A: Datasheet

Algorithm: dahua_004

Developer: Dahua Technology Co Ltd

Submission Date: 2021_11_18

Template size: 2048 bytes

Template time (2.5 percentile): 756 msec

Template time (median): 758 msec

Template time (97.5 percentile): 765 msec

Investigation:

Frontal mugshot ranking 8 (out of 322) −− FNIR(1600000, 0, 1) = 0.0011 vs. lowest 0.0009 from sensetime_006

Mugshot webcam ranking 12 (out of 284) −− FNIR(1600000, 0, 1) = 0.0076 vs. lowest 0.0057 from sensetime_006

Mugshot profile ranking 30 (out of 253) −− FNIR(1600000, 0, 1) = 0.1438 vs. lowest 0.0550 from sensetime_006

Immigration visa−border ranking 11 (out of 211) −− FNIR(1600000, 0, 1) = 0.0016 vs. lowest 0.0009 from sensetime_006

Immigration visa−kiosk ranking 11 (out of 208) −− FNIR(1600000, 0, 1) = 0.0689 vs. lowest 0.0487 from cubox_000

Identification:

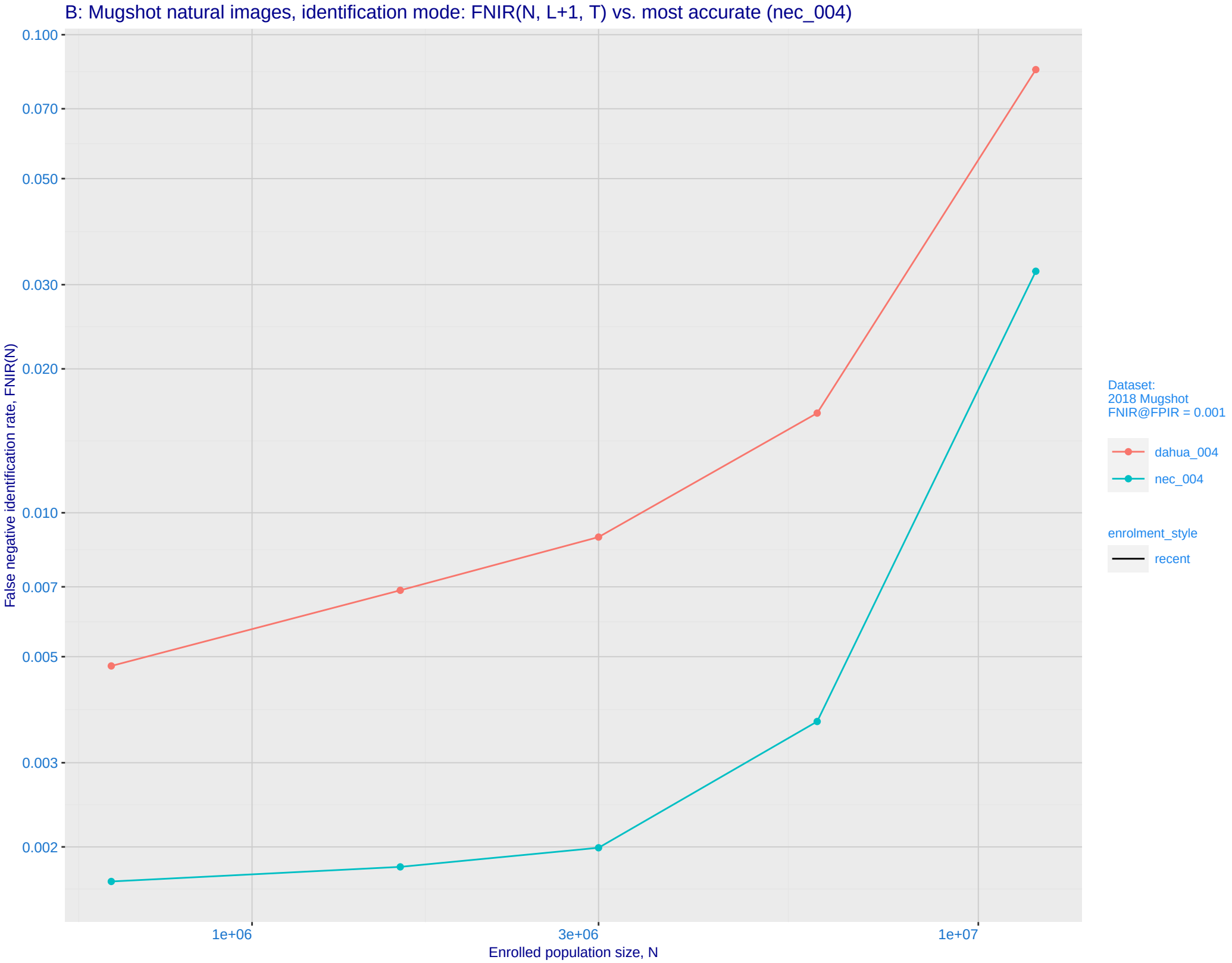
Frontal mugshot ranking 27 (out of 322) −− FNIR(1600000, T, L+1) = 0.0069, FPIR=0.001000 vs. lowest 0.0018 from sensetime_004

