A: Datasheet

Algorithm: cognitec_006

Developer: Cognitec Systems GmbH

Submission Date: 2022_02_10

Template size: 2052 bytes

Template time (2.5 percentile): 445 msec

Template time (median): 463 msec

Template time (97.5 percentile): 483 msec

Investigation:

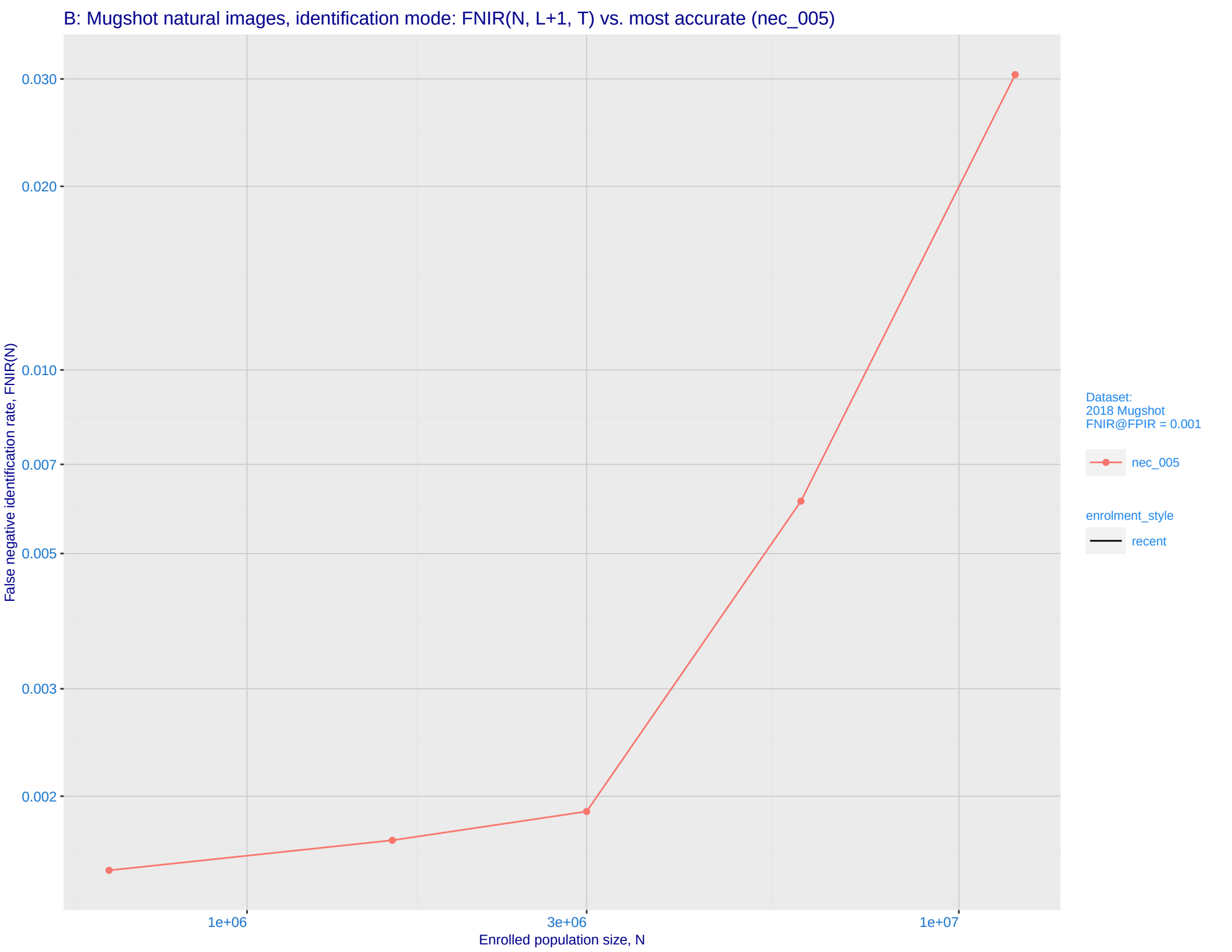
Immigration visa−border ranking 103 (out of 225) −− FNIR(1600000, 0, 1) = 0.0069 vs. lowest 0.0008 from sensetime_007

Immigration visa−kiosk ranking 85 (out of 222) −− FNIR(1600000, 0, 1) = 0.1111 vs. lowest 0.0487 from cubox_000

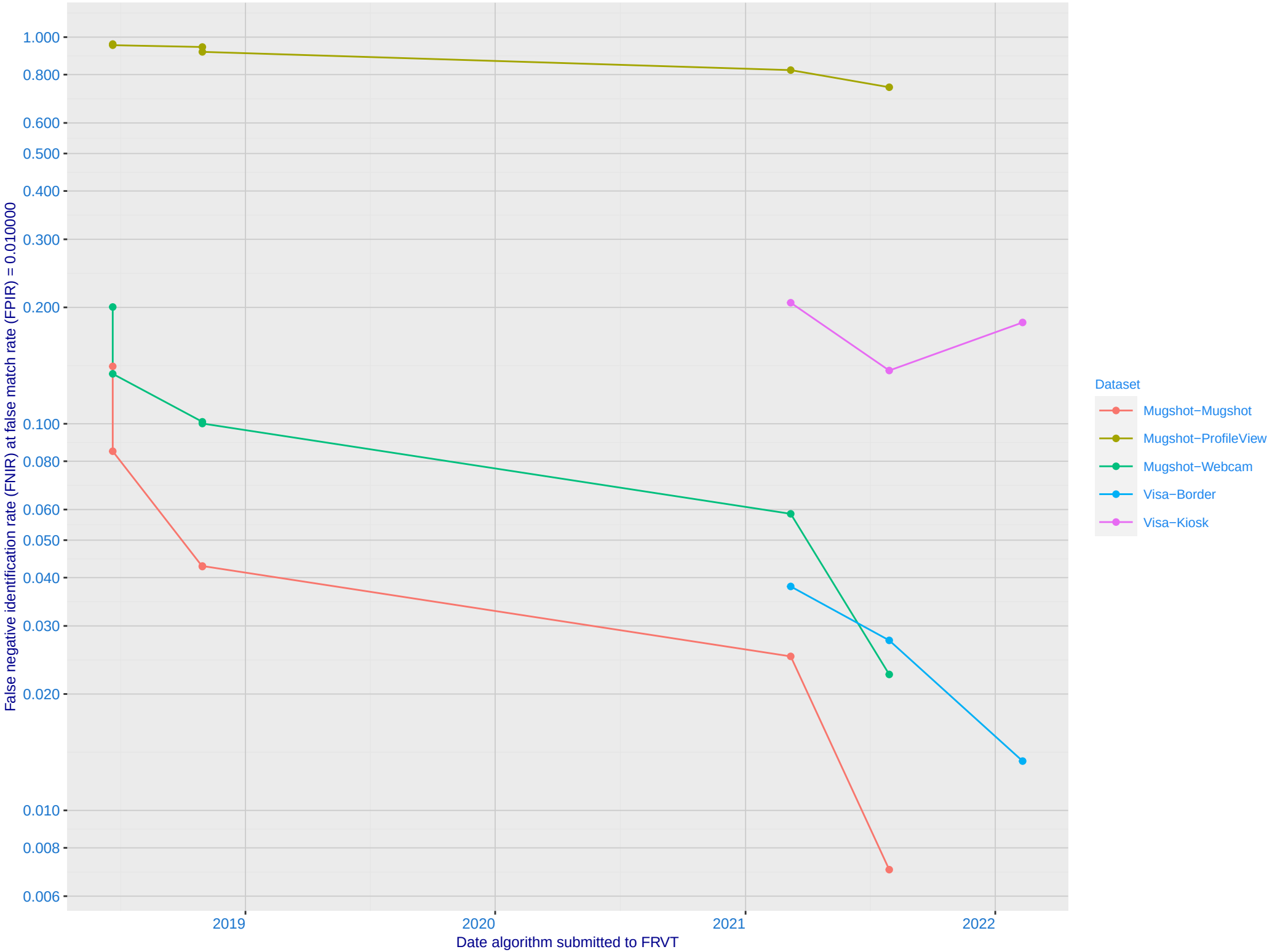
Identification:

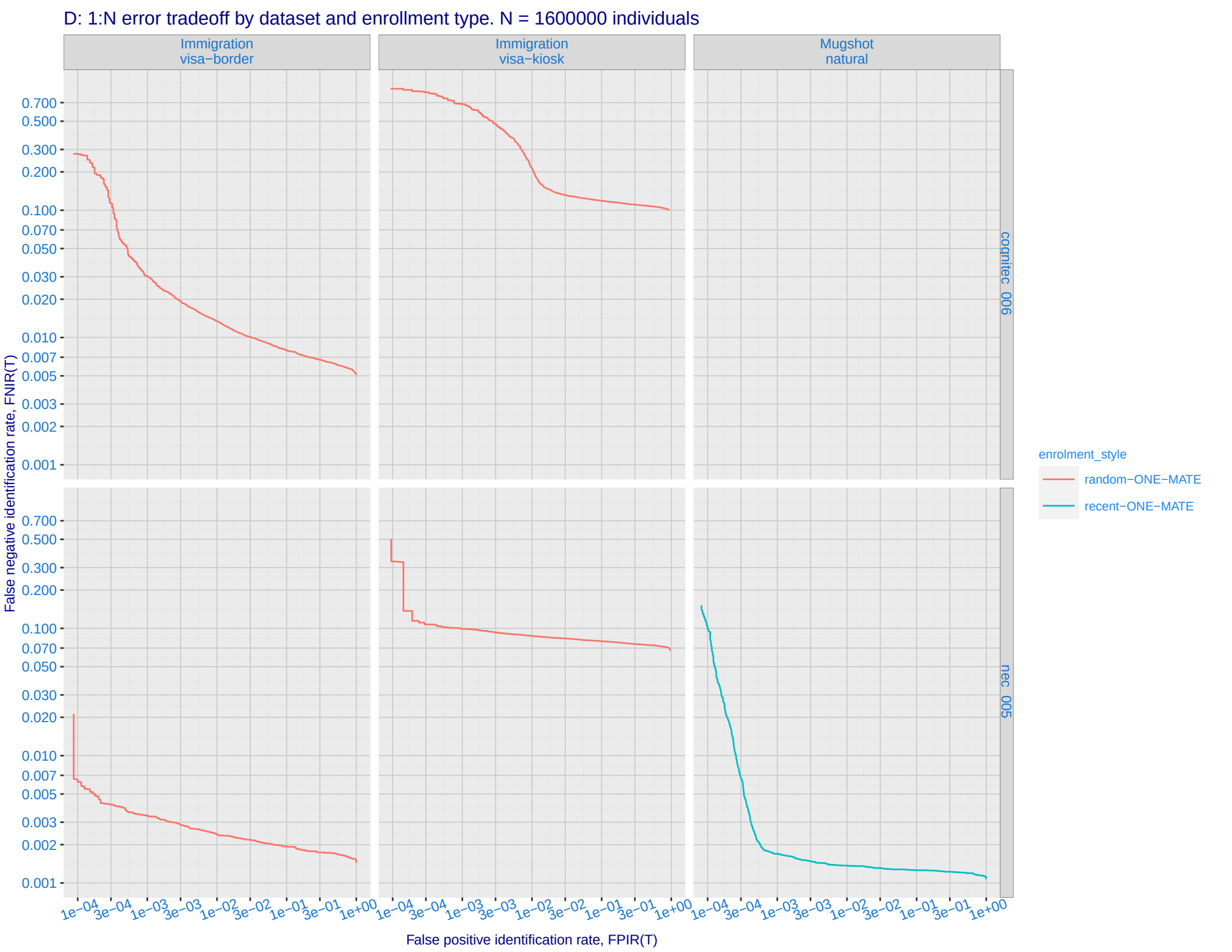
Immigration visa−border ranking 69 (out of 224) −− FNIR(1600000, T, L+1) = 0.0303, FPIR=0.001000 vs. lowest 0.0024 from cloudwalk_mt_000

Immigration visa−kiosk ranking 135 (out of 219) −− FNIR(1600000, T, L+1) = 0.6841, FPIR=0.001000 vs. lowest 0.0719 from cloudwalk_mt_000


B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (nec_005)
False negative identification rate, FNIR(N)
0.030
0.020
0.010
0.007
0.005
0.003
0.002
1e+06
3e+06
1e+07
Enrolled population size, N
Dataset:
2018 Mugshot
FNIR@FPIR = 0.001
nec_005
enrolment_style
recent

C: Evolution of accuracy for COGNITEC algorithms on three datasets 2018 − present

