A: Datasheet

Algorithm: maxvision_000

Developer: [**Developer name**]

Submission Date: 2022_06_17

Template size: 2048 bytes

Template time (2.5 percentile): 183 msec

Template time (median): 184 msec

Template time (97.5 percentile): 190 msec

Investigation:

Frontal mugshot ranking 104 (out of 355) −− FNIR(1600000, 0, 1) = 0.0024 vs. lowest 0.0008 from sensetime_007

Mugshot webcam ranking 108 (out of 317) −− FNIR(1600000, 0, 1) = 0.0145 vs. lowest 0.0056 from sensetime_007

Mugshot profile ranking 90 (out of 286) −− FNIR(1600000, 0, 1) = 0.3272 vs. lowest 0.0521 from sensetime_007

Immigration visa−border ranking 84 (out of 244) −− FNIR(1600000, 0, 1) = 0.0042 vs. lowest 0.0008 from sensetime_007

Immigration visa−kiosk ranking 77 (out of 241) −− FNIR(1600000, 0, 1) = 0.1007 vs. lowest 0.0472 from kakao_001

Identification:

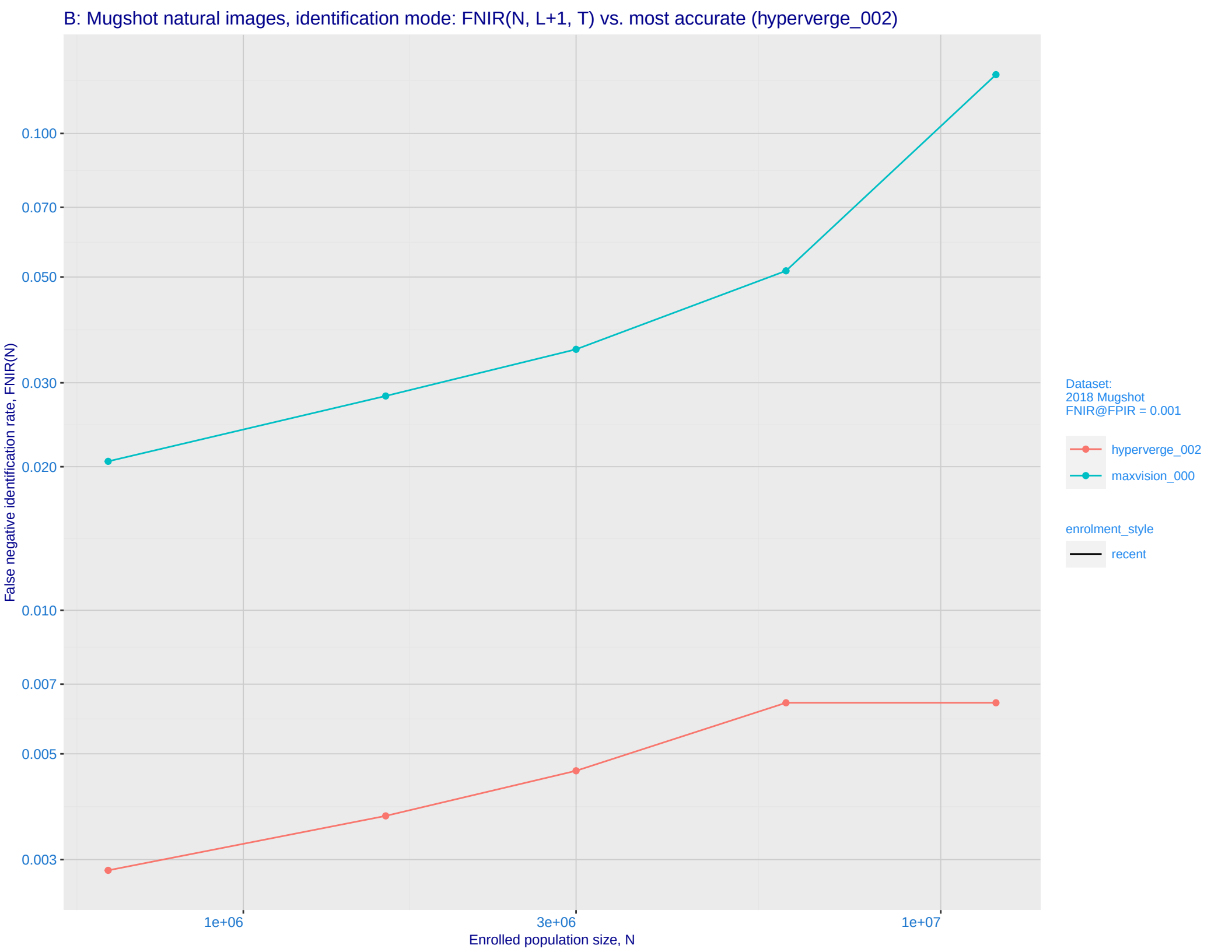
Frontal mugshot ranking 119 (out of 355) −− FNIR(1600000, T, L+1) = 0.0281, FPIR=0.001000 vs. lowest 0.0014 from sensetime_007

Mugshot webcam ranking 217 (out of 315) −− FNIR(1600000, T, L+1) = 0.2350, FPIR=0.001000 vs. lowest 0.0093 from sensetime_007

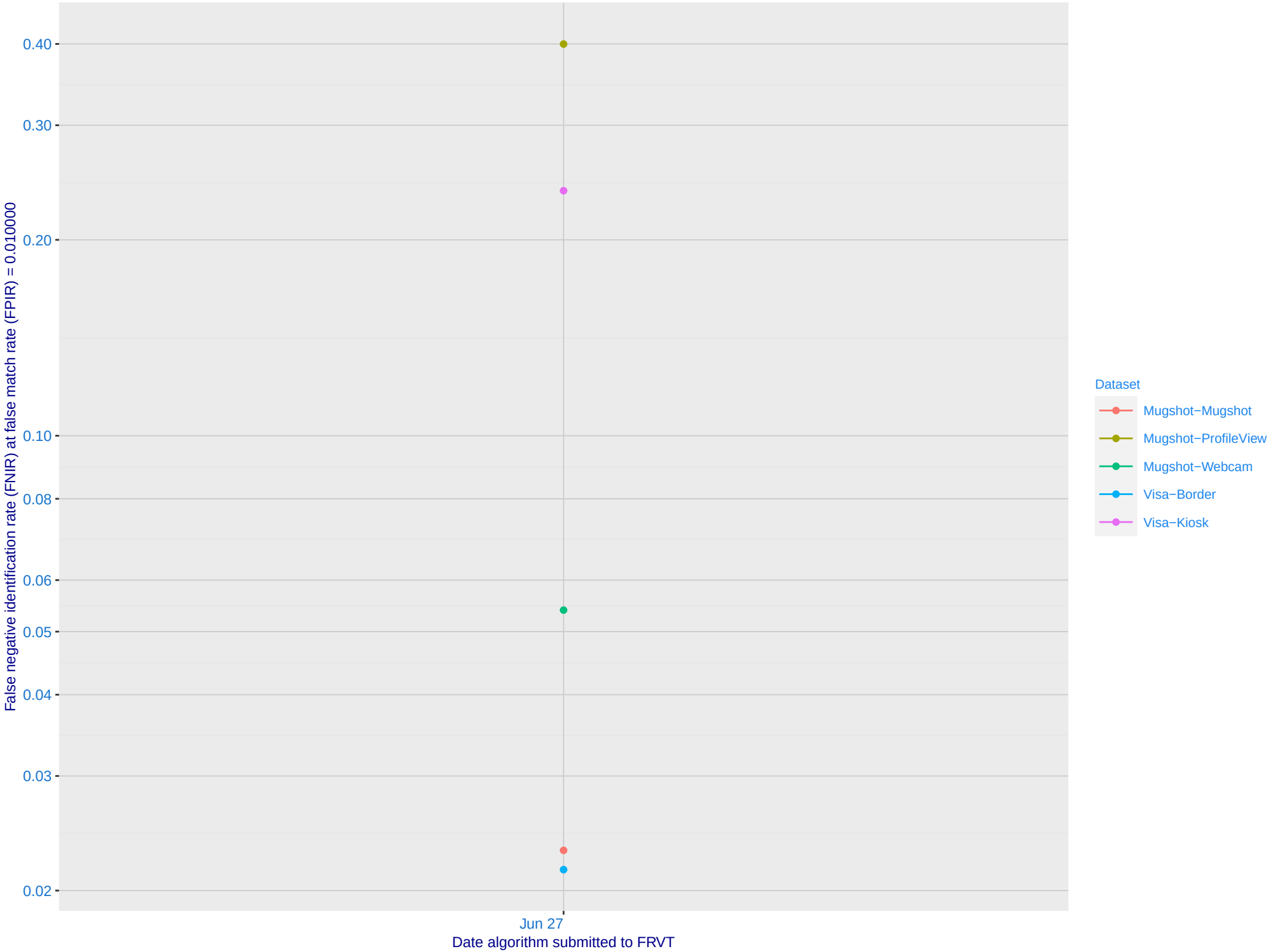
Mugshot profile ranking 52 (out of 285) −− FNIR(1600000, T, L+1) = 0.7672, FPIR=0.001000 vs. lowest 0.1093 from cloudwalk_mt_000

