 \quad-4$ -3 $-2$



Cross age FMR at threshold $T=2.589$ for algorithm everai_002, giving $\operatorname{FMR}(T)=0.0001$ globally.
og 10 FMR
$-6$
$-5 \quad-4$
$\begin{array}{ll}-3 & -2\end{array}$


Cross age FMR at threshold $\mathrm{T}=2.667$ for algorithm everai_paravision_003, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
$-6$ $\begin{array}{ll}-5 & -4\end{array}$ $-3$ $-2$


Cross age FMR at threshold $T=0.400$ for algorithm f8_001, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR


Cross age FMR at threshold $\mathrm{T}=1.375$ for algorithm facesoft_000, giving $\operatorname{FMR}(T)=0.0001$ globally. $\quad \log 10$ FMR



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.611$ for algorithm glory_000, giving $\operatorname{FMR}(T)=0.0001$ globally .


Cross age FMR at threshold $\mathrm{T}=0.618$ for algorithm glory_001, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR

-


Cross age FMR at threshold $T=0.483$ for algorithm gorilla_002, giving $\operatorname{FMR}(T)=0.0001$ globally. og 10 FMR


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -5.4 | -5.0 | -5.2 | -5.3 | -4.7 | -4.5 | -4.4 | -4.0 | -3.7 | -3.1 | -2.7 | $-2.3$ | -2.1 |
| $-6.0$ | -5.6 | -5.3 | -5.0 | -4.9 | -4.6 | $-4.2$ | -4.0 | $-3.7$ | $-3.3$ | $-2.8$ | $-2.4$ | $-2.3$ | $-2.3$ |
| -5.4 | $-4.9$ | -4.5 | -4.5 | -4.4 | -4.1 | $-3.8$ | $-3.6$ | $-3.4$ | $-3.0$ | -2.6 | $-2.4$ | $-2.4$ | $-2.5$ |
| -5.5 | -4.8 | -4.4 | -4.2 | -4.0 | $-3.7$ | $-3.5$ | $-3.3$ | $-3.1$ | $-2.9$ | -2.6 | $-2.6$ | $-2.7$ | $-2.9$ |
| -6.0 | -4.9 | -4.4 | -4.0 | $-3.8$ | -3.5 | $-3.3$ | $-3.2$ | -3.1 | $-3.0$ | -3.0 | -3.1 | $-3.3$ | -3.7 |
| $-6.0$ | $-4.8$ | -4.1 | $-3.7$ | $-3.5$ | $-3.3$ | $-3.1$ | $-3.0$ | $-3.0$ | $-3.0$ | -3.1 | $-3.4$ | $-3.7$ | -4.0 |
| -5.6 | -4.5 | $-3.9$ | $-3.6$ | $-3.4$ | $-3.2$ | $-3.1$ | -3.1 | $-3.1$ | $-3.1$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.3 |
| -5.3 | -4.4 | $-3.7$ | $-3.4$ | $-3.2$ | $-3.1$ | $-3.1$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.8$ | $-4.1$ | -4.6 |
| -5.5 | -4.3 | $-3.7$ | $-3.3$ | $-3.1$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.7$ | $-4.1$ | $-4.5$ | -5.1 |
| -5.3 | -4.2 | $-3.6$ | $-3.3$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.8$ | -4.0 | -4.4 | -4.7 | -5.2 |
| -4.6 | $-3.6$ | $-3.0$ | $-3.0$ | $-3.2$ | $-3.2$ | $-3.4$ | $-3.5$ | $-3.6$ | $-3.9$ | -4.2 | $-4.5$ | $-4.9$ | -5.2 |
| $-3.6$ | $-2.7$ | $-2.5$ | $-3.1$ | $-3.4$ | $-3.6$ | $-3.8$ | $-3.8$ | $-4.0$ | $-4.2$ | -4.6 | $-4.7$ | -5.2 | -6.0 |
| $-2.4$ | -2.1 | -2.5 | -3.7 | -4.0 | -4.2 | -4.4 | -4.5 | -4.6 | -4.8 | -5.1 | -5.2 | -5.9 | -5.6 |
| -1.4 | $-2.3$ | $-3.4$ | -4.8 | -5.3 | -5.2 | -5.2 | -5.4 | -5.5 | -5.4 | -5.6 | -5.8 | -6.0 | -6.0 |
| $0, A^{\prime}$ | $(0)^{\prime}$ | $, 161$ | $, 20^{1}$ | (4) | $8)^{1}$ |  |  | $40{ }^{1}$ | $8{ }^{1}$ |  | $\left.{ }^{64}\right)^{\circ}$ | (12) | $1200^{\circ}$ |

Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.454$ for algorithm gorilla_003, giving $\operatorname{FMR}(T)=0.0001$ globally. og 10 FMR

| -6 |
| :--- |

$-5 \quad-4$


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=66.565$ for algorithm hik_001, giving $\operatorname{FMR}(T)=0.0001$ globally .
-6



Cross age FMR at threshold $\mathrm{T}=0.823$ for algorithm hr_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR


Cross age FMR at threshold $T=0.285$ for algorithm hr_002, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR



Cross age FMR at threshold $T=37645.000$ for algorithm id3_003, giving $\operatorname{FMR}(T)=0.0001$ globally. log10 FMR



Age of enrollee

Cross age FMR at threshold $T=37001.000$ for algorithm id3_004, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR



Cross age FMR at threshold $T=3664.380$ for algorithm idemia_003, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally .