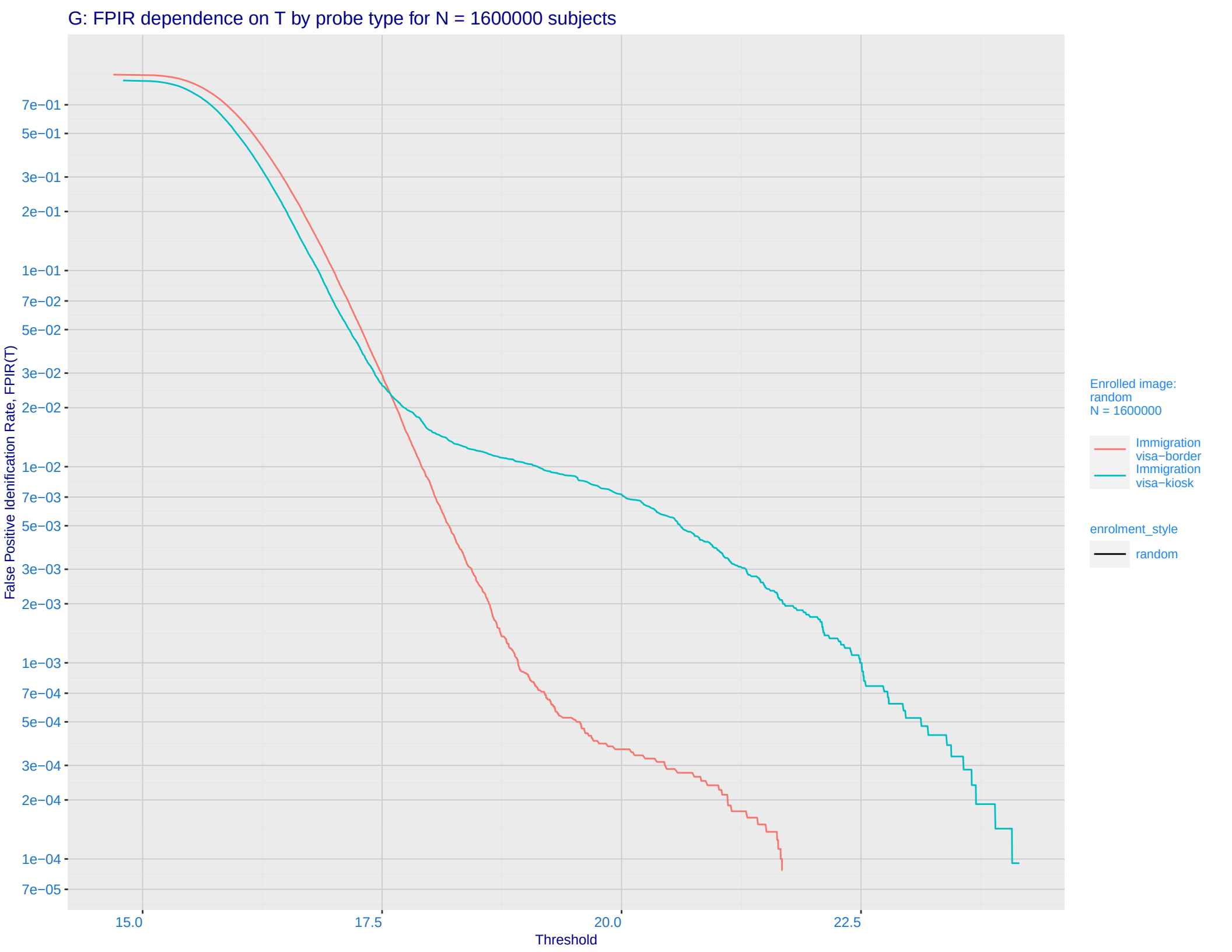


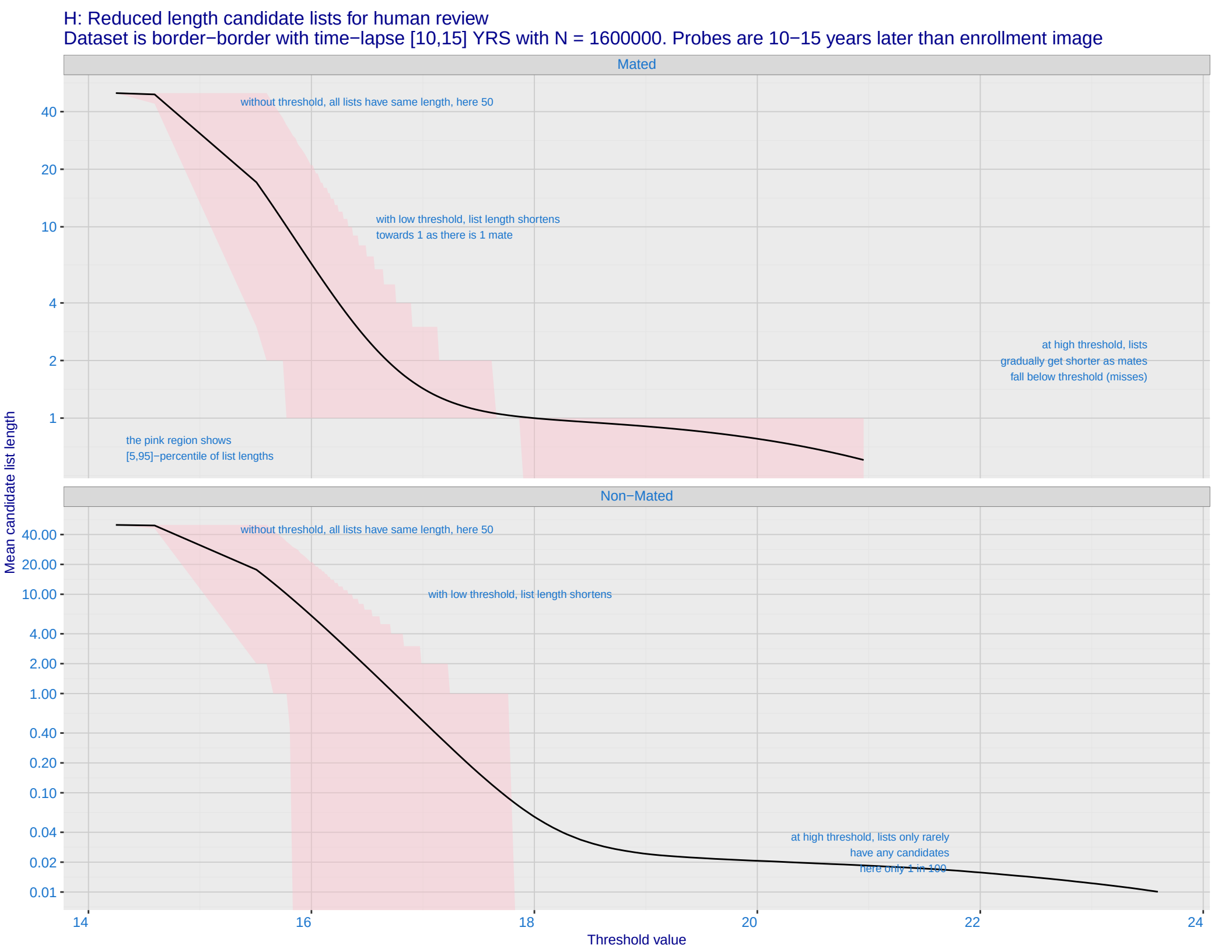

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
cognitec 006
nec 005
False negative identification rate, FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
1e+00
False positive identification rate, FPIR(T)
enrolment_style
random−ONE−MATE
recent−ONE−MATE