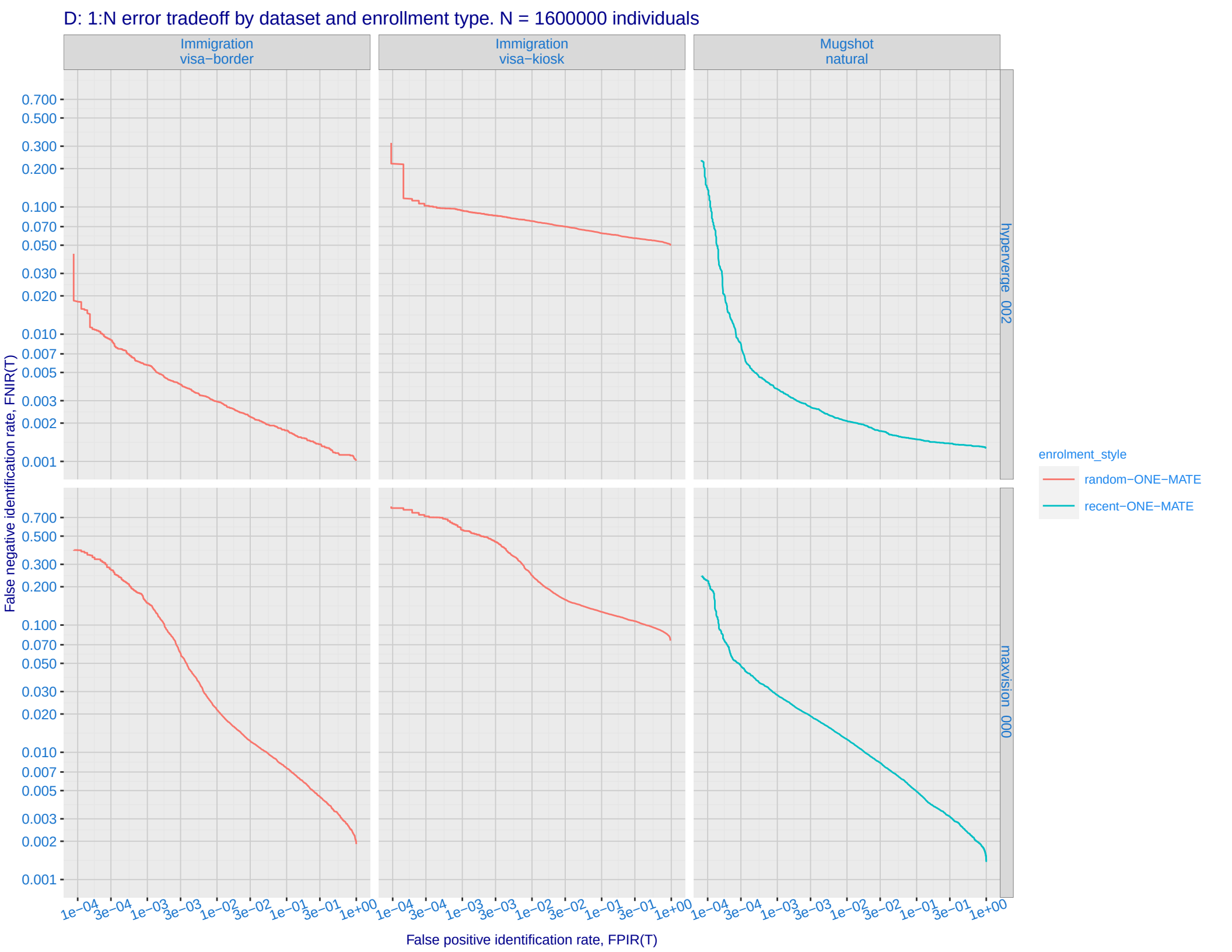
Immigration visa−border ranking 160 (out of 243) −− FNIR(1600000, T, L+1) = 0.1493, FPIR=0.001000 vs. lowest 0.0024 from cloudwalk_mt_000

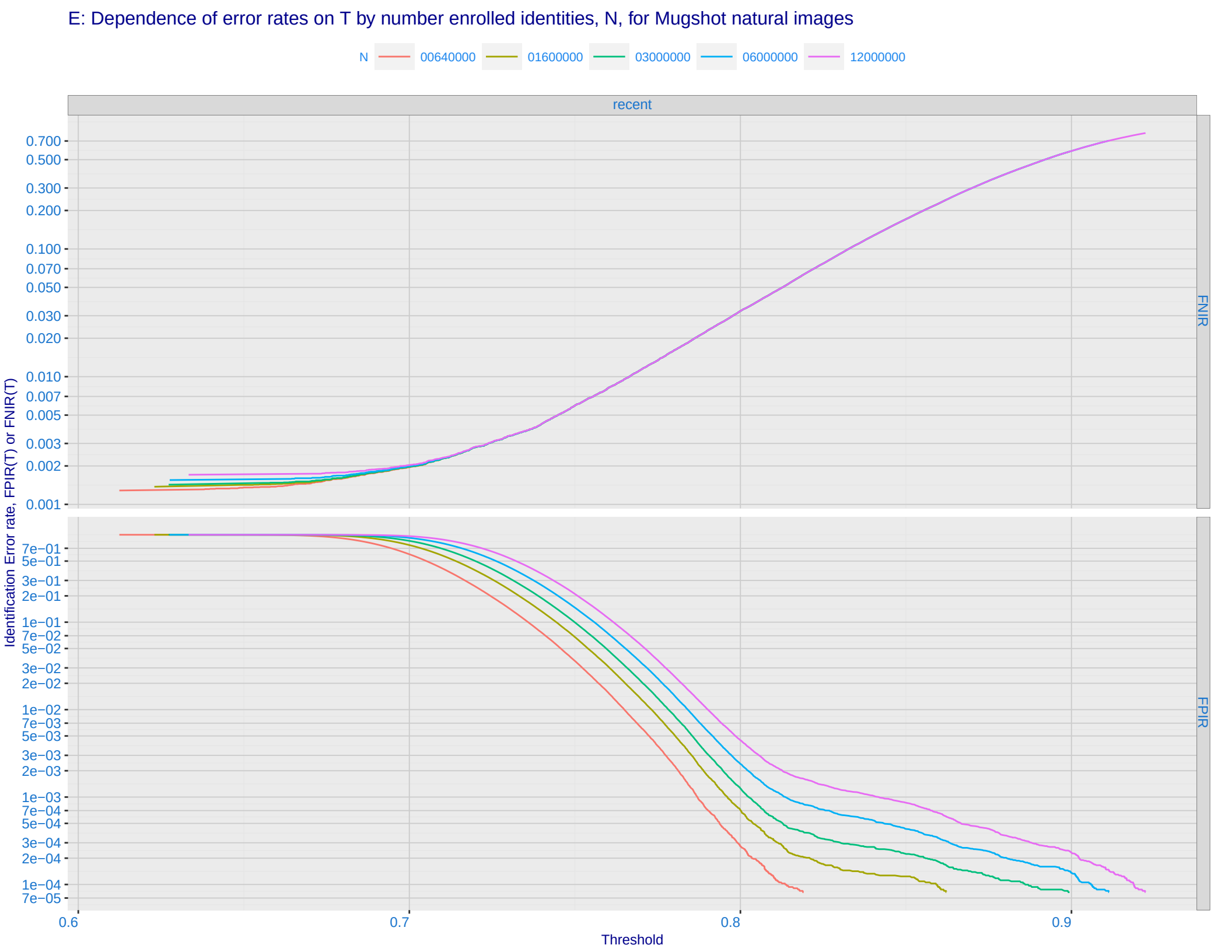
Immigration visa−kiosk ranking 140 (out of 238) −− FNIR(1600000, T, L+1) = 0.5587, FPIR=0.001000 vs. lowest 0.0719 from cloudwalk_mt_000