-5

| (72,120] - | All impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | -6.0 | $-6.0$ | -6.0 | -6.0 | $-6.0$ | $-6.0$ | $-6.0$ | -5.9 | -5.7 | -5.0 | $-4.3$ | $-3.7$ | $-3.3$ | -3.1 |
| (64,72] - | -6.0 | -6.0 | $-6.0$ | -6.0 | $-6.0$ | $-6.0$ | $-5.7$ | -5.2 | -4.9 | -4.4 | $-3.8$ | $-3.5$ | $-3.2$ | $-3.2$ |
| $(56,64]$ - | -6.0 | -5.8 | -5.4 | -5.7 | -5.6 | -5.3 | -5.0 | -4.7 | -4.4 | -4.0 | -3.6 | -3.4 | -3.4 | -3.5 |
| $(48,56]$ - | -6.0 | -5.9 | -5.3 | -5.2 | $-5.1$ | -4.9 | $-4.6$ | -4.4 | -4.1 | $-3.9$ | $-3.7$ | $-3.7$ | $-3.8$ | -4.1 |
| $(40,48]$ - | $-6.0$ | -5.6 | -5.0 | $-4.8$ | $-4.7$ | -4.5 | -4.3 | -4.2 | -4.0 | $-3.9$ | $-4.0$ | -4.2 | -4.5 | -4.9 |
| $(36,40]$ - | -6.0 | -5.2 | $-4.6$ | -4.4 | -4.4 | -4.2 | -4.0 | -3.9 | $-3.9$ | $-3.9$ | -4.1 | -4.4 | -4.7 | -5.2 |
| $(32,36]$ - | $-6.0$ | -5.2 | -4.5 | $-4.3$ | $-4.2$ | -4.0 | -4.0 | $-4.0$ | $-3.9$ | -4.0 | $-4.3$ | -4.6 | -4.9 | -5.4 |
| $(28,32]$ - | -6.0 | -4.9 | -4.2 | -4.1 | -4.0 | -3.9 | -3.9 | -4.0 | -4.1 | -4.2 | -4.5 | -5.0 | -5.5 | -6.0 |
| $(24,28]$ - | $-6.0$ | $-4.8$ | -4.3 | -4.1 | $-3.9$ | $-3.8$ | -3.9 | -4.1 | -4.2 | -4.4 | $-4.7$ | -5.3 | -5.9 | -6.0 |
| $(20,24]$ - | -6.0 | -4.6 | $-4.0$ | -3.9 | -3.9 | -3.9 | -4.1 | -4.3 | -4.4 | $-4.6$ | -5.0 | -5.7 | -6.0 | -6.0 |
| $(16,20]$ - | -5.8 | $-3.8$ | $-3.3$ | -3.5 | $-3.7$ | $-3.8$ | -4.0 | -4.2 | -4.3 | -4.6 | -5.1 | -5.5 | $-6.0$ | -6.0 |
| $(10,16]$ - | -3.9 | $-2.9$ | $-2.7$ | $-3.6$ | $-3.9$ | -4.1 | -4.4 | -4.5 | -4.7 | $-5.0$ | -5.5 | -6.0 | -6.0 | -6.0 |
| $(04,10)$ - | $-2.7$ | $-2.2$ | $-2.7$ | -4.0 | -4.4 | -4.6 | -4.9 | -5.1 | -5.2 | -5.3 | -5.7 | $-6.0$ | $-6.0$ | -6.0 |
| $(0,4]$ - | -2.1 | -2.5 | $-3.7$ | -5.3 | -5.6 | -6.0 | -5.9 | -6.0 | -6.0 | -6.0 | $-6.0$ | -6.0 | -6.0 | $-6.0$ |
|  |  |  |  |  |  |  |  |  | $400^{1}$ |  |  |  |  | $.201$ |


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | $-6.0$ | $-6.0$ | -5.5 | $-6.0$ | -5.3 | -5.1 | $-4.9$ | $-4.8$ | -4.1 | $-3.3$ | $-2.8$ | $-2.4$ | $-2.3$ |
| $-6.0$ | $-6.0$ | $-5.3$ | $-6.0$ | -5.3 | -5.1 | $-4.8$ | $-4.3$ | $-4.0$ | $-3.5$ | $-2.9$ | $-2.6$ | $-2.3$ | $-2.4$ |
| $-6.0$ | -5.2 | -4.6 | -4.8 | -4.8 | -4.4 | -4.1 | $-3.8$ | $-3.5$ | $-3.2$ | -2.7 | -2.5 | $-2.5$ | -2.6 |
| $-6.0$ | -5.1 | -4.7 | -4.4 | -4.3 | $-4.0$ | $-3.6$ | $-3.4$ | $-3.2$ | $-3.0$ | $-2.8$ | $-2.8$ | $-2.9$ | $-3.2$ |
| -6.0 | -5.0 | -4.2 | -3.9 | $-3.8$ | -3.5 | -3.3 | $-3.2$ | -3.1 | $-3.0$ | -3.1 | -3.3 | -3.6 | -4.0 |
| -6.0 | -4.5 | -3.9 | -3.5 | -3.4 | -3.2 | -3.1 | $-3.0$ | -2.9 | $-3.0$ | -3.1 | $-3.5$ | $-3.8$ | -4.3 |
| -6.0 | $-4.6$ | $-3.7$ | $-3.4$ | $-3.2$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.7$ | $-3.9$ | -4.4 |
| $-6.0$ | -4.2 | $-3.4$ | $-3.2$ | -3.1 | $-2.9$ | $-2.9$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.5$ | -4.0 | -4.5 | -5.1 |
| -5.7 | -4.1 | $-3.5$ | $-3.2$ | $-3.0$ | $-2.8$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.4$ | $-3.8$ | -4.4 | -4.9 | $-5.5$ |
| -5.9 | -4.1 | $-3.3$ | -3.1 | -3.1 | $-3.0$ | $-3.2$ | $-3.4$ | $-3.5$ | $-3.8$ | -4.2 | $-4.8$ | -5.4 | -6.0 |
| $-5.2$ | $-3.2$ | $-2.6$ | $-2.7$ | $-2.8$ | $-2.9$ | -3.1 | $-3.3$ | $-3.4$ | $-3.7$ | -4.2 | -4.7 | -5.1 | $-5.5$ |
| -3.6 | $-2.4$ | $-2.2$ | $-2.9$ | -3.1 | $-3.3$ | $-3.6$ | $-3.8$ | $-3.9$ | -4.3 | -4.8 | -5.5 | -5.4 | $-6.0$ |
| $-2.3$ | -1.8 | -2.2 | -3.4 | -3.7 | -3.9 | -4.2 | -4.5 | -4.6 | -4.7 | -5.2 | -5.4 | -5.9 | -6.0 |
| -1.7 | $-2.1$ | -3.2 | $-4.6$ | -4.9 | -5.2 | -5.2 | $-5.8$ | -5.8 | -6.0 | -6.0 | -6.0 | -6.0 | -6.0 |
| $(0,4)^{\prime}$ |  |  |  |  |  |  |  |  | $8{ }^{81}$ |  | $\left.6^{4}\right)^{\circ}$ | ,2) | $.200^{\circ}$ |

Cross age FMR at threshold $T=3925.463$ for algorithm idemia_004, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=3764.961$ for algorithm idemia_005, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR

## -6

 $-5$


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.760$ for algorithm iit_000, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR
-6 -5


Cross age FMR at threshold $\mathrm{T}=0.691$ for algorithm iit_001, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR
-6 -5


Cross age FMR at threshold $T=0.926$ for algorithm imagus_000, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally. $\quad \log 10 \mathrm{FMR}$



Age of enrollee

Cross age FMR at threshold $T=1.375$ for algorithm imperial_000, giving $\operatorname{FMR}(T)=0.0001$ globally . log 10 FMR


Cross age FMR at threshold $T=1.358$ for algorithm imperial_002, giving $\operatorname{FMR}(T)=0.0001$ globally . log 10 FMR


Cross age FMR at threshold $T=1.427$ for algorithm incode_003, giving $\operatorname{FMR}(T)=0.0001$ globally. g10 FMR
 $\begin{array}{ll}-5 & -4\end{array}$ -3 $\begin{array}{ll}-2 & -1\end{array}$


Cross age FMR at threshold $T=1.398$ for algorithm incode_004, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR

$-5$
$-4$

| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | $-6.0$ | -6.0 | -5.5 | $-5.4$ | -4.9 | -4.5 | -4.5 | -4.2 | $-3.8$ | $-3.3$ | $-2.9$ | $-2.6$ | $-2.5$ |
| -5.3 | -5.4 | $-5.7$ | -5.0 | -5.1 | -4.8 | -4.4 | $-4.3$ | $-4.0$ | $-3.6$ | $-3.1$ | $-2.8$ | $-2.7$ | $-2.6$ |
| -5.7 | -5.7 | -5.1 | -4.8 | -4.8 | -4.5 | -4.1 | $-3.8$ | $-3.7$ | $-3.3$ | $-2.9$ | $-2.7$ | $-2.7$ | $-2.8$ |
| -5.2 | -5.1 | $-4.7$ | $-4.3$ | -4.2 | -3.9 | $-3.7$ | $-3.5$ | $-3.3$ | -3.1 | $-2.8$ | $-2.8$ | $-2.9$ | -3.1 |
| -5.1 | -4.9 | -4.6 | -4.0 | $-3.9$ | -3.6 | $-3.5$ | $-3.3$ | -3.2 | -3.2 | -3.1 | -3.2 | -3.5 | -3.9 |
| $-4.7$ | -4.5 | -4.2 | $-3.8$ | $-3.6$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.9$ | -4.2 |
| -4.7 | -4.3 | -4.0 | $-3.6$ | $-3.3$ | -3.2 | $-3.1$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.2 | -4.6 |
| -4.4 | -4.1 | $-3.7$ | $-3.3$ | $-3.1$ | $-3.0$ | $-3.0$ | -3.1 | -3.3 | $-3.4$ | $-3.6$ | $-4.0$ | -4.3 | $-4.6$ |
| -4.2 | $-3.8$ | $-3.6$ | $-3.2$ | $-3.0$ | $-2.9$ | $-3.0$ | $-3.2$ | $-3.3$ | $-3.6$ | $-3.9$ | -4.3 | $-4.8$ | -5.0 |
| -4.2 | $-3.7$ | $-3.3$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.1 | -4.5 | $-4.8$ | -5.0 |
| $-4.0$ | $-3.4$ | $-3.1$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.4$ | $-3.6$ | $-3.8$ | -4.1 | -4.6 | -4.7 | -5.1 | -5.1 |
| -3.1 | $-2.6$ | $-2.5$ | $-2.8$ | -3.1 | $-3.3$ | $-3.5$ | $-3.7$ | $-4.0$ | -4.3 | -4.9 | -5.2 | -5.4 | -5.3 |
| $-2.2$ | $-2.1$ | $-2.5$ | $-3.3$ | -3.6 | $-3.8$ | $-4.0$ | -4.2 | -4.4 | $-4.8$ | -5.1 | -5.5 | -5.9 | -6.0 |
| -1.3 | $-2.1$ | -3.1 | $-3.9$ | -4.1 | -4.1 | -4.3 | -4.4 | $-4.8$ | -5.1 | -5.3 | -5.2 | -5.2 | -5.2 |
| $\left.(0,)^{\prime}\right)^{\prime}$ |  |  |  | A) |  |  |  |  | 8) | 6) | 64) | , 21 | $200^{\prime}$ |

Age of enrollee

Cross age FMR at threshold $T=29.232$ for algorithm innovatrics_004, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR

$\square$ $-3$ $-2$


Cross age FMR at threshold $T=27.987$ for algorithm innovatrics_006, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


```
                -5
```

$-4$


Cross age FMR at threshold $\mathrm{T}=0.705$ for algorithm intellicloudai_001, giving $\operatorname{FMR}(T)=0.0001$ globally . log 10 FMR
-6 $-5 \quad-4$


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -6.0 | -6.0 | -6.0 | -6.0 | $-5.4$ | -5.0 | $-4.9$ | -4.6 | $-4.3$ | $-4.1$ | $-3.3$ | -2.9 | $-2.6$ | $-2.5$ |
| $-6.0$ | -5.9 | $-5.7$ | -5.0 | -5.0 | $-4.8$ | $-4.5$ | -4.2 | $-4.0$ | $-3.6$ | $-3.0$ | $-2.7$ | $-2.6$ | $-2.6$ |
| -5.8 | -5.5 | -5.1 | $-4.7$ | -4.5 | -4.3 | -4.1 | -3.9 | $-3.7$ | $-3.3$ | $-2.8$ | $-2.7$ | $-2.6$ | $-2.8$ |
| -6.0 | -5.5 | $-4.8$ | -4.4 | -4.2 | -4.0 | $-3.7$ | -3.5 | $-3.3$ | $-3.1$ | $-2.8$ | $-2.8$ | $-2.9$ | $-3.2$ |
| $-6.0$ | -5.0 | -4.4 | -4.0 | $-3.9$ | $-3.7$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.2$ | -3.4 | $-3.6$ | -4.1 |
| -5.5 | $-4.8$ | -4.1 | $-3.7$ | $-3.6$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.6$ | -4.0 | -4.2 |
| -5.3 | -4.6 | $-3.9$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.2$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.1 | -4.7 |
| -5.3 | -4.2 | $-3.6$ | $-3.3$ | $-3.2$ | $-3.2$ | -3.2 | $-3.2$ | $-3.3$ | $-3.4$ | $-3.7$ | -4.0 | -4.5 | -4.6 |
| -5.0 | -4.1 | $-3.6$ | $-3.3$ | $-3.2$ | -3.1 | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.9$ | -4.4 | -4.7 | -5.2 |
| -4.8 | $-3.9$ | $-3.4$ | $-3.2$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.6$ | $-3.8$ | -4.2 | -4.6 | -4.8 | -5.2 |
| -4.1 | $-3.3$ | $-2.8$ | $-2.8$ | $-3.0$ | -3.1 | $-3.3$ | $-3.4$ | $-3.6$ | $-3.9$ | -4.3 | -4.7 | -5.1 | -5.5 |
| -3.0 | $-2.4$ | $-2.3$ | $-2.9$ | $-3.2$ | $-3.4$ | $-3.6$ | $-3.8$ | -4.1 | $-4.4$ | -4.7 | -5.2 | -5.5 | -6.0 |
| $-2.1$ | -1.9 | $-2.2$ | $-3.4$ | $-3.7$ | $-3.9$ | -4.2 | -4.4 | -4.6 | $-4.8$ | -5.0 | -5.0 | $-6.0$ | -5.3 |
| -1.2 | $-2.0$ | $-3.0$ | -4.2 | -4.5 | $-4.8$ | -4.7 | $-4.8$ | -5.2 | -5.3 | -5.9 | -6.0 | -6.0 | -6.0 |
| $0,4)^{\top}$ | 10) | 6) | ,20 | (4) | $281$ | 2) | $361$ | AOD | 8) | 6) |  | ,2) | $1201$ |