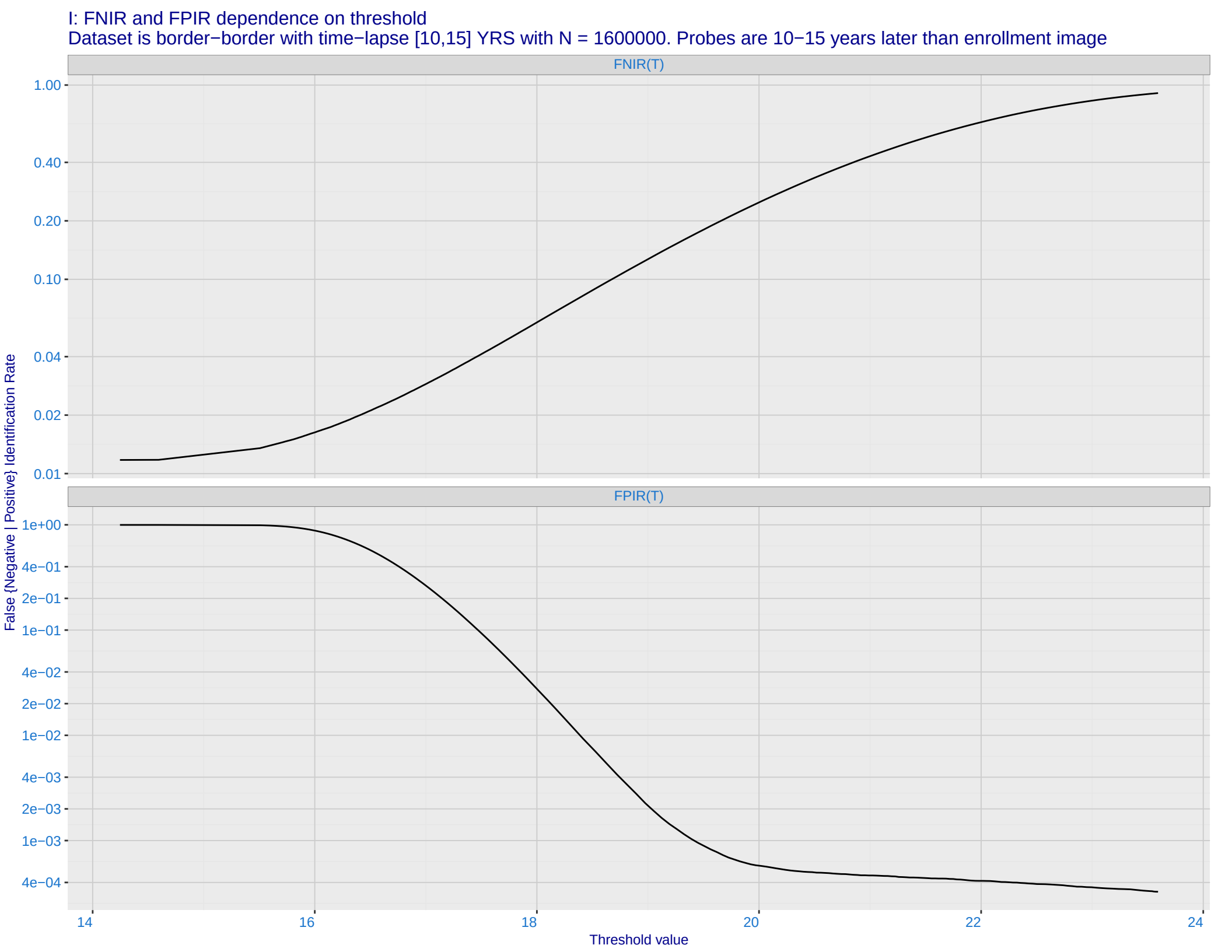
F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate

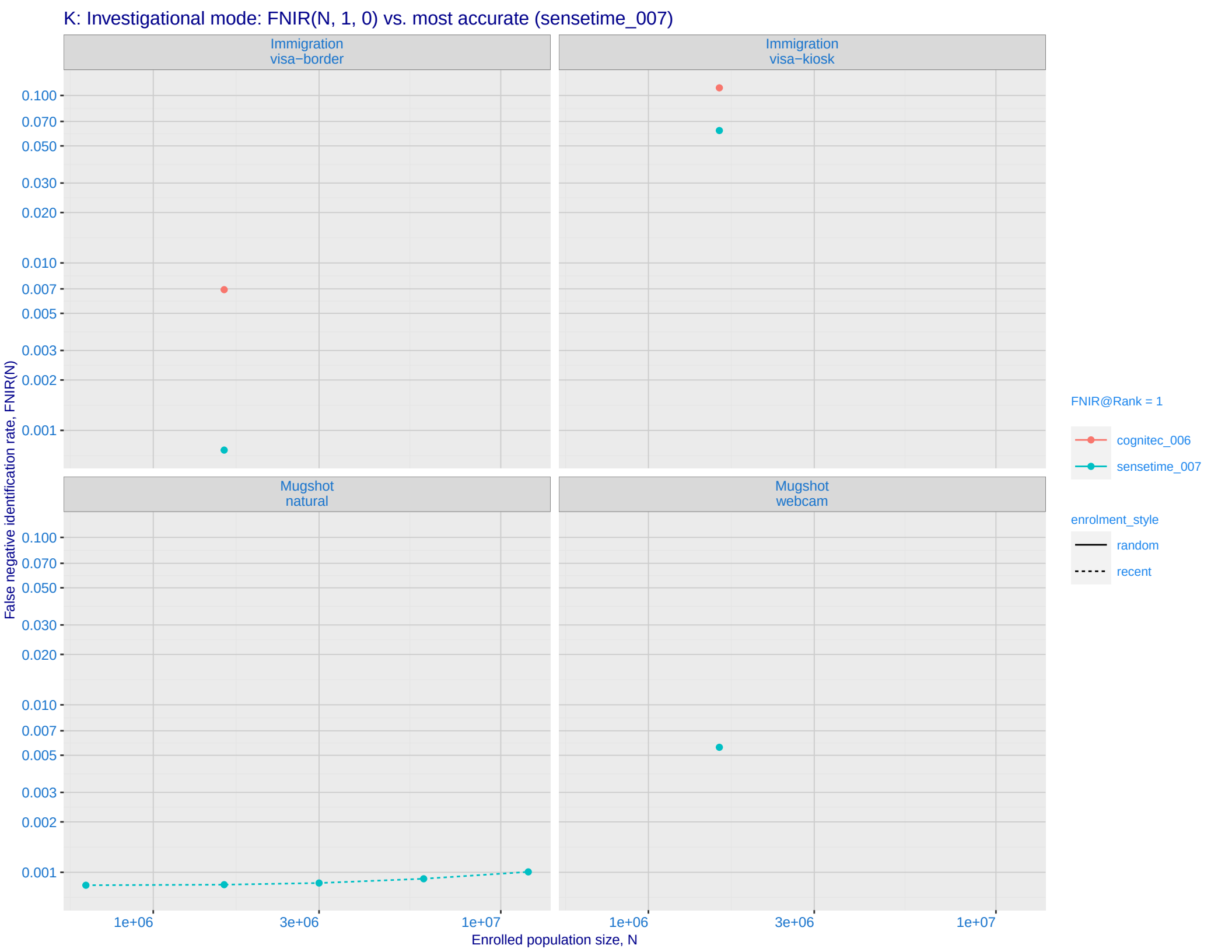
Selectivity, SEL(T)