Mugshot webcam ranking 23 (out of 282) −− FNIR(1600000, T, L+1) = 0.0260, FPIR=0.001000 vs. lowest 0.0122 from sensetime_003

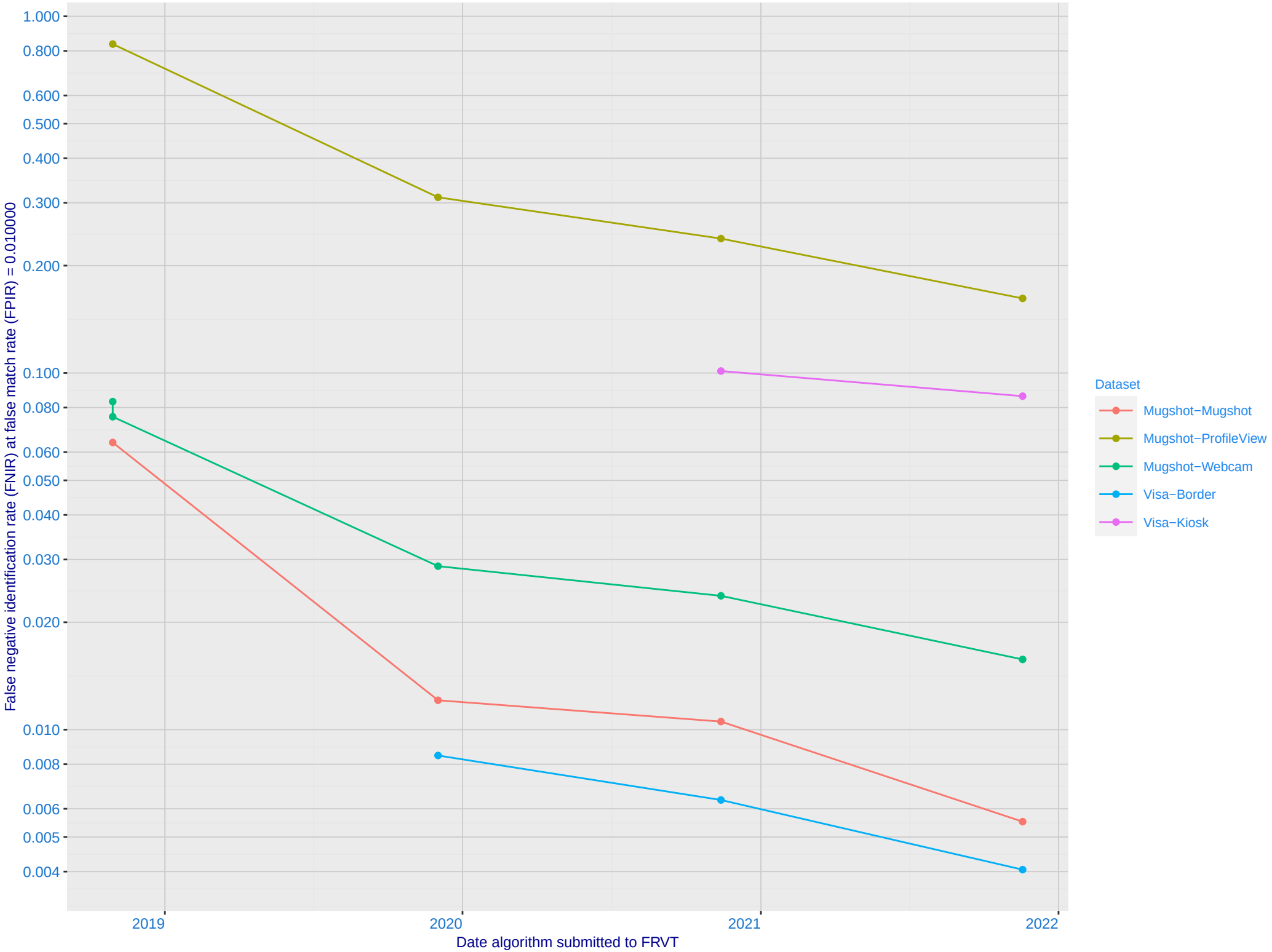
Mugshot profile ranking 19 (out of 252) −− FNIR(1600000, T, L+1) = 0.4852, FPIR=0.001000 vs. lowest 0.1331 from cloudwalk_hr_000