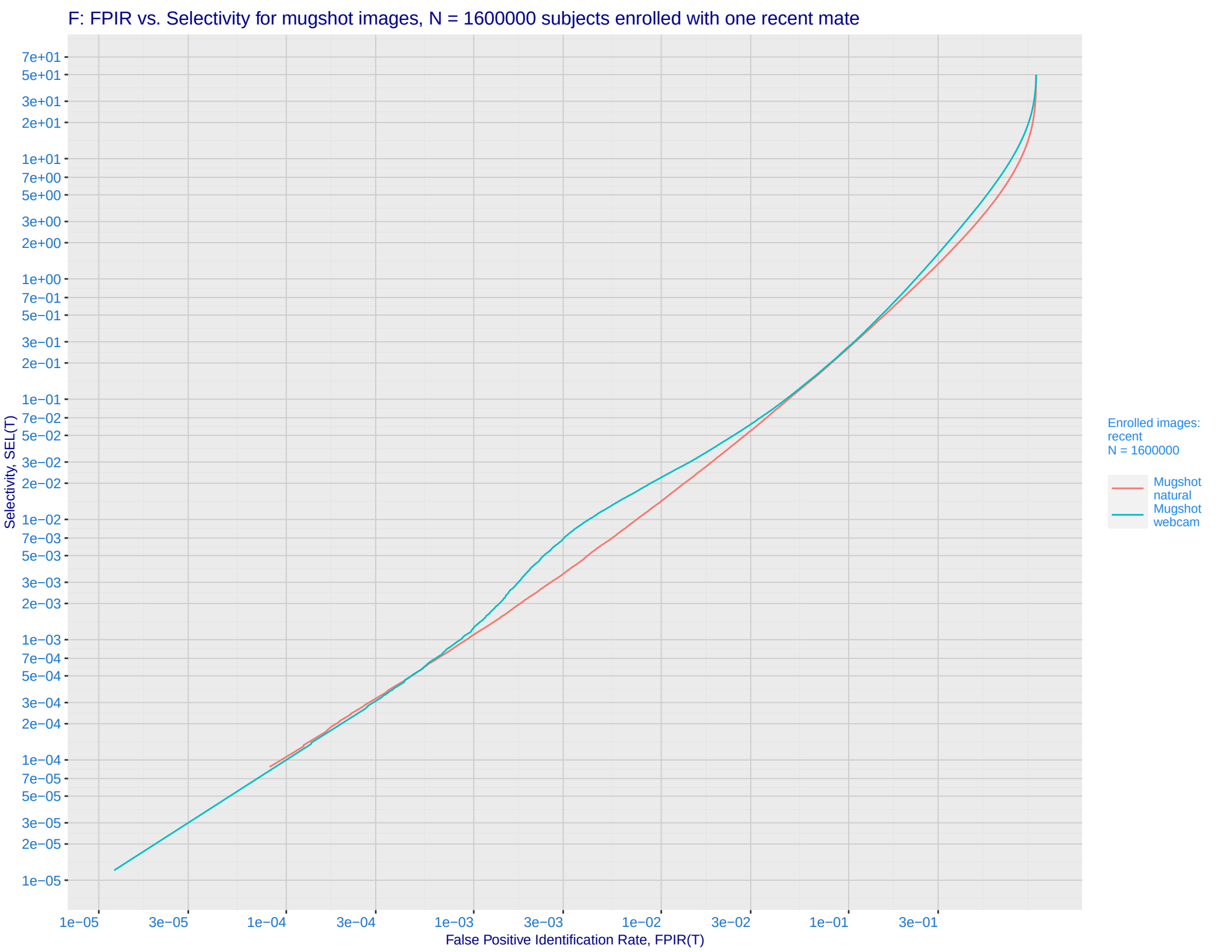

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (hyperverge_002)
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
1e+06
3e+06
1e+07
Enrolled population size, N
Dataset:
2018 Mugshot
FNIR@FPIR = 0.001
hyperverge_002
maxvision_000
enrolment_style
recent

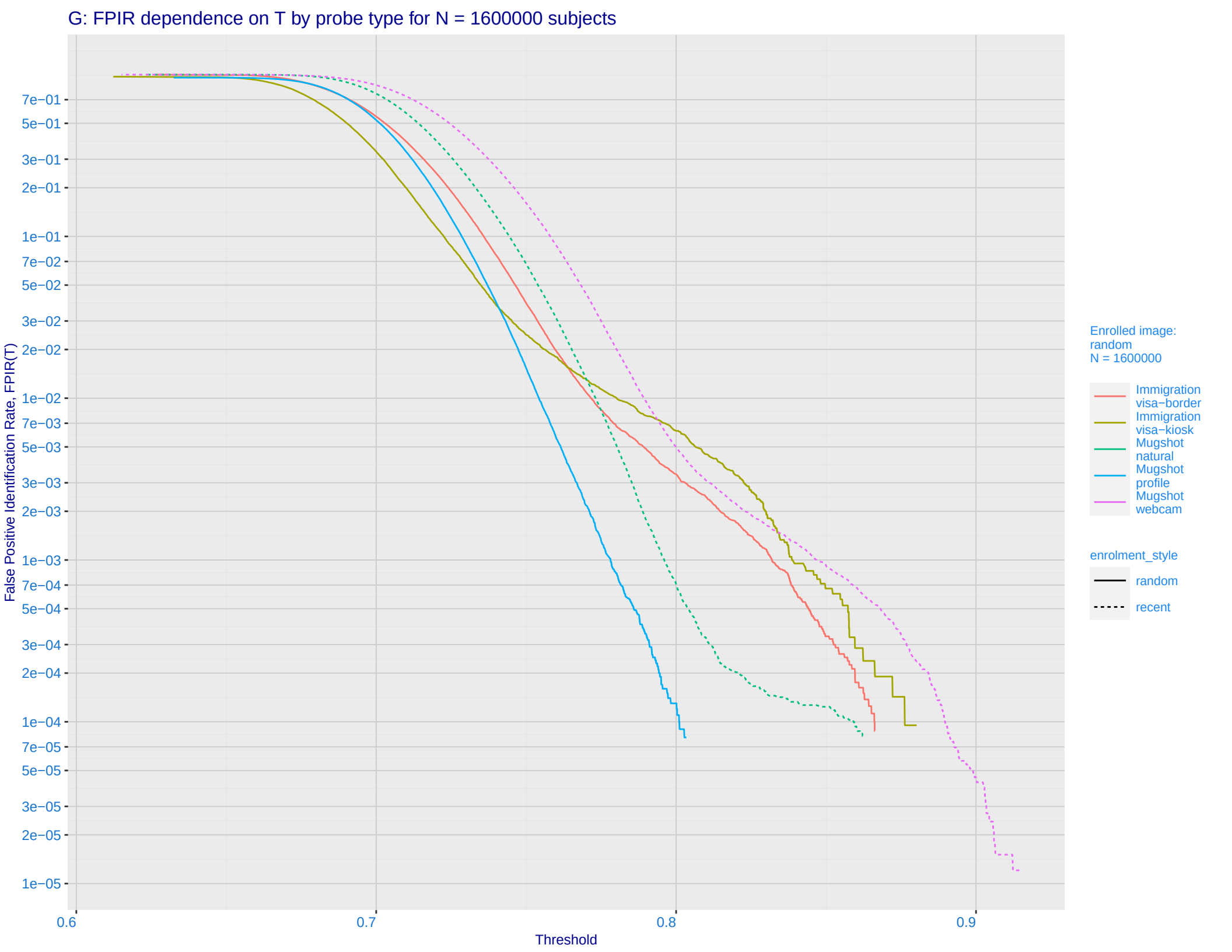
C: Evolution of accuracy for MAXVISION algorithms on three datasets 2018 − present