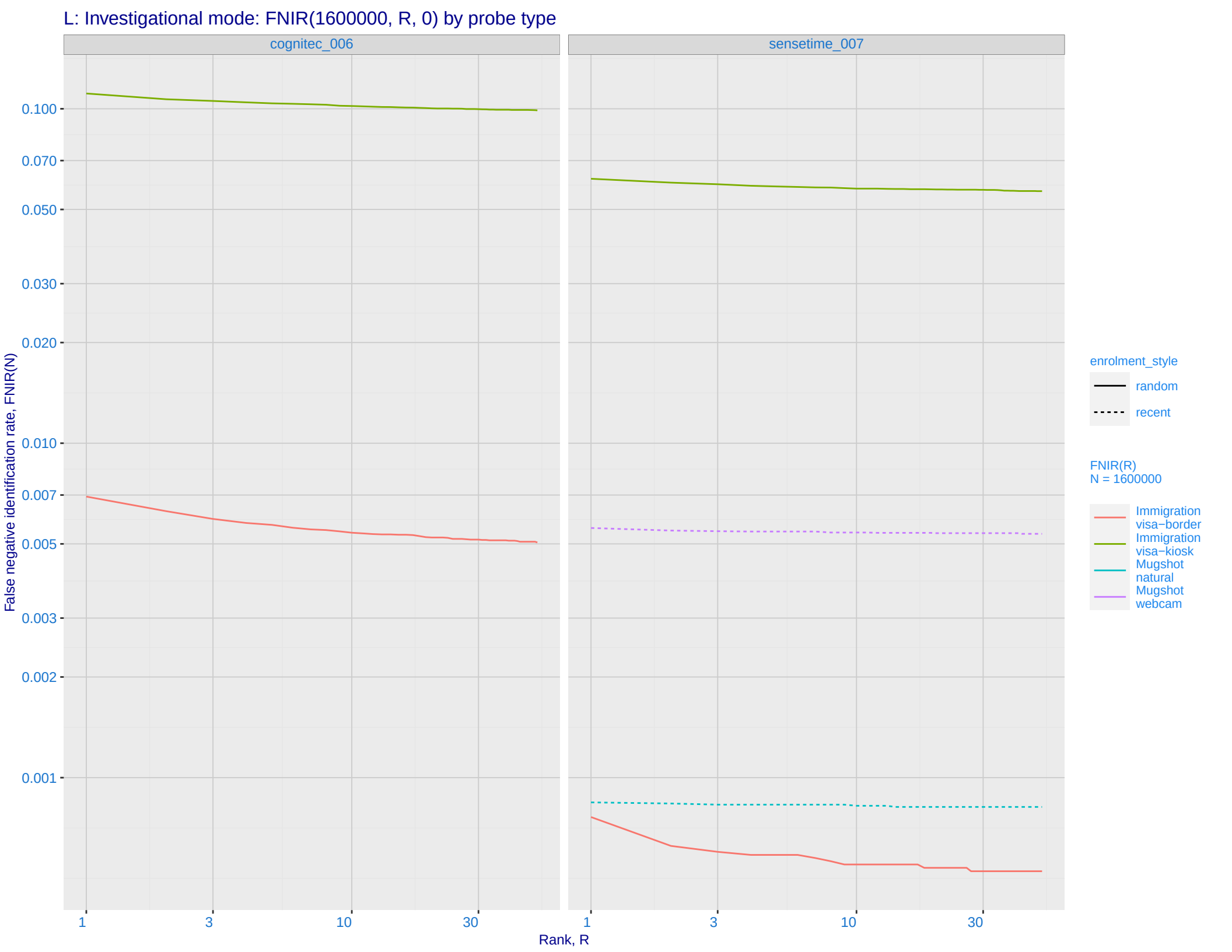
False Positive Idenification Rate, FPIR(T)


G: FPIR dependence on T by probe type for N = 1600000 subjects
False Positive Idenification Rate, FPIR(T)
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
15.0
17.5
20.0
22.5
Threshold
Enrolled image:
random
N = 1600000
Immigration
visa−border
Immigration
visa−kiosk
enrolment_style
random