Age of enrollee

Cross age FMR at threshold $T=0.300$ for algorithm intellifusion_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR

| -6 | -5 | -4 | -3 | -2 | -1 |
| :--- | :--- | :--- | :--- | :--- | :--- |



Cross age FMR at threshold $T=49.664$ for algorithm intellivision_001, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally $\log 10$ FMR

$\square$


Cross age FMR at threshold $T=44.160$ for algorithm intellivision_002, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
$\begin{array}{llllll}-6 & -5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=594.014$ for algorithm intelresearch_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR $\begin{array}{cccccc}-6 & -5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=1.389$ for algorithm intsysmsu_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR

$-5$
-4


Cross age FMR at threshold $\mathrm{T}=1.361$ for algorithm iqface_000, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
-6
-5 -4

| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -6.0 | -6.0 | -6.0 | -5.1 | -4.8 | $-4.5$ | $-4.6$ | -4.2 | $-3.7$ | $-3.2$ | $-2.8$ | $-2.5$ | $-2.4$ |
| $-6.0$ | $-6.0$ | -5.3 | -5.0 | $-4.7$ | -4.6 | $-4.3$ | $-4.0$ | $-3.9$ | $-3.4$ | $-2.9$ | $-2.6$ | $-2.5$ | $-2.5$ |
| $-6.0$ | -5.2 | -4.6 | -4.5 | -4.4 | -4.2 | $-3.9$ | $-3.7$ | $-3.5$ | $-3.1$ | $-2.7$ | $-2.6$ | $-2.5$ | $-2.7$ |
| $-6.0$ | -5.5 | -4.6 | -4.2 | -4.0 | $-3.7$ | $-3.5$ | $-3.4$ | $-3.2$ | $-3.0$ | $-2.7$ | $-2.7$ | $-2.8$ | $-3.0$ |
| $-6.0$ | -5.0 | -4.4 | $-3.9$ | -3.7 | -3.5 | $-3.3$ | $-3.2$ | $-3.1$ | $-3.0$ | $-3.0$ | -3.2 | -3.4 | $-3.7$ |
| -5.2 | -4.5 | -4.0 | $-3.6$ | $-3.5$ | $-3.3$ | $-3.1$ | $-3.0$ | $-3.0$ | -3.1 | $-3.2$ | $-3.4$ | $-3.8$ | -4.0 |
| -4.9 | $-4.3$ | -3.9 | $-3.4$ | $-3.3$ | -3.1 | $-3.0$ | $-3.0$ | $-3.0$ | -3.1 | $-3.3$ | $-3.6$ | -4.0 | -4.4 |
| $-4.8$ | -4.2 | $-3.6$ | $-3.3$ | -3.1 | $-3.0$ | $-3.0$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.5$ | $-3.8$ | -4.2 | -4.5 |
| -4.6 | -4.0 | $-3.5$ | $-3.2$ | -3.0 | $-3.0$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.5$ | $-3.7$ | -4.0 | -4.6 | -4.8 |
| -4.6 | $-3.8$ | $-3.3$ | $-3.0$ | -3.0 | $-3.0$ | $-3.1$ | $-3.3$ | -3.4 | $-3.7$ | $-3.9$ | -4.3 | -4.6 | -5.1 |
| $-4.3$ | $-3.3$ | $-2.9$ | $-2.9$ | $-3.0$ | -3.1 | $-3.2$ | $-3.4$ | $-3.6$ | $-3.9$ | -4.2 | -4.5 | -5.1 | -5.1 |
| $-3.1$ | $-2.5$ | $-2.4$ | $-2.9$ | -3.1 | $-3.3$ | $-3.5$ | $-3.7$ | -3.9 | -4.2 | -4.6 | -4.8 | -5.1 | -6.0 |
| $-2.2$ | $-2.0$ | $-2.4$ | $-3.4$ | $-3.7$ | $-3.9$ | -4.2 | $-4.3$ | -4.5 | $-4.8$ | -4.8 | -5.0 | -5.6 | $-6.0$ |
| -1.5 | $-2.1$ | -3.1 | -4.1 | -4.5 | -4.6 | -4.9 | -4.9 | -4.9 | -5.4 | -5.9 | -5.3 | $-6.0$ | -6.0 |
| $\left\langle A^{\prime}\right.$ |  |  |  |  |  |  |  |  | 81 | 6) | A) | $12)$ | $201$ |

Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.985$ for algorithm isap_001, giving $\operatorname{FMR}(T)=0.0001$ globally .
-6



Age of enrollee

Cross age FMR at threshold $T=23.498$ for algorithm isityou_000, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $\mathrm{T}=0.693$ for algorithm isystems_001, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold T $=0.690$ for algorithm isystems_002, giving $\operatorname{FMR}(T)=0.0001$ globally .
g $\begin{array}{llllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $\mathrm{T}=49.879$ for algorithm itmo_005, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
$-6$
-5 -4
$-3$
$-2$