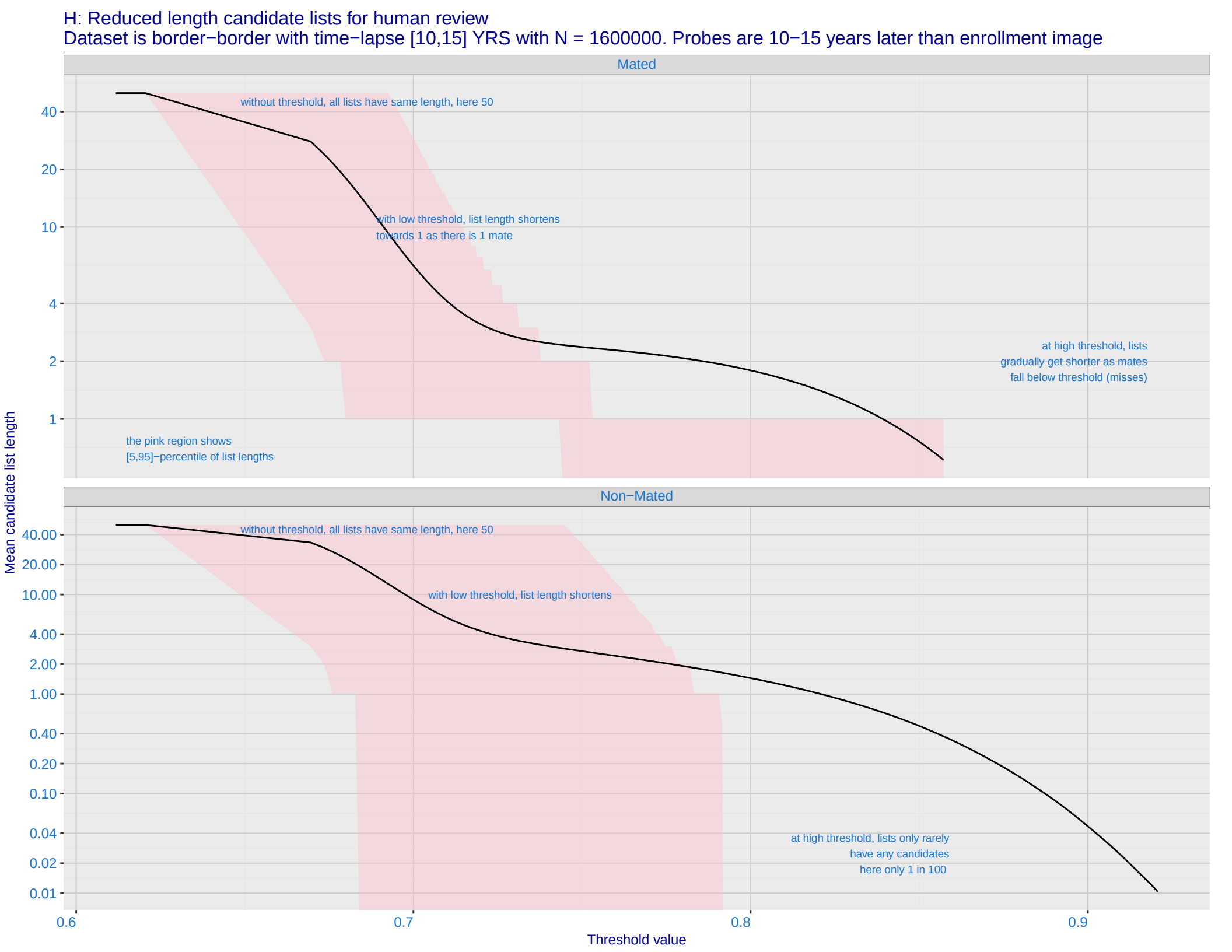


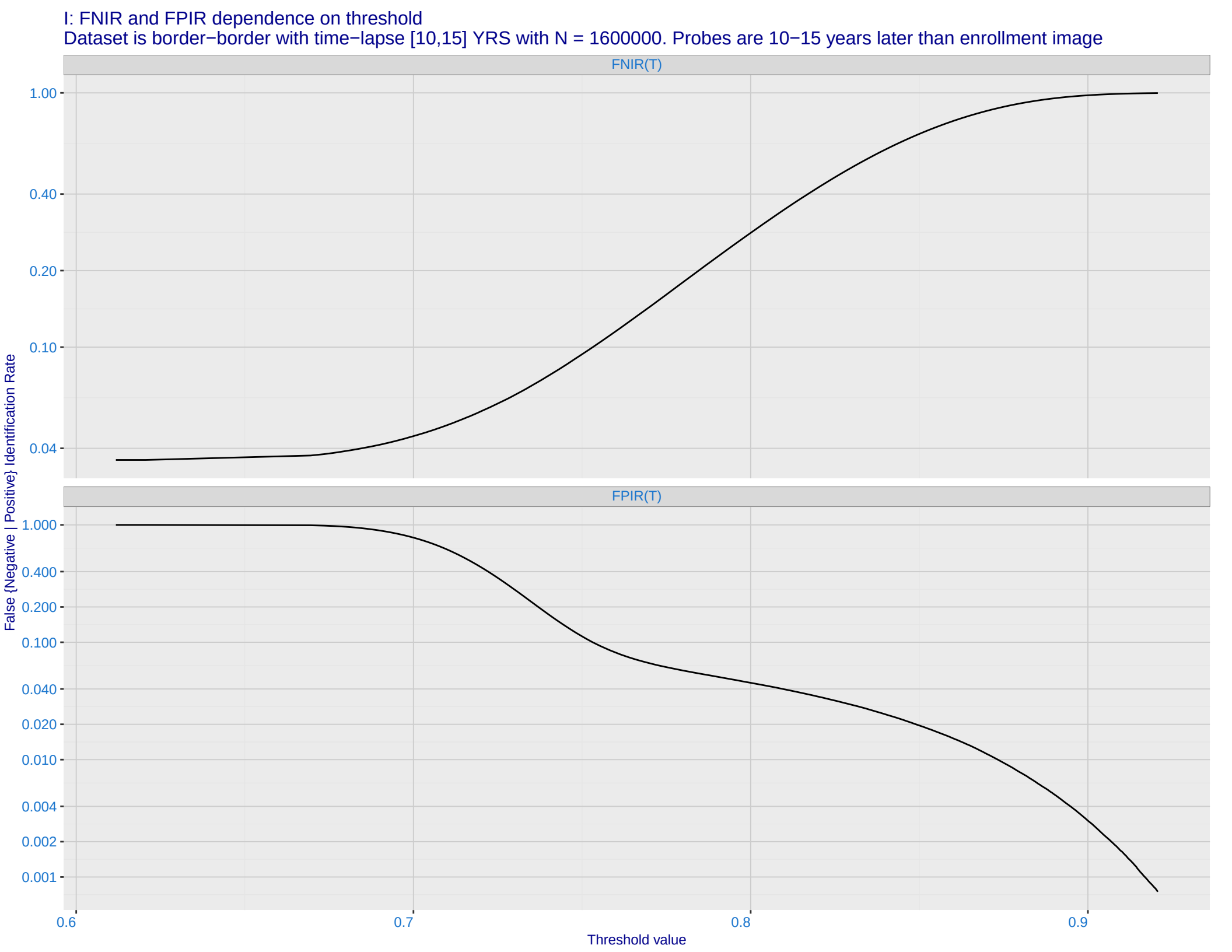

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
hyperverge_002
maxvision_000
False negative identification rate, FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
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