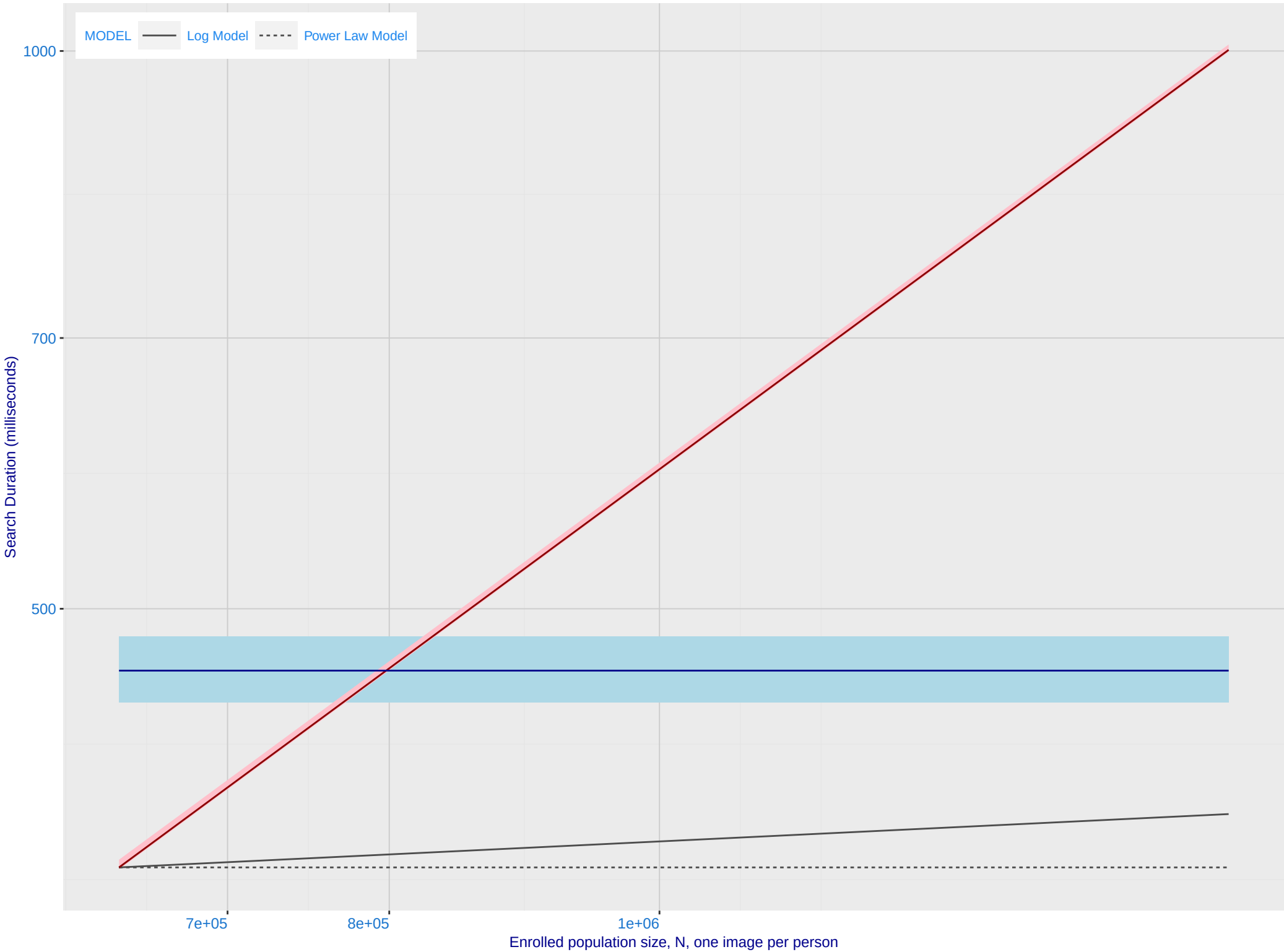

H: Reduced length candidate lists for human review
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image
Mated
without threshold, all lists have same length, here 50
with low threshold, list length shortens
towards 1 as there is 1 mate
at high threshold, lists
gradually get shorter as mates
fall below threshold (misses)
the pink region shows
[5,95]−percentile of list lengths
Non−Mated
without threshold, all lists have same length, here 50
with low threshold, list length shortens
at high threshold, lists only rarely
have any candidates
here only 1 in 100
Mean candidate list length
Threshold value