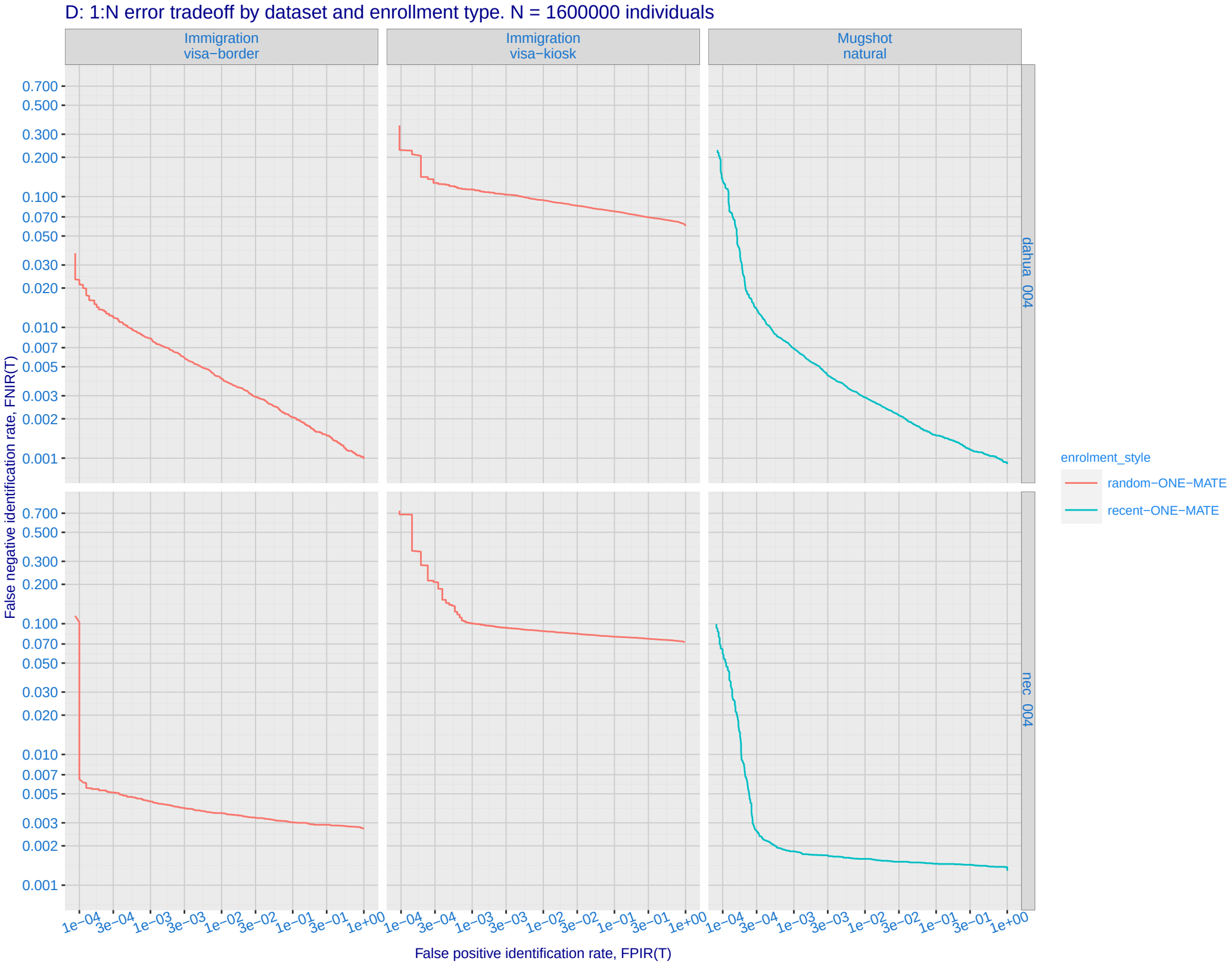
Immigration visa−border ranking 20 (out of 210) −− FNIR(1600000, T, L+1) = 0.0082, FPIR=0.001000 vs. lowest 0.0039 from sensetime_006