Age of enrollee

Cross age FMR at threshold $T=49.789$ for algorithm itmo_006, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
 $\begin{array}{lllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $\mathrm{T}=1.301$ for algorithm kakao_001, giving $\operatorname{FMR}(T)=0.0001$ globally.
og 10 FMR
-6
-5 -4
$-3$


Cross age FMR at threshold $T=0.929$ for algorithm kakao_002, giving $\operatorname{FMR}(T)=0.0001$ globally
og10 FMR
$\mathrm{g}_{-6}$
$-5 \quad-4$
-3
$-2 \quad-1$


Cross age FMR at threshold $T=0.686$ for algorithm kedacom_000, giving $\operatorname{FMR}(T)=0.0001$ globally


Cross age FMR at threshold $\mathrm{T}=0.500$ for algorithm kneron_003, giving $\operatorname{FMR}(T)=0.0001$ globally . log 10 FMR
ng
$\begin{array}{llllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $\mathrm{T}=0.701$ for algorithm lookman_002, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR


Cross age FMR at threshold $T=0.733$ for algorithm lookman_004, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR


Cross age FMR at threshold $T=74.511$ for algorithm megvii_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $T=66.384$ for algorithm megvii_002, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.425$ for algorithm meiya_001, giving $\operatorname{FMR}(T)=0.0001$ globally. og 10 FMR
-6
-5 -4
$-3$


Cross age FMR at threshold $T=0.668$ for algorithm microfocus_001, giving $\operatorname{FMR}(T)=0.0001$ globally .


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -6.0 | $-6.0$ | -6.0 | -6.0 | -5.4 | -5.1 | -4.7 | -4.7 | -4.3 | -4.1 | -3.5 | -3.1 | -2.9 | $-2.8$ |
| -6.0 | -6.0 | $-5.3$ | -5.0 | -5.1 | $-4.7$ | -4.4 | $-4.2$ | $-3.8$ | $-3.5$ | -3.1 | $-2.8$ | $-2.7$ | $-2.8$ |
| -5.7 | -5.1 | -4.5 | -4.5 | -4.4 | -4.2 | -3.9 | $-3.7$ | $-3.5$ | $-3.2$ | $-2.9$ | $-2.8$ | $-2.8$ | $-3.0$ |
| -5.6 | -4.9 | -4.4 | -4.2 | -4.0 | $-3.8$ | -3.6 | $-3.4$ | $-3.3$ | -3.1 | $-2.9$ | $-2.9$ | -3.1 | -3.4 |
| -5.6 | -4.6 | -4.1 | $-3.9$ | -3.7 | $-3.4$ | $-3.3$ | $-3.2$ | -3.1 | $-3.0$ | -3.1 | $-3.3$ | -3.5 | -4.0 |
| -5.2 | -4.4 | -4.0 | -3.6 | $-3.4$ | $-3.2$ | -3.1 | -3.1 | -3.1 | -3.1 | $-3.2$ | -3.5 | -3.9 | -4.2 |
| -5.0 | -4.2 | $-3.7$ | $-3.5$ | $-3.2$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.0$ | $-3.1$ | $-3.3$ | $-3.6$ | -3.9 | $-4.3$ |
| $-4.6$ | -4.0 | $-3.6$ | $-3.4$ | $-3.0$ | $-2.8$ | $-2.8$ | $-3.0$ | -3.1 | $-3.2$ | $-3.4$ | $-3.8$ | -4.2 | $-4.8$ |
| $-4.8$ | -4.1 | $-3.6$ | $-3.3$ | -2.9 | $-2.8$ | $-2.9$ | -3.1 | $-3.2$ | $-3.3$ | $-3.6$ | -4.0 | -4.5 | -4.9 |
| $-4.9$ | -4.1 | $-3.6$ | $-3.4$ | $-3.2$ | $-3.1$ | $-3.2$ | $-3.4$ | $-3.5$ | $-3.6$ | $-3.9$ | -4.3 | -4.8 | -5.7 |
| $-4.3$ | $-3.6$ | $-3.2$ | $-3.1$ | -3.2 | $-3.2$ | $-3.3$ | $-3.4$ | $-3.5$ | $-3.7$ | -4.0 | -4.4 | -4.9 | $-6.0$ |
| -3.6 | $-2.9$ | $-2.9$ | -3.2 | -3.4 | -3.5 | $-3.7$ | $-3.8$ | -4.0 | -4.2 | $-4.8$ | -5.1 | -5.8 | -6.0 |
| $-2.6$ | $-2.5$ | $-2.9$ | $-3.8$ | $-3.9$ | -4.0 | -4.2 | $-4.3$ | -4.3 | -4.5 | -4.8 | -5.1 | $-5.6$ | -5.6 |
| -1.4 | $-2.5$ | $-3.5$ | -4.3 | -4.6 | -4.4 | $-4.8$ | -5.2 | -5.2 | -5.2 | -5.3 | -5.8 | -6.0 | -5.2 |
| $A^{\prime}$ |  |  |  |  |  | ,21 |  | 4, 01 | 81 |  |  | ( | $.200^{\prime}$ |

Age of enrollee

Cross age FMR at threshold $T=0.602$ for algorithm microfocus_002, giving $\operatorname{FMR}(T)=0.0001$ globally .


Cross age FMR at threshold $\mathrm{T}=1.394$ for algorithm mt_000, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally. $\quad \log 10 \mathrm{FMR}$


Cross age FMR at threshold $T=46.101$ for algorithm neurotechnology_005, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR
${ }_{-6}$ $\begin{array}{lllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=2044.000$ for algorithm neurotechnology_006, giving $\operatorname{MR}(\mathrm{T})=0.0001$ globally . $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $T=1.000$ for algorithm nodeflux_001, giving
$\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR


Age of enrollee

Cross age FMR at threshold $T=0.455$ for algorithm nodeflux_002, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR



Cross age FMR at threshold $T=1.997$ for algorithm ntechlab_006, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=1.416$ for algorithm ntechlab_007, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR


Cross age FMR at threshold $\mathrm{T}=0.428$ for algorithm pixelall_002, giving $\operatorname{FMR}(T)=0.0001$ globally .
-6 $-5 \quad-4$ -3 $-2$