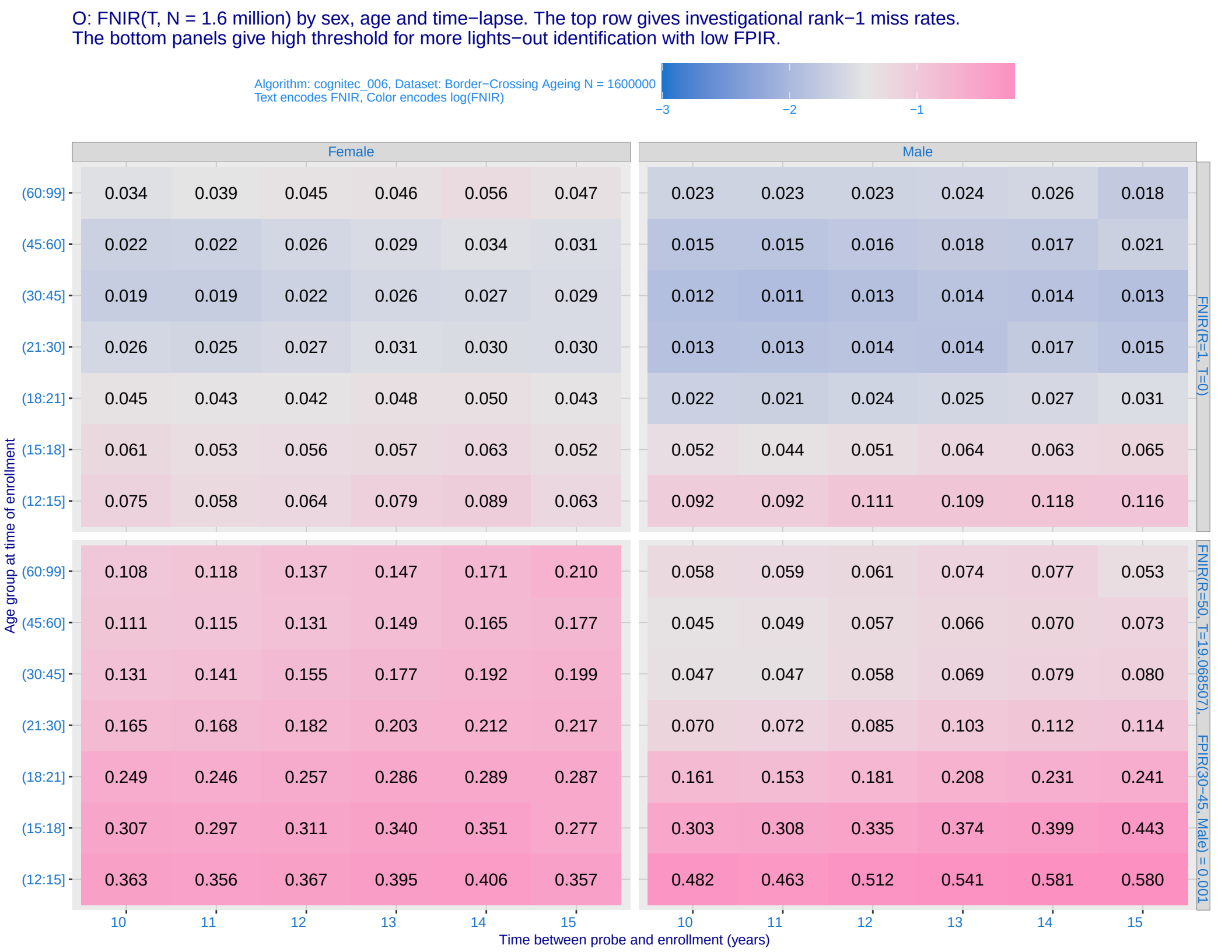

I: FNIR and FPIR dependence on threshold
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image
FNIR(T)
1.00
0.40
0.20
0.10
0.04
0.02
0.01
FPIR(T)
1e+00
4e−01
2e−01
1e−01
4e−02
2e−02
1e−02
4e−03
2e−03
1e−03
4e−04
False {Negative | Positive} Identification Rate
14
16
18
20
22
24
Threshold value

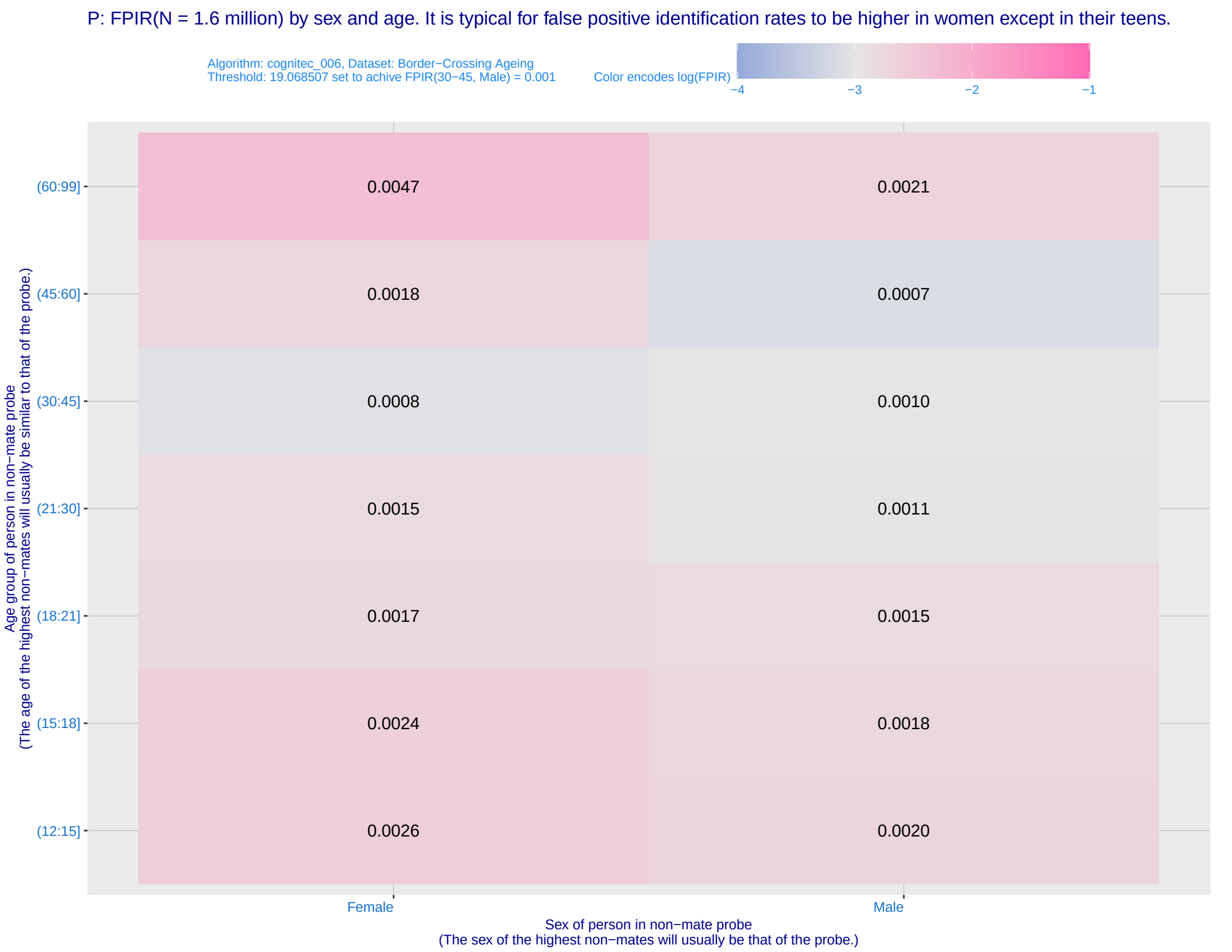

K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_007)
Immigration
visa−border
Immigration
visa−kiosk
Mugshot
natural
Mugshot
webcam
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e+06
3e+06
1e+07
Enrolled population size, N
FNIR@Rank = 1
cognitec_006
sensetime_007
enrolment_style
random
recent