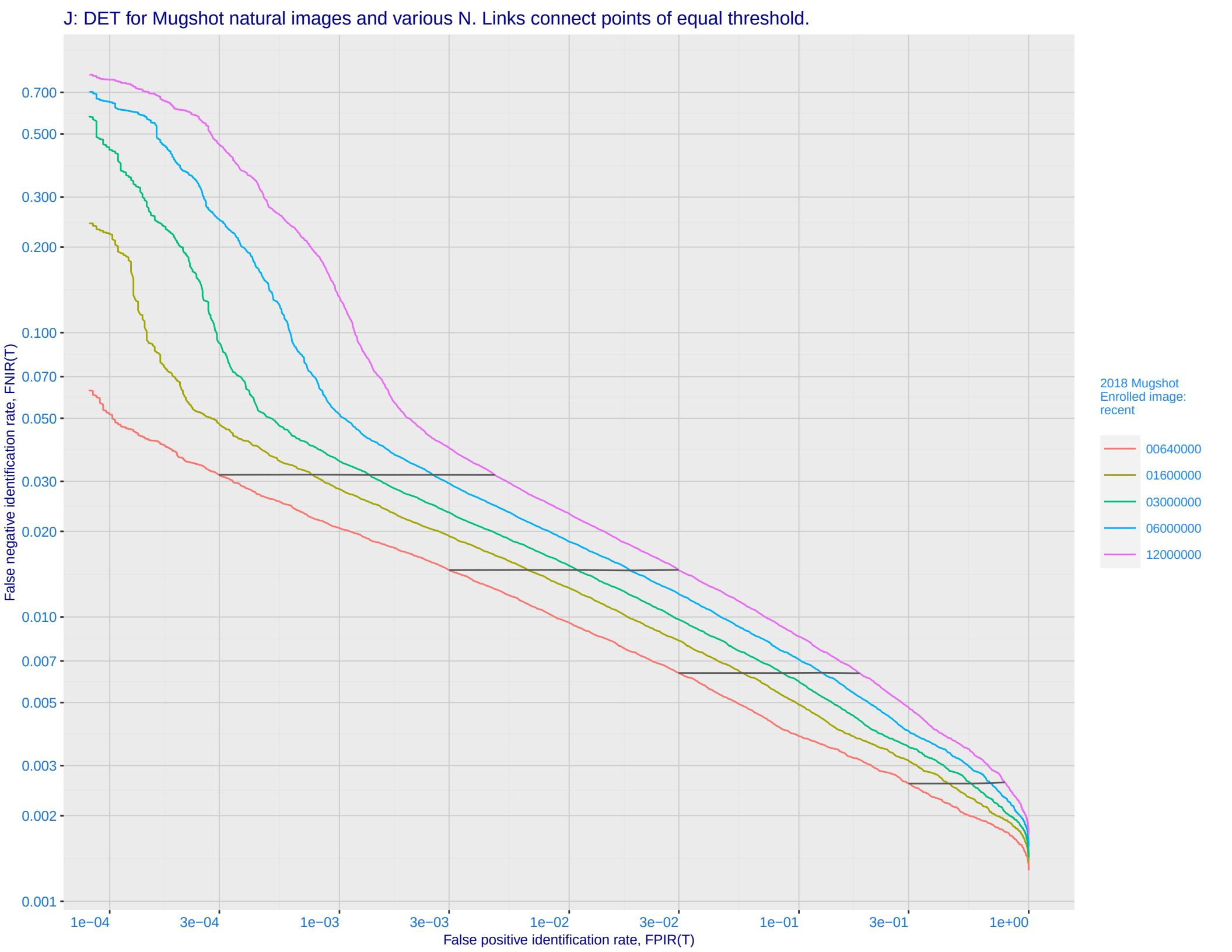

E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images
N
00640000
01600000
03000000
06000000
12000000
recent
FNIR
FPIR
Identification Error rate, FPIR(T) or FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
7e−01
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
0.6
0.7
0.8
0.9
Threshold

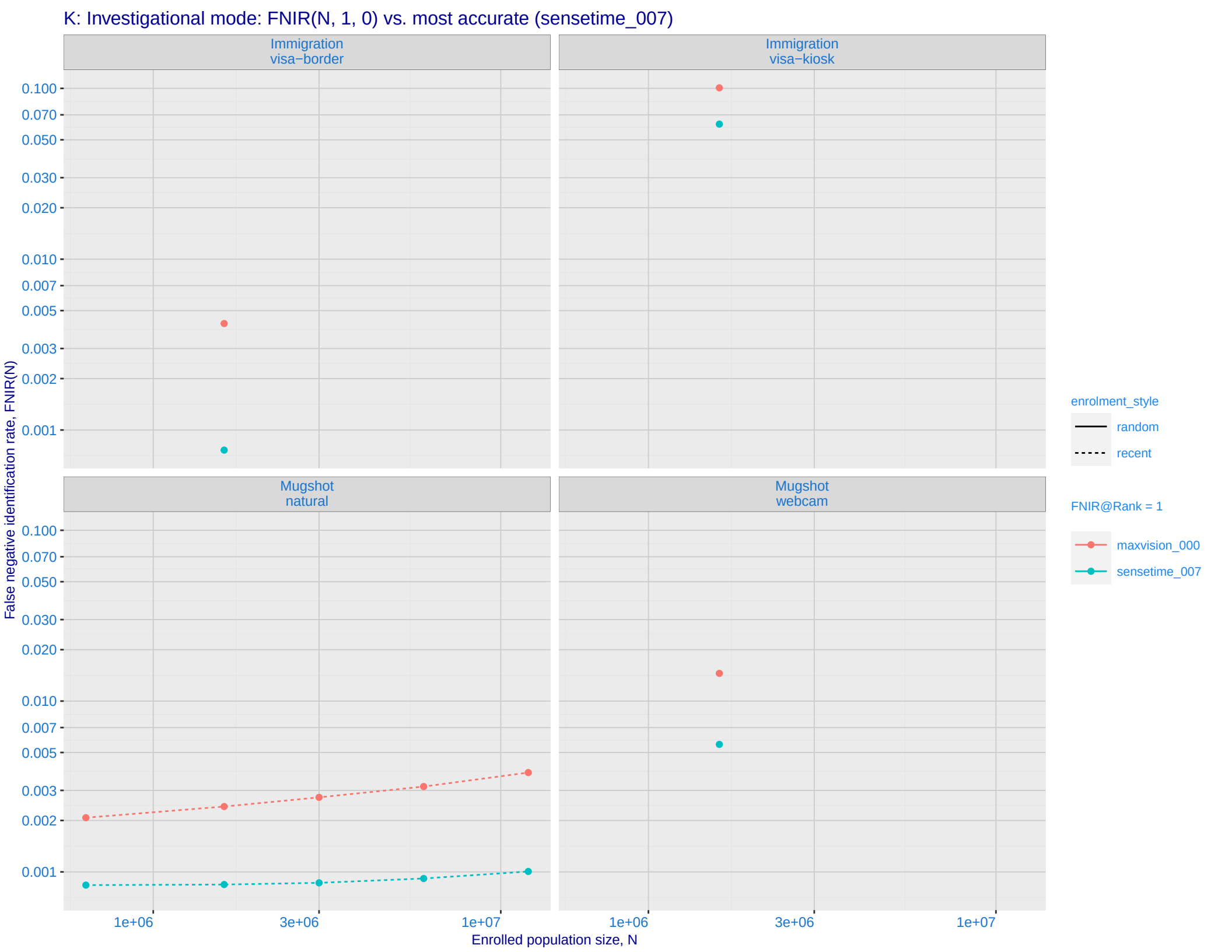

F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate
Selectivity, SEL(T)
7e+01
5e+01
3e+01
2e+01
1e+01
7e+00
5e+00
3e+00
2e+00
1e+00
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
5e−05
3e−05
2e−05
1e−05
1e−05
3e−05
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
False Positive Identification Rate, FPIR(T)
Enrolled images:
recent
N = 1600000
Mugshot
natural
Mugshot
webcam