Immigration visa−kiosk ranking 15 (out of 205) −− FNIR(1600000, T, L+1) = 0.1135, FPIR=0.001000 vs. lowest 0.0729 from cubox_000

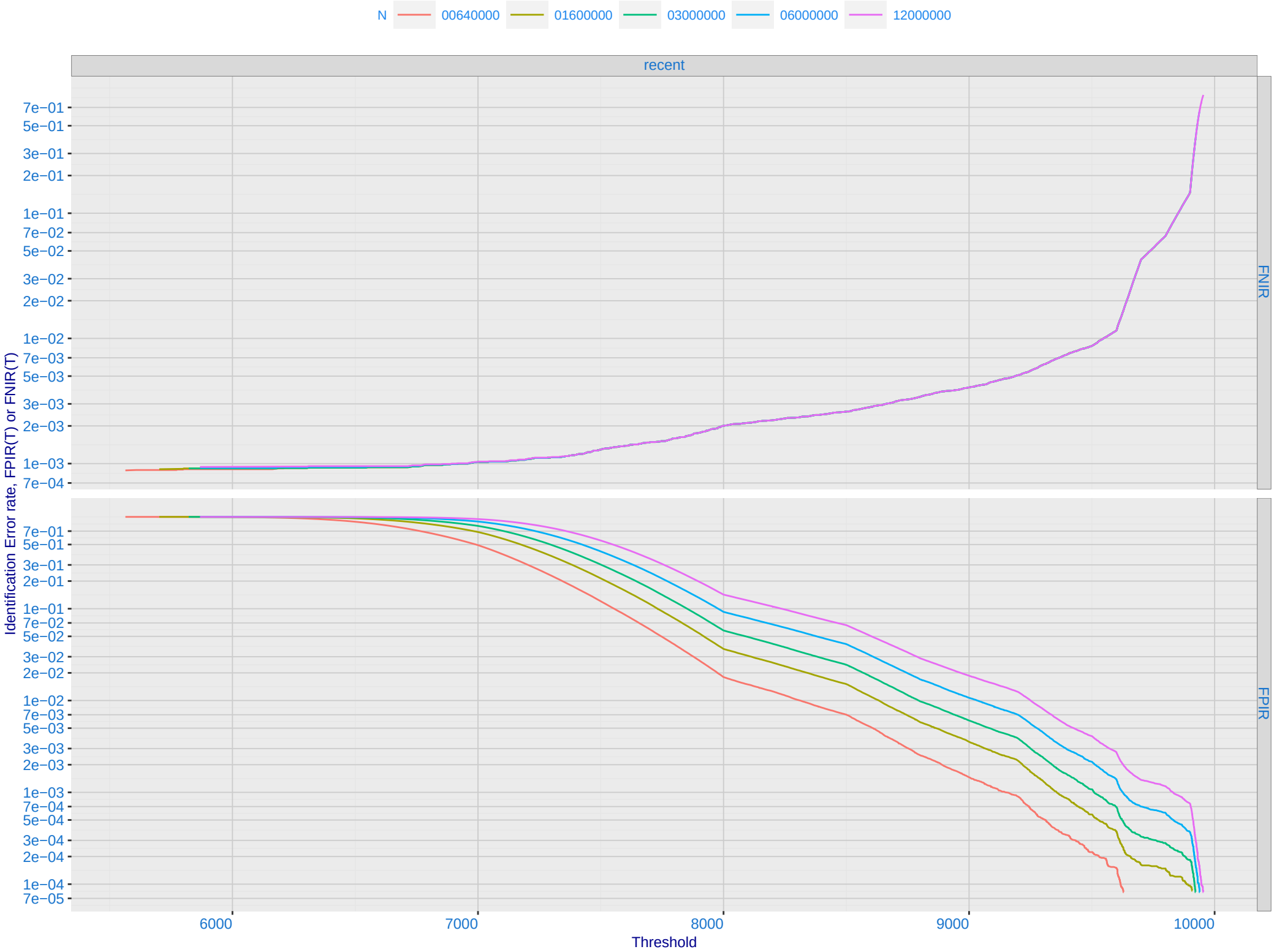

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (nec_004)
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
1e+06
3e+06
1e+07
Enrolled population size, N
Dataset:
2018 Mugshot
FNIR@FPIR = 0.001
dahua_004
nec_004
enrolment_style
recent