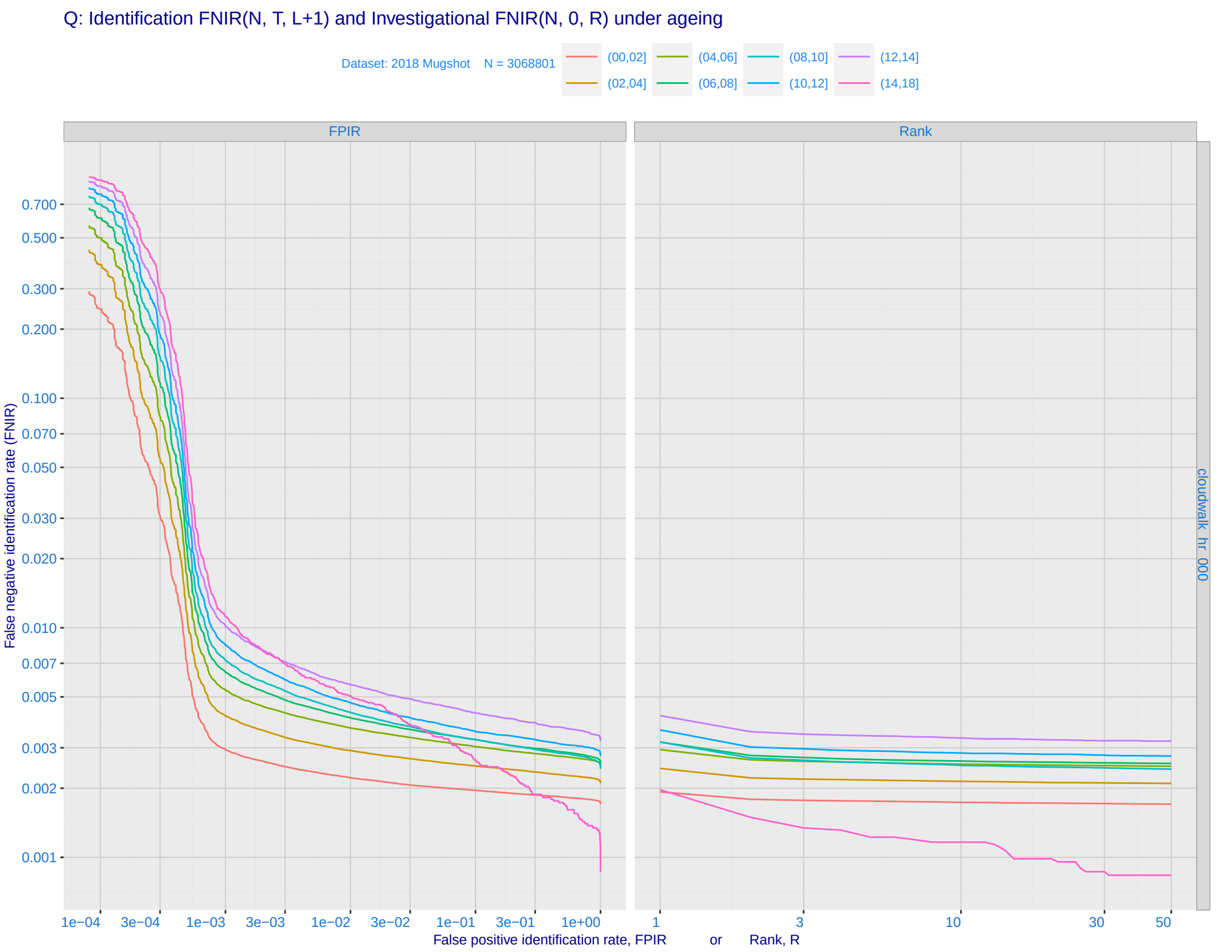

L: Investigational mode: FNIR(1600000, R, 0) by probe type
cognitec_006
sensetime_007
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1
3
10
30
Rank, R
enrolment_style
random
recent
FNIR(R)
N = 1600000
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
Mugshot webcam

M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements.
The template generation time is independent of N. The log and power−law models are fit to the first two (N,T) observations




O: FNIR(T, N = 1.6 million) by sex, age and time−lapse. The top row gives investigational rank−1 miss rates.
The bottom panels give high threshold for more lights−out identification with low FPIR.
Algorithm: cognitec_006, Dataset: Border−Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)
−3
−2
−1
Female
Male
(60:99]
(45:60]
(30:45]
(21:30]
(18:21]
(15:18]
(12:15]
0.034 0.039 0.045 0.046 0.056 0.047
0.022 0.022 0.026 0.029 0.034 0.031
0.019 0.019 0.022 0.026 0.027 0.029
0.026 0.025 0.027 0.031 0.030 0.030
0.045 0.043 0.042 0.048 0.050 0.043
0.061 0.053 0.056 0.057 0.063 0.052
0.075 0.058 0.064 0.079 0.089 0.063
0.023 0.023 0.023 0.024 0.026 0.018
0.015 0.015 0.016 0.018 0.017 0.021
0.012 0.011 0.013 0.014 0.014 0.013
0.013 0.013 0.014 0.014 0.017 0.015
0.022 0.021 0.024 0.025 0.027 0.031
0.052 0.044 0.051 0.064 0.063 0.065
0.092 0.092 0.111 0.109 0.118 0.116
FNIR(R=1, T=0)
0.108 0.118 0.137 0.147 0.171 0.210
0.111 0.115 0.131 0.149 0.165 0.177
0.131 0.141 0.155 0.177 0.192 0.199
0.165 0.168 0.182 0.203 0.212 0.217
0.249 0.246 0.257 0.286 0.289 0.287
0.307 0.297 0.311 0.340 0.351 0.277
0.363 0.356 0.367 0.395 0.406 0.357
0.058 0.059 0.061 0.074 0.077 0.053
0.045 0.049 0.057 0.066 0.070 0.073
0.047 0.047 0.058 0.069 0.079 0.080
0.070 0.072 0.085 0.103 0.112 0.114
0.161 0.153 0.181 0.208 0.231 0.241
0.303 0.308 0.335 0.374 0.399 0.443
0.482 0.463 0.512 0.541 0.581 0.580
FNIR(R=50, T=19.068507), FPIR(30−45, Male) = 0.001
Age group at time of enrollment
10 11 12 13 14 15
Time between probe and enrollment (years)


P: FPIR(N = 1.6 million) by sex and age. It is typical for false positive identification rates to be higher in women except in their teens.
Algorithm: cognitec_006, Dataset: Border−Crossing Ageing
Threshold: 19.068507 set to achive FPIR(30−45, Male) = 0.001
Color encodes log(FPIR)
−4
−3
−2
−1
(60:99]
(45:60]
(30:45]
(21:30]
(18:21]
(15:18]
(12:15]
0.0047
0.0021
0.0018
0.0007
0.0008
0.0010
0.0015
0.0011
0.0017
0.0015
0.0024
0.0018
0.0026
0.0020
Age group of person in non−mate probe
(The age of the highest non−mates will usually be similar to that of the probe.)
Female
Male
Sex of person in non−mate probe
(The sex of the highest non−mates will usually be that of the probe.)


Q: Identification FNIR(N, T, L+1) and Investigational FNIR(N, 0, R) under ageing
Dataset: 2018 Mugshot N = 3068801
(00,02]
(02,04]
(04,06]
(06,08]
(08,10]
(10,12]
(12,14]
(14,18]
FPIR
Rank
False negative identification rate (FNIR)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
1e+00
1
3
10
30
50
False positive identification rate, FPIR or Rank, R
cloudwalk hr 000