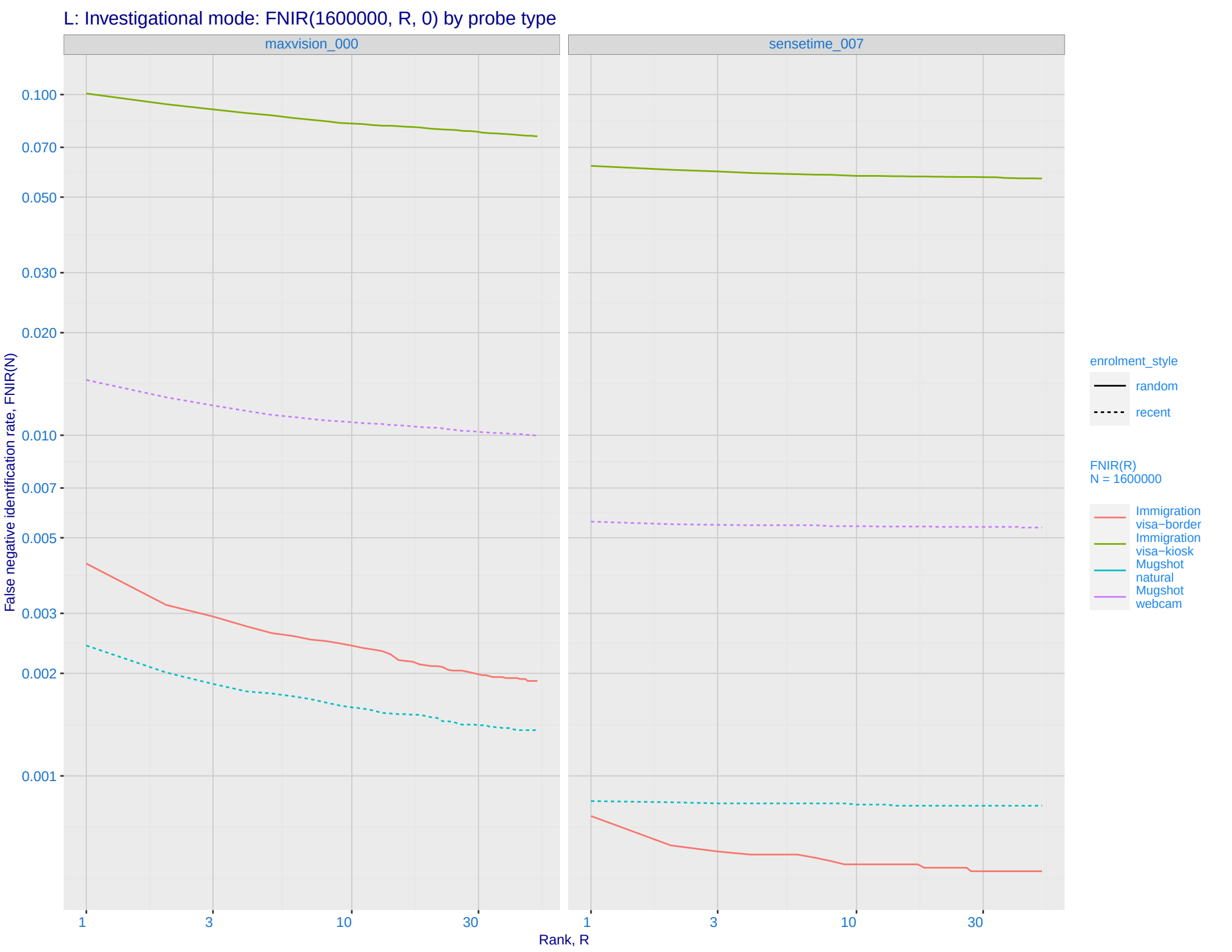

G: FPIR dependence on T by probe type for N = 1600000 subjects
False Positive Identification Rate, FPIR(T)
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
5e−05
3e−05
2e−05
1e−05
0.6
0.7
0.8
0.9
Threshold
Enrolled image:
random
N = 1600000
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
Mugshot profile
Mugshot webcam
enrolment_style
random
recent