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

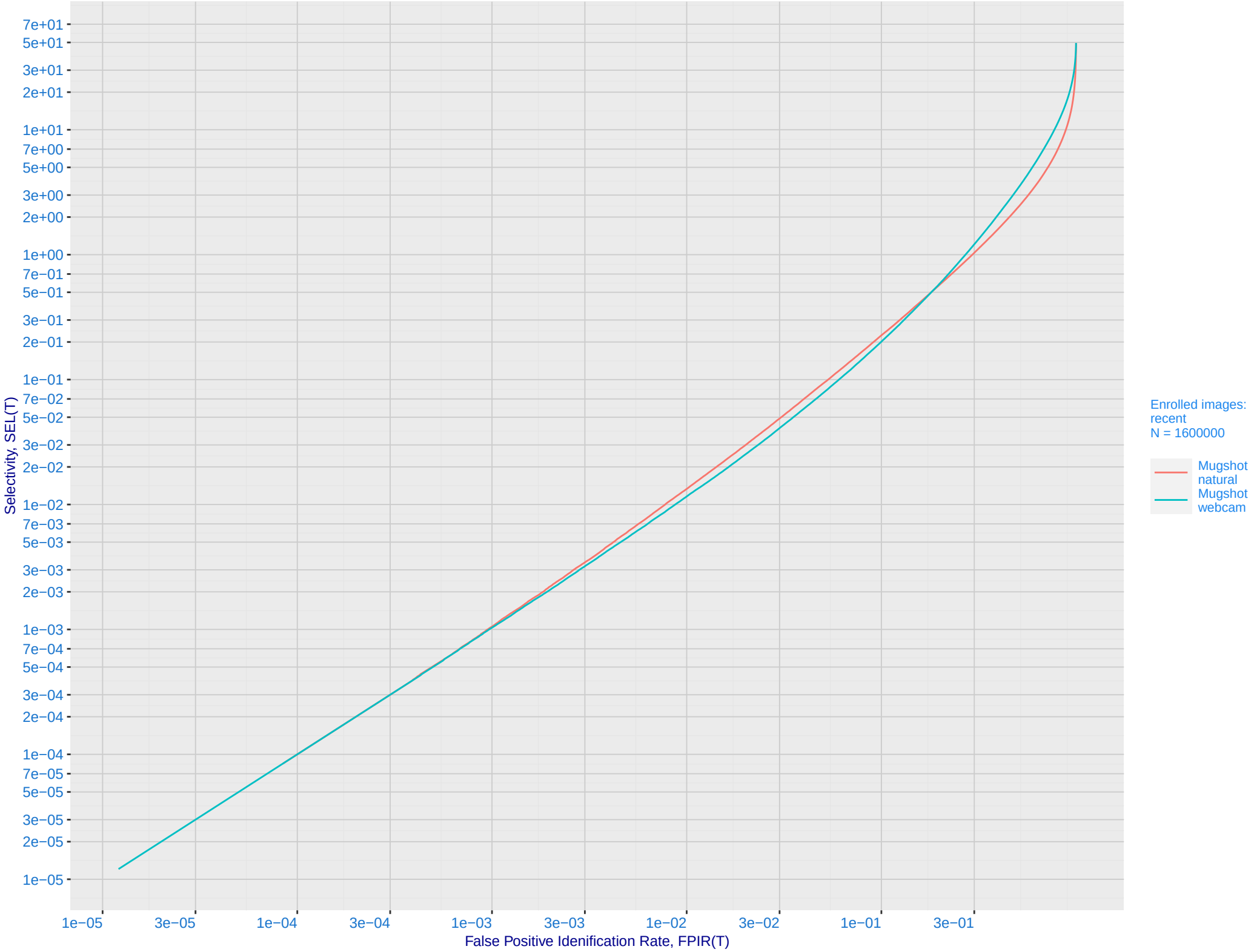


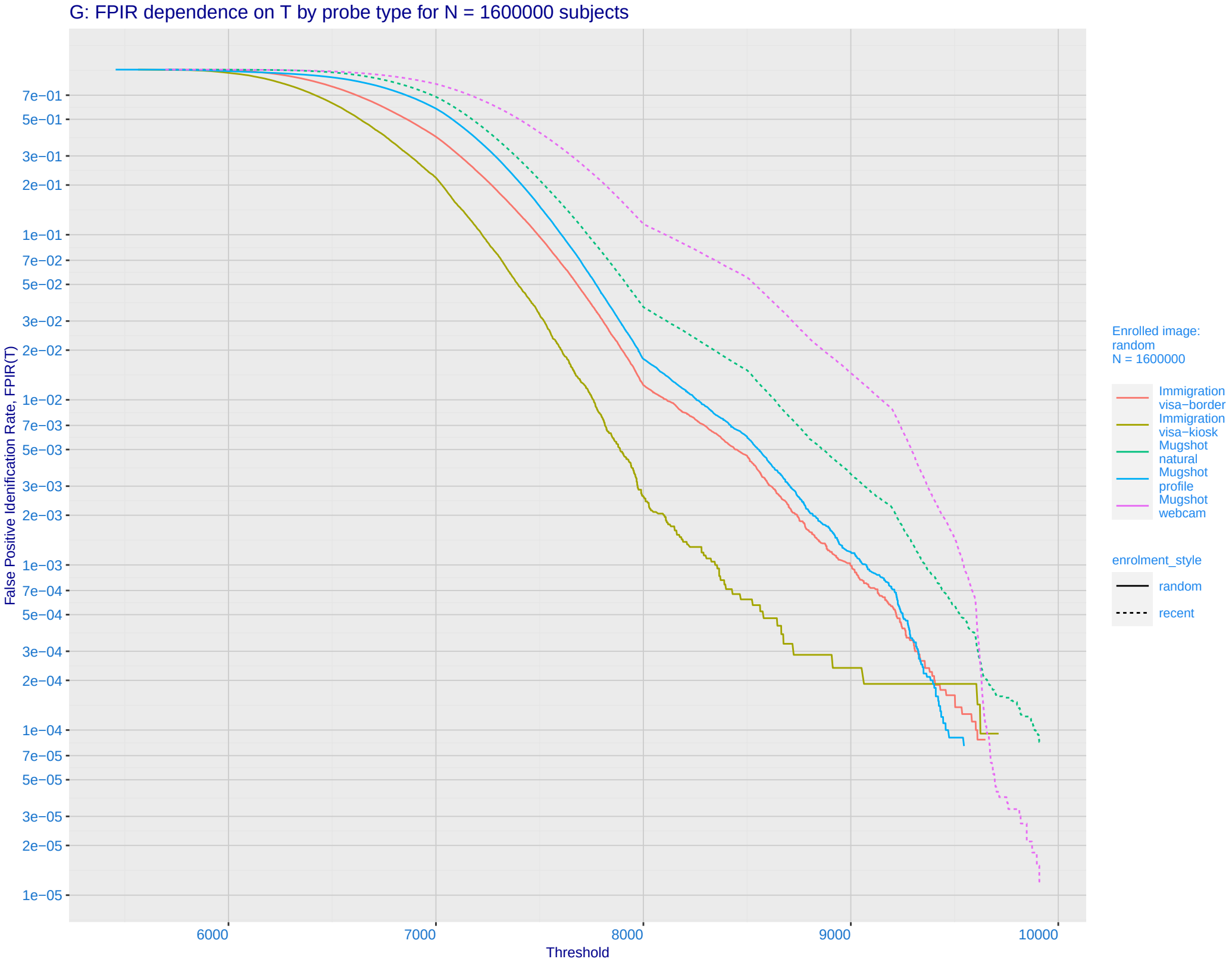

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
dahua_004
nec_004
False negative identification rate, FNIR(T)
False positive identification rate, FPIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
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
enrolment_style
random−ONE−MATE
recent−ONE−MATE