Cross age FMR at threshold $T=0.353$ for algorithm psi_002, giving $\operatorname{FMR}(T)=0.0001$ globally . log 10 FMR
-$\begin{array}{lllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=0.668$ for algorithm psi_003, giving $\operatorname{FMR}(T)=0.0001$ globally . log 10 FMR
-$\begin{array}{lllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $\mathrm{T}=0.779$ for algorithm rankone_006, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . log 10 FMR
$\square$
-6




Age of enrollee

Cross age FMR at threshold $T=0.661$ for algorithm rankone_007, giving $\operatorname{FMR}(T)=0.0001$ globally log 10 FMR
-6 $\begin{array}{llllll}-5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=0.883$ for algorithm realnetworks_002, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
-6

| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -5.5 | -5.1 | $-6.0$ | -6.0 | -5.4 | -5.1 | -4.6 | -4.6 | -4.3 | -4.0 | $-3.3$ | $-2.8$ | -2.4 | -2.2 |
| -5.4 | -5.0 | -5.7 | -5.5 | -5.0 | $-4.8$ | $-4.4$ | $-4.3$ | $-4.0$ | -3.5 | $-3.0$ | $-2.7$ | $-2.5$ | $-2.5$ |
| $-5.3$ | -5.1 | -4.9 | -4.5 | -4.6 | -4.3 | $-4.0$ | $-3.7$ | $-3.5$ | -3.1 | $-2.8$ | $-2.6$ | $-2.6$ | $-2.8$ |
| -5.5 | -5.0 | $-4.7$ | -4.3 | -4.2 | $-3.8$ | $-3.5$ | $-3.3$ | $-3.1$ | $-2.9$ | $-2.7$ | $-2.8$ | $-2.9$ | $-3.3$ |
| -5.6 | -4.9 | $-4.4$ | $-3.9$ | $-3.6$ | $-3.3$ | $-3.1$ | $-3.0$ | $-2.8$ | $-2.8$ | -2.9 | -3.1 | -3.5 | -4.0 |
| -5.1 | -4.9 | -4.2 | $-3.6$ | $-3.3$ | $-3.0$ | $-2.9$ | $-2.8$ | $-2.8$ | $-2.8$ | $-3.1$ | $-3.5$ | -4.0 | -4.4 |
| -5.5 | -4.6 | $-4.0$ | $-3.3$ | $-3.1$ | $-2.9$ | $-2.8$ | $-2.7$ | $-2.8$ | $-2.9$ | $-3.3$ | -3.7 | -4.1 | -4.6 |
| -5.3 | -4.6 | $-3.8$ | $-3.2$ | $-2.9$ | $-2.8$ | $-2.7$ | $-2.8$ | $-2.9$ | $-3.1$ | -3.5 | -4.0 | -4.4 | -4.8 |
| -5.5 | -4.5 | $-3.7$ | $-3.0$ | $-2.8$ | $-2.7$ | $-2.8$ | $-2.9$ | $-3.1$ | $-3.3$ | $-3.8$ | $-4.2$ | $-4.7$ | -5.1 |
| $-5.8$ | -4.5 | $-3.5$ | $-2.9$ | $-2.8$ | $-2.9$ | $-3.0$ | $-3.2$ | $-3.4$ | $-3.7$ | -4.1 | -4.5 | -5.2 | -5.3 |
| $-5.3$ | -4.1 | $-3.0$ | $-2.6$ | $-2.8$ | $-2.9$ | $-3.1$ | $-3.3$ | $-3.5$ | $-3.9$ | $-4.3$ | -4.6 | -5.0 | $-5.8$ |
| -4.7 | $-3.2$ | $-2.6$ | $-3.0$ | $-3.3$ | $-3.5$ | $-3.8$ | $-4.0$ | -4.2 | -4.5 | $-4.9$ | -5.3 | -5.4 | -6.0 |
| $-3.5$ | $-2.8$ | -3.1 | -4.1 | -4.4 | $-4.5$ | $-4.6$ | $-4.8$ | $-4.8$ | -5.1 | -5.4 | -5.2 | -5.4 | -5.3 |
| $-2.8$ | -3.4 | -4.5 | -5.2 | -5.6 | -5.2 | -5.2 | -5.4 | -5.5 | -5.3 | -5.9 | -6.0 | -5.2 | -6.0 |
| $\left.0_{4},\right)^{\prime}$ | 0) | $, 161$ | $, 201$ | A) | 28) | $2{ }^{1}$ |  | $401^{1}$ | $8{ }^{1}$ | 6) | 4) | 127 | $120^{\circ}$ |

Age of enrollee

Cross age FMR at threshold $T=0.886$ for algorithm realnetworks_003, giving $\operatorname{FMR}(T)=0.0001$ globally .


All impostor pairs



Age of enrollee

Cross age FMR at threshold $T=70.373$ for algorithm remarkai_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=70.384$ for algorithm remarkai_001, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR



Cross age FMR at threshold $T=0.663$ for algorithm rokid_000, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally.


Cross age FMR at threshold $\mathrm{T}=0.682$ for algorithm saffe_001, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally .


Cross age FMR at threshold $T=0.383$ for algorithm saffe_002, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold T $=0.390$ for algorithm sensetime_001, giving $\operatorname{FMR}(T)=0.0001$ globally .



Age of enrollee

Cross age FMR at threshold $T=0.390$ for algorithm sensetime_002, giving $\operatorname{FMR}(T)=0.0001$ globally .



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.713$ for algorithm sertis_000, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
-6
$-5 \quad-4$


Cross age FMR at threshold $T=0.970$ for algorithm shaman_000, giving
$\operatorname{FMR}(\mathrm{T})=0.0001$ globally . log 10 FMR

All impostor pairs


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.725$ for algorithm shaman_001, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.400$ for algorithm shu $\quad 001$, giving $\operatorname{MR}(T)=0.0001$ globally .
-6
$\begin{array}{lllll}-5 & -4 & -3 & -2\end{array}$


Cross age FMR at threshold $\mathrm{T}=0.390$ for algorithm siat_002, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . $\log 10$ FMR
-6



Cross age FMR at threshold $\mathrm{T}=0.393$ for algorithm siat_004, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . $\log 10$ FMR
-6



Cross age FMR at threshold $T=1.206$ for algorithm sjtu_001, giving $\operatorname{FMR}(T)=0.0001$ globally .



Cross age FMR at threshold $T=0.598$ for algorithm smilart_002, giving $\operatorname{FMR}(T)=0.0001$ globally . og 10 FMR
$\square$
-6 -5


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.654$ for algorithm smilart_003, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR


All impostor pairs



Cross age FMR at threshold $T=0.314$ for algorithm starhybrid_001, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally .


Cross age FMR at threshold $T=0.221$ for algorithm synesis_004, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
-6 $\begin{array}{ll}-5 & -4\end{array}$


Cross age FMR at threshold $T=0.356$ for algorithm synesis_005, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally . $\log 10$ FMR
$-6$ $\begin{array}{ll}-5 & -4\end{array}$



Age of enrollee

Cross age FMR at threshold $T=147.661$ for algorithm tech5_002, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=147.080$ for algorithm tech5_003, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=0.896$ for algorithm tevian_004, giving $\operatorname{FMR}(T)=0.0001$ globally.
og 10 FMR



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.854$ for algorithm tevian_005, giving $\operatorname{FMR}(T)=0.0001$ globally. og 10 FMR


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -4.9 | -4.7 | -4.5 | -5.0 | -4.6 | -4.0 | $-3.9$ | -3.6 | $-3.2$ | $-2.8$ | $-2.4$ | $-2.0$ | -1.7 | -1.6 |
| -4.9 | -4.3 | -4.4 | -4.4 | -4.2 | -3.9 | -3.6 | -3.2 | $-3.0$ | $-2.6$ | $-2.2$ | -1.9 | -1.7 | $-1.7$ |
| $-4.8$ | -4.4 | $-4.3$ | -4.4 | -4.2 | -3.9 | -3.6 | -3.2 | -2.9 | $-2.5$ | $-2.2$ | $-2.0$ | -1.9 | -1.9 |
| -4.8 | -4.4 | -4.2 | -4.3 | -4.1 | $-3.7$ | $-3.4$ | -3.1 | $-2.8$ | -2.5 | $-2.3$ | $-2.3$ | $-2.3$ | $-2.4$ |
| -5.1 | -4.3 | -4.2 | -4.1 | $-3.9$ | $-3.6$ | $-3.2$ | $-3.0$ | $-2.8$ | $-2.6$ | $-2.6$ | $-2.7$ | $-2.8$ | $-2.9$ |
| -4.8 | $-4.3$ | -4.1 | $-3.9$ | $-3.7$ | $-3.4$ | $-3.1$ | $-3.0$ | $-2.8$ | $-2.7$ | $-2.8$ | $-2.9$ | $-3.0$ | $-3.2$ |
| -4.9 | -4.2 | $-4.0$ | $-3.8$ | $-3.6$ | $-3.4$ | $-3.2$ | $-3.0$ | $-2.9$ | $-2.9$ | $-3.0$ | $-3.2$ | $-3.3$ | $-3.5$ |
| -4.9 | -4.2 | $-3.9$ | $-3.7$ | $-3.6$ | $-3.4$ | $-3.3$ | $-3.3$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.7$ | $-3.9$ |
| -4.9 | -4.1 | $-3.9$ | $-3.6$ | $-3.5$ | $-3.5$ | $-3.4$ | $-3.4$ | $-3.4$ | $-3.6$ | $-3.8$ | -4.0 | -4.1 | $-4.3$ |
| -4.7 | -4.1 | $-3.8$ | $-3.6$ | $-3.6$ | $-3.5$ | $-3.6$ | $-3.7$ | $-3.7$ | $-3.9$ | -4.1 | -4.2 | -4.2 | -4.5 |
| -4.4 | $-3.6$ | $-3.3$ | $-3.4$ | $-3.4$ | $-3.5$ | $-3.6$ | $-3.8$ | $-3.8$ | $-3.9$ | -4.1 | $-4.3$ | -4.5 | -4.5 |
| $-3.8$ | $-3.0$ | $-2.8$ | $-3.5$ | $-3.7$ | $-3.8$ | $-4.0$ | $-4.1$ | $-4.2$ | $-4.3$ | -4.5 | -4.4 | -4.5 | -4.6 |
| -3.2 | $-2.7$ | $-2.8$ | $-3.8$ | -4.0 | $-4.0$ | -4.1 | -4.1 | -4.1 | -4.1 | -4.1 | -4.2 | -4.1 | -4.2 |
| $-2.8$ | $-3.2$ | $-3.8$ | $-4.6$ | $-4.8$ | -4.5 | $-4.7$ | $-4.6$ | $-4.8$ | $-4.8$ | -5.0 | -4.9 | -4.7 | -4.5 |
| $(0,)^{\prime}$ | (0) | $\left.6\right\|^{1}$ | $201$ | A) | 8) | $21$ | $361$ | + | $x_{8} 1^{1}$ |  |  |  | $200^{\prime}$ |

Age of enrollee

Cross age FMR at threshold $\mathrm{T}=151.011$ for algorithm tiger_002, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR
-6 -5 -4 $-3$

Same sex and same region impostor pairs


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=149.313$ for algorithm tiger_003, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
${ }_{-6}$ $-5 \quad-4$


Age of enrollee

Cross age FMR at threshold $T=43.677$ for algorithm tongyi_005, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
 $-5 \quad-4$ $-3$ $-2$


Cross age FMR at threshold $T=0.628$ for algorithm toshiba_002, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally. $\quad \log 10 \mathrm{FMR}$



Cross age FMR at threshold $\mathrm{T}=0.626$ for algorithm toshiba_003, giving $\operatorname{FMR}(T)=0.0001$ globally. $\quad \log 10$ FMR