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

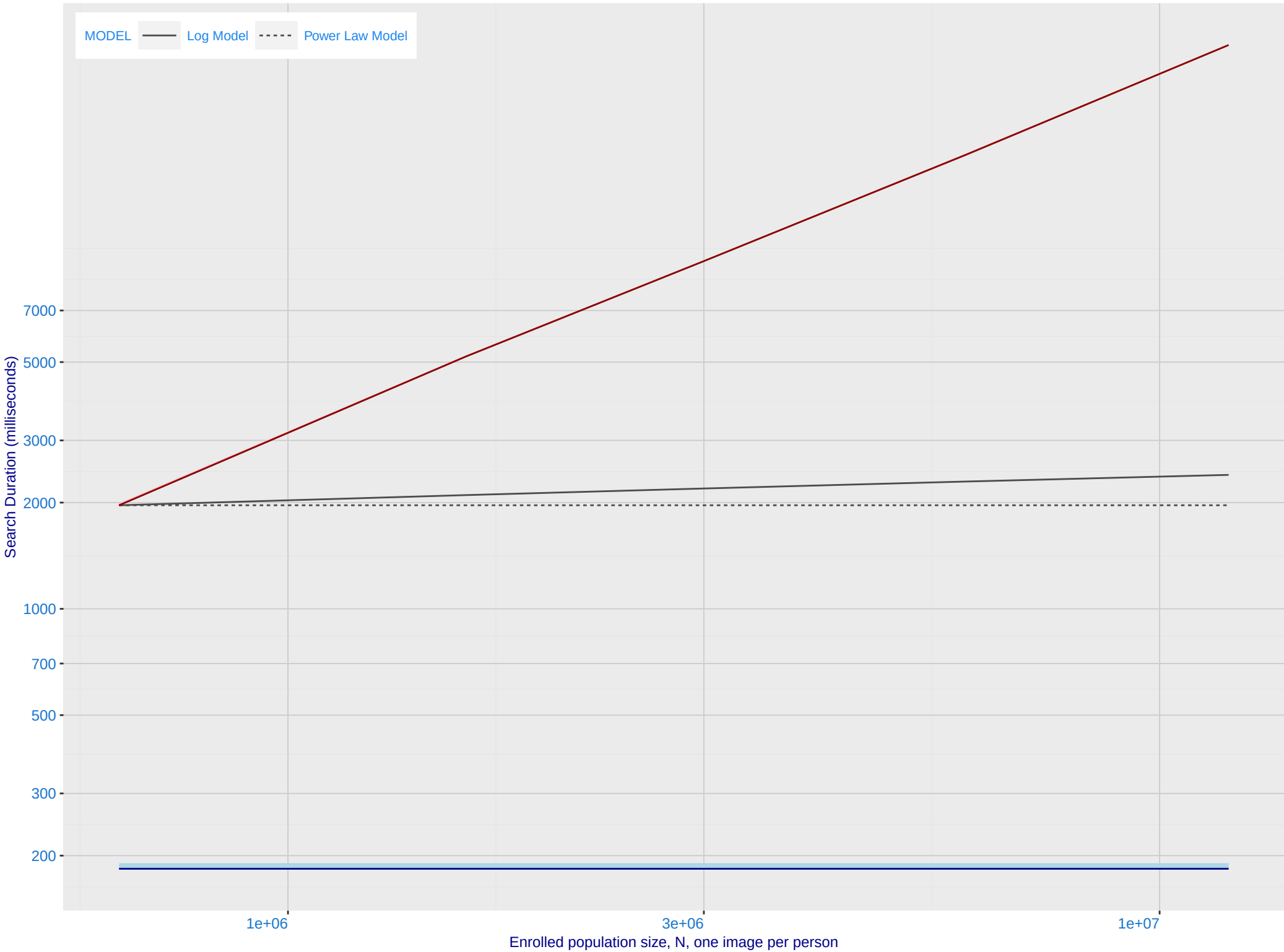

I: FNIR and FPIR dependence on threshold
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image
FNIR(T)
1.00
0.40
0.20
0.10
0.04
FPIR(T)
1.000
0.400
0.200
0.100
0.040
0.020
0.010
0.004
0.002
0.001
False {Negative | Positive} Identification Rate
0.6
0.7
0.8
0.9
Threshold value

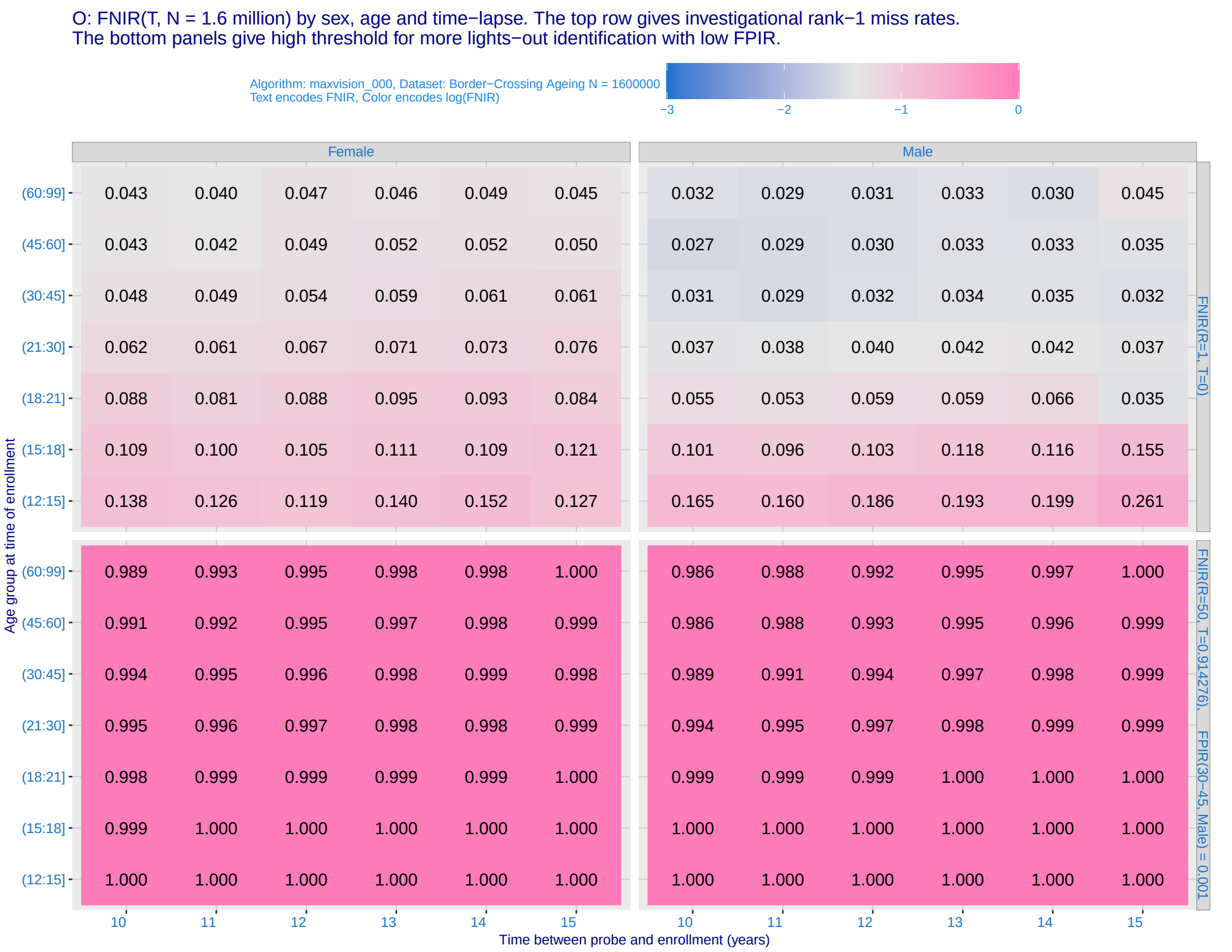

J: DET for Mugshot natural images and various N. Links connect points of equal threshold.
False negative identification rate, FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
1e+00
False positive identification rate, FPIR(T)
2018 Mugshot
Enrolled image:
recent
00640000
01600000
03000000
06000000
12000000