E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images

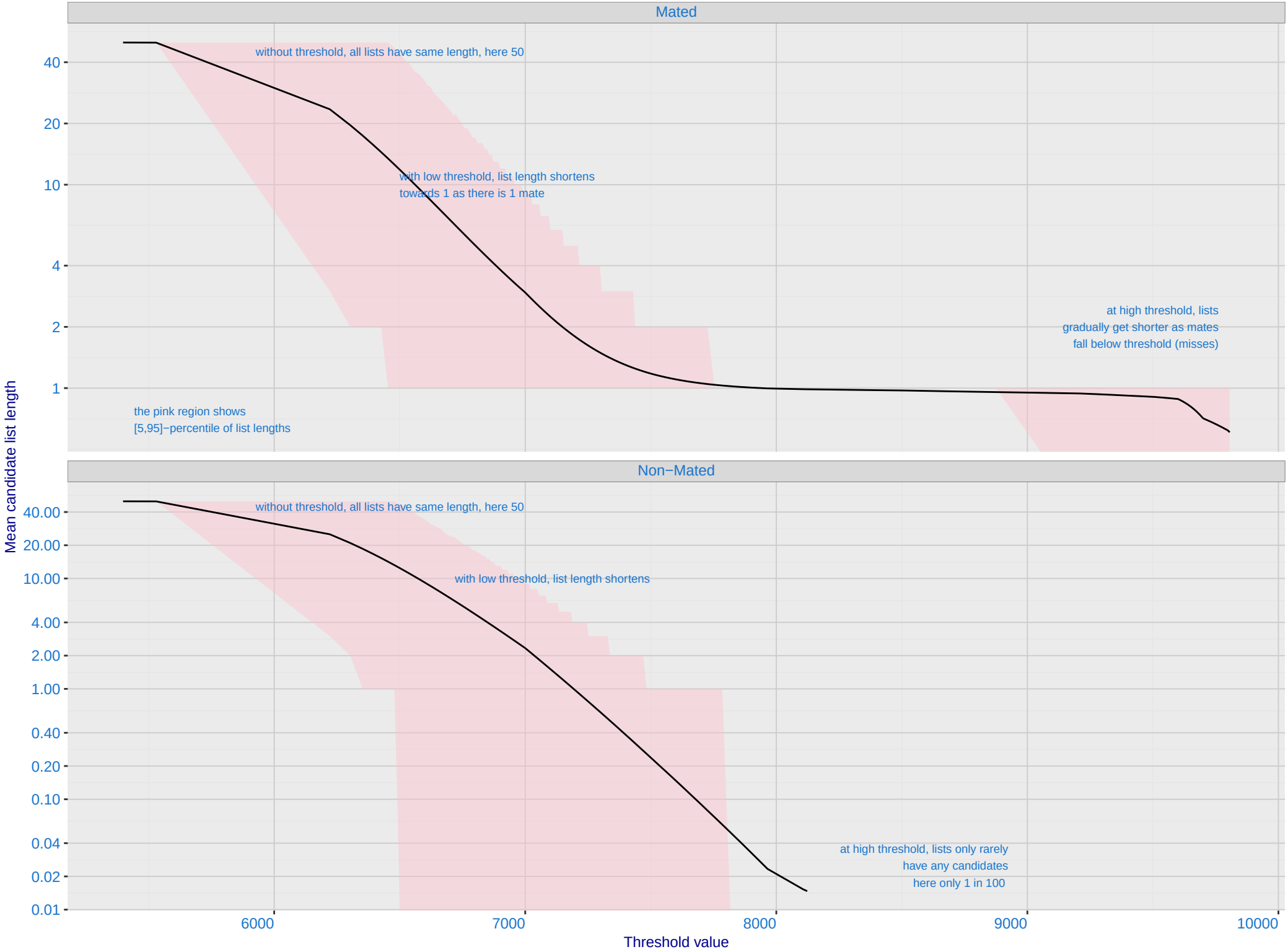


F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate

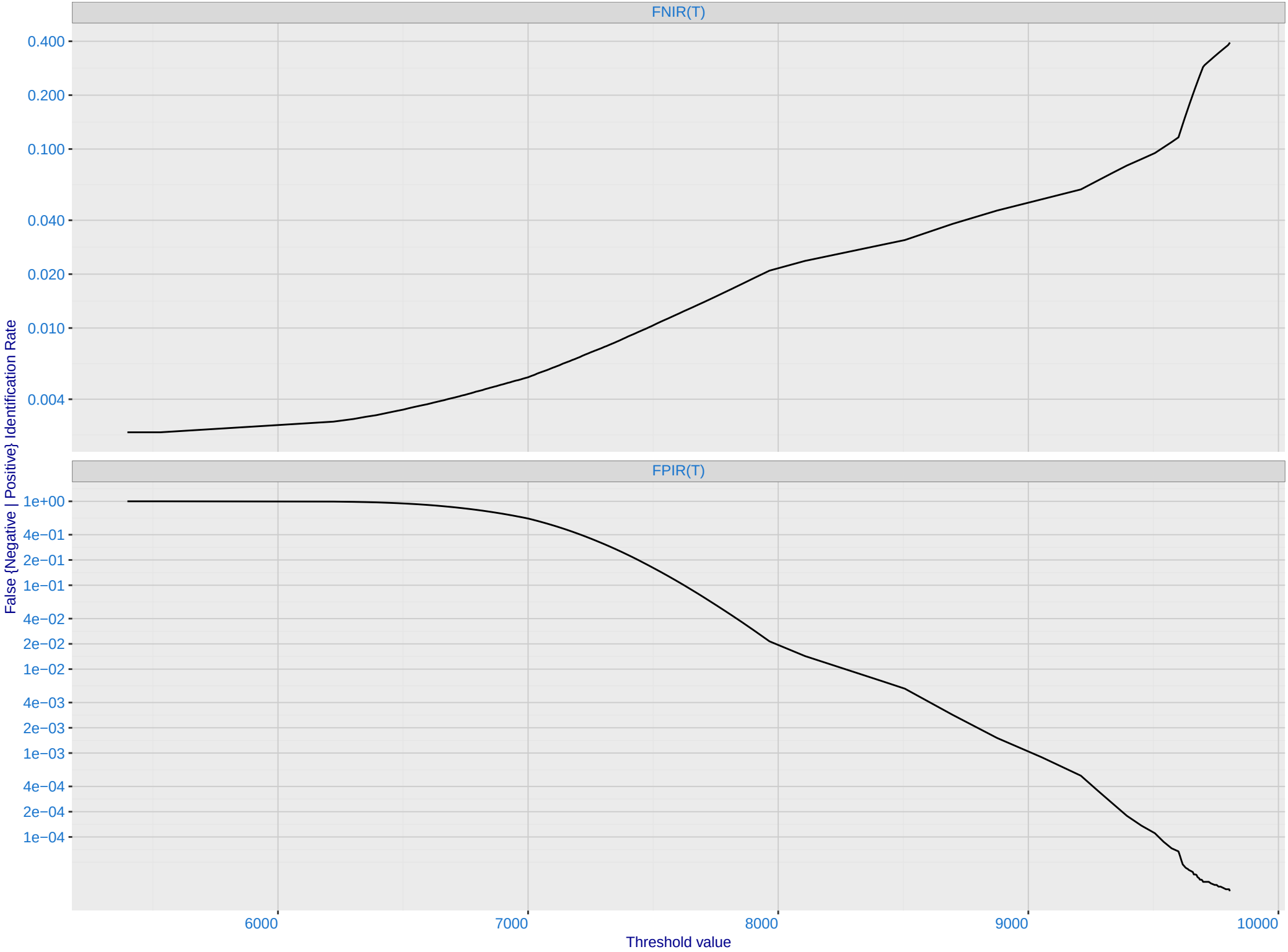



G: FPIR dependence on T by probe type for N = 1600000 subjects
False Positive Idenification Rate, FPIR(T)
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
5e−05
3e−05
2e−05
1e−05
6000
7000
8000
9000
10000
Threshold
Enrolled image:
random
N = 1600000
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
Mugshot profile
Mugshot webcam
enrolment_style
random
recent