| Same sex and same region impostor pairs |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $-6.0$ | -6.0 | -6.0 | -6.0 | -6.0 | -5.7 | -5.7 | -5.6 | -4.5 | -4.4 | $-3.5$ | $-3.1$ | $-2.7$ | -2.5 |
| $-6.0$ | $-6.0$ | -5.7 | -5.7 | -5.3 | -5.1 | $-4.7$ | -4.5 | -4.4 | $-3.8$ | $-3.2$ | $-2.9$ | $-2.7$ | $-2.7$ |
| -6.0 | -6.0 | -5.7 | -4.9 | -4.9 | -4.7 | $-4.3$ | -4.1 | -3.9 | $-3.5$ | $-3.0$ | $-2.8$ | $-2.7$ | -2.9 |
| $-6.0$ | -5.7 | -5.1 | -4.6 | -4.4 | -4.1 | $-3.9$ | -3.7 | $-3.5$ | $-3.2$ | $-2.9$ | $-2.9$ | $-3.1$ | $-3.3$ |
| $-6.0$ | -5.5 | -4.8 | -4.2 | -4.0 | $-3.8$ | $-3.6$ | $-3.5$ | $-3.4$ | $-3.3$ | $-3.3$ | $-3.4$ | $-3.7$ | -4.2 |
| -5.9 | -5.0 | -4.4 | -4.0 | $-3.8$ | $-3.6$ | $-3.4$ | $-3.4$ | $-3.3$ | $-3.4$ | $-3.5$ | $-3.8$ | -4.2 | -4.4 |
| -5.9 | -4.7 | $-4.3$ | $-3.7$ | $-3.6$ | $-3.4$ | $-3.3$ | $-3.3$ | $-3.3$ | $-3.5$ | $-3.6$ | $-4.0$ | $-4.5$ | -5.0 |
| -5.1 | -4.5 | $-3.9$ | $-3.5$ | $-3.3$ | -3.2 | $-3.3$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.8$ | $-4.3$ | -4.6 | -5.0 |
| -5.2 | -4.4 | $-3.8$ | -3.4 | $-3.3$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.6$ | $-3.8$ | $-4.1$ | $-4.5$ | -5.0 | $-5.5$ |
| $-4.9$ | -4.1 | $-3.6$ | $-3.2$ | $-3.2$ | $-3.3$ | $-3.4$ | $-3.5$ | $-3.7$ | -4.0 | $-4.3$ | -4.7 | -5.1 | $-5.5$ |
| -4.4 | $-3.5$ | $-3.0$ | $-3.1$ | $-3.2$ | $-3.3$ | $-3.5$ | $-3.7$ | $-3.9$ | -4.2 | $-4.6$ | $-4.9$ | $-6.0$ | $-5.8$ |
| $-3.1$ | $-2.4$ | $-2.4$ | $-3.1$ | $-3.3$ | -3.5 | $-3.8$ | -4.0 | -4.3 | -4.6 | -5.1 | -5.3 | -5.5 | $-6.0$ |
| $-2.0$ | -1.8 | $-2.3$ | $-3.6$ | $-3.9$ | -4.2 | -4.5 | -4.7 | -5.2 | -5.2 | -5.6 | -6.0 | -5.9 | $-6.0$ |
| -1.1 | $-2.0$ | -3.1 | -4.5 | -5.0 | -4.9 | -5.2 | -5.2 | -5.2 | $-6.0$ | -6.0 | -5.5 | -6.0 | -6.0 |
| $(0,4)^{1}$ |  |  |  |  |  |  |  |  |  |  |  | 12) |  |

Cross age FMR at threshold $T=0.368$ for algorithm trueface_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR


Cross age FMR at threshold $T=0.151$ for algorithm ulsee_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
-6 $-5$ $-4$


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.771$ for algorithm uluface_002, giving $\operatorname{FMR}(T)=0.0001$ globally.

 $\begin{array}{ll}-5 & -4\end{array}$



Cross age FMR at threshold $T=0.482$ for algorithm upc_001, giving $\operatorname{MR}(T)=0.0001$ globally .

$\square$
$\square$


Age of enrollee

Cross age FMR at threshold $T=0.428$ for algorithm vcog_002, giving $\operatorname{FMR}(T)=0.0001$ globally .

## $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $T=71.529$ for algorithm vd_001, giving $\operatorname{FMR}(T)=0.0001$ globally

$\square$




Cross age FMR at threshold $T=3.325$ for algorithm veridas_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR
 $\begin{array}{llllll}-6 & -5 & -4 & -3 & -2 & -1\end{array}$


Cross age FMR at threshold $T=3.389$ for algorithm veridas_002, giving $\operatorname{FMR}(T)=0.0001$ globally. log 10 FMR

$\begin{array}{lll}-6 & -5 & -4\end{array}$

-2


Cross age FMR at threshold $T=2.859$ for algorithm via_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
 $\begin{array}{lllll}-5 & -4 & -3 & -2\end{array}$


Cross age FMR at threshold $\mathrm{T}=0.842$ for algorithm videonetics_001, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR


Cross age FMR at threshold $T=3.057$ for algorithm vigilantsolutions_006, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR




Age of enrollee

Cross age FMR at threshold $T=2.926$ for algorithm vigilantsolutions_007, giving $\operatorname{FMR}(T)=0.0001$ globally. $\log 10$ FMR

| -6 | -5 | -4 | -3 | -2 | -1 |
| :--- | :--- | :--- | :--- | :--- | :--- |



Cross age FMR at threshold $\mathrm{T}=0.432$ for algorithm vion_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
-6 $\square$ $-3$ $\square$


Cross age FMR at threshold $\mathrm{T}=0.433$ for algorithm visionbox_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR
$-6$ $\begin{array}{ll}-5 & -4\end{array}$


Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.382$ for algorithm visionbox_001, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR



Age of enrollee

Cross age FMR at threshold $\mathrm{T}=0.669$ for algorithm visionlabs_006, giving $F M R(T)=0.0001$ globally. $\log 10$ FMR


Cross age FMR at threshold $\mathrm{T}=0.657$ for algorithm visionlabs_007, giving $F M R(T)=0.0001$ globally.


Cross age FMR at threshold $T=995.898$ for algorithm vocord_006, giving $\operatorname{FMR}(T)=0.0001$ globally .


Cross age FMR at threshold $\mathrm{T}=995.241$ for algorithm vocord_007, giving $\operatorname{FMR}(T)=0.0001$ globally $\square$ $-5$ $-4$


Cross age FMR at threshold $T=0.400$ for algorithm winsense_000, giving $\operatorname{FMR}(T)=0.0001$ globally $\log 10$ FMR

6 $-5$

$$
\begin{aligned}
& \text { Age of enrollee }
\end{aligned}
$$

Cross age FMR at threshold $\mathrm{T}=0.404$ for algorithm x-laboratory_000, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR

| -6 |
| :--- | $\begin{array}{llllll}-5 & -4 & -3 & -2 & -1\end{array}$



Cross age FMR at threshold $T=5.544$ for algorithm yisheng_004, giving $\operatorname{FMR}(\mathrm{T})=0.0001$ globally. $\quad \log 10 \mathrm{FMR}$



Age of enrollee

Cross age FMR at threshold $T=37.698$ for algorithm yitu_003, giving $\operatorname{FMR}(T)=0.0001$ globally . $\log 10$ FMR

$\begin{array}{llllll}-5 & -4 & -3 & -2 & -1\end{array}$