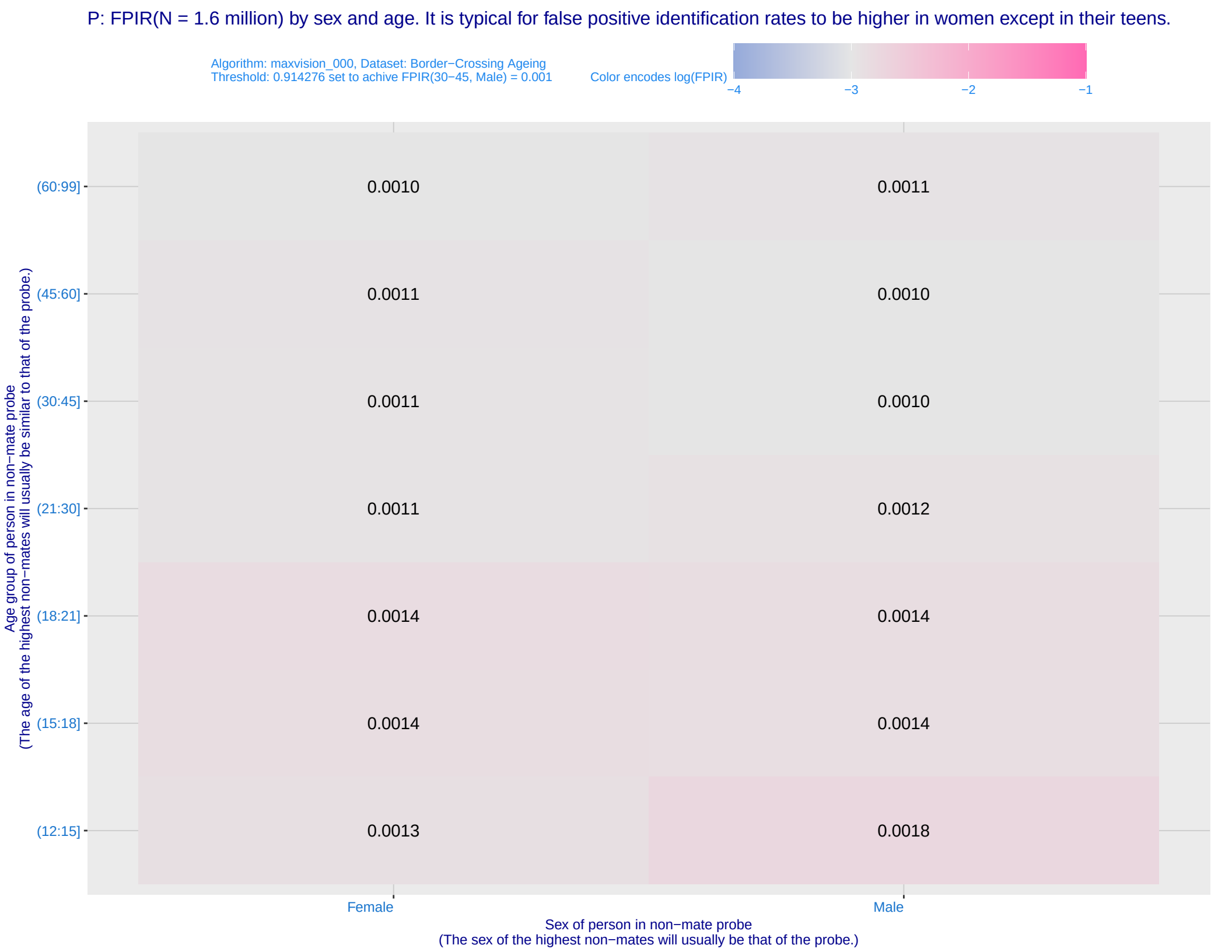

K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_007)
Immigration
visa−border
Immigration
visa−kiosk
Mugshot
natural
Mugshot
webcam
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e+06
3e+06
1e+07
Enrolled population size, N
enrolment_style
random
recent
FNIR@Rank = 1
maxvision_000
sensetime_007

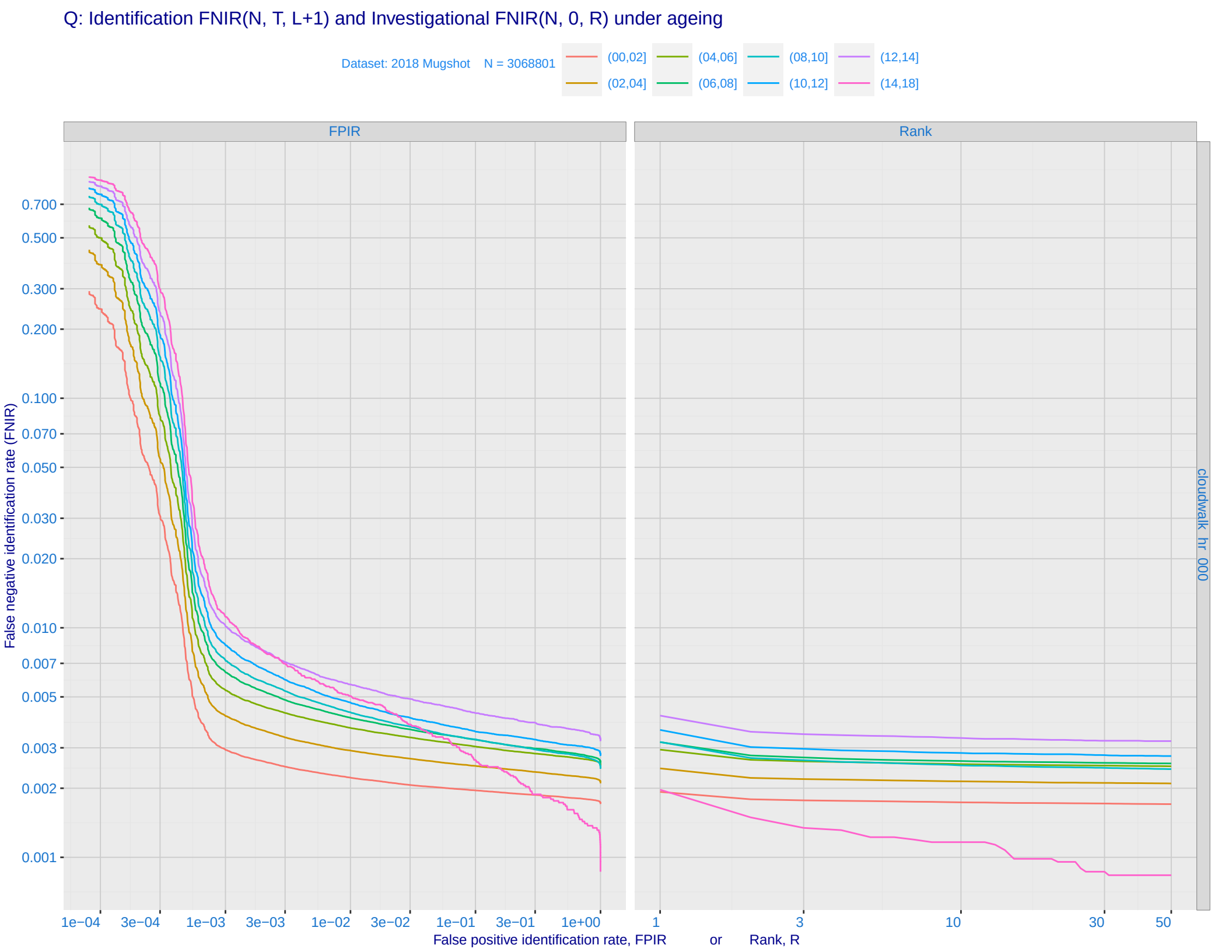

L: Investigational mode: FNIR(1600000, R, 0) by probe type
maxvision_000
sensetime_007
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1
3
10
30
Rank, R
enrolment_style
random
recent
FNIR(R)
N = 1600000
Immigration visa−border
Immigration 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: maxvision_000, Dataset: Border−Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)
−3
−2
−1
0
Female
Male
(60:99]
(45:60]
(30:45]
(21:30]
(18:21]
(15:18]
(12:15]
0.043 0.040 0.047 0.046 0.049 0.045
0.043 0.042 0.049 0.052 0.052 0.050
0.048 0.049 0.054 0.059 0.061 0.061
0.062 0.061 0.067 0.071 0.073 0.076
0.088 0.081 0.088 0.095 0.093 0.084
0.109 0.100 0.105 0.111 0.109 0.121
0.138 0.126 0.119 0.140 0.152 0.127
0.032 0.029 0.031 0.033 0.030 0.045
0.027 0.029 0.030 0.033 0.033 0.035
0.031 0.029 0.032 0.034 0.035 0.032
0.037 0.038 0.040 0.042 0.042 0.037
0.055 0.053 0.059 0.059 0.066 0.035
0.101 0.096 0.103 0.118 0.116 0.155
0.165 0.160 0.186 0.193 0.199 0.261
FNIR(R=1, T=0)
0.989 0.993 0.995 0.998 0.998 1.000
0.991 0.992 0.995 0.997 0.998 0.999
0.994 0.995 0.996 0.998 0.999 0.998
0.995 0.996 0.997 0.998 0.998 0.999
0.998 0.999 0.999 0.999 0.999 1.000
0.999 1.000 1.000 1.000 1.000 1.000
1.000 1.000 1.000 1.000 1.000 1.000
0.986 0.988 0.992 0.995 0.997 1.000
0.986 0.988 0.993 0.995 0.996 0.999
0.989 0.991 0.994 0.997 0.998 0.999
0.994 0.995 0.997 0.998 0.999 0.999
0.999 0.999 0.999 1.000 1.000 1.000
1.000 1.000 1.000 1.000 1.000 1.000
1.000 1.000 1.000 1.000 1.000 1.000
FNIR(R=50, T=0.914276), FPIR(30−45, Male) = 0.001
Age group at time of enrollment
10 11 12 13 14 15
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: maxvision_000, Dataset: Border−Crossing Ageing
Threshold: 0.914276 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]
0.0010
0.0011
0.0011
0.0010
0.0011
0.0012
0.0014
0.0014
0.0014
0.0014
0.0013
0.0018
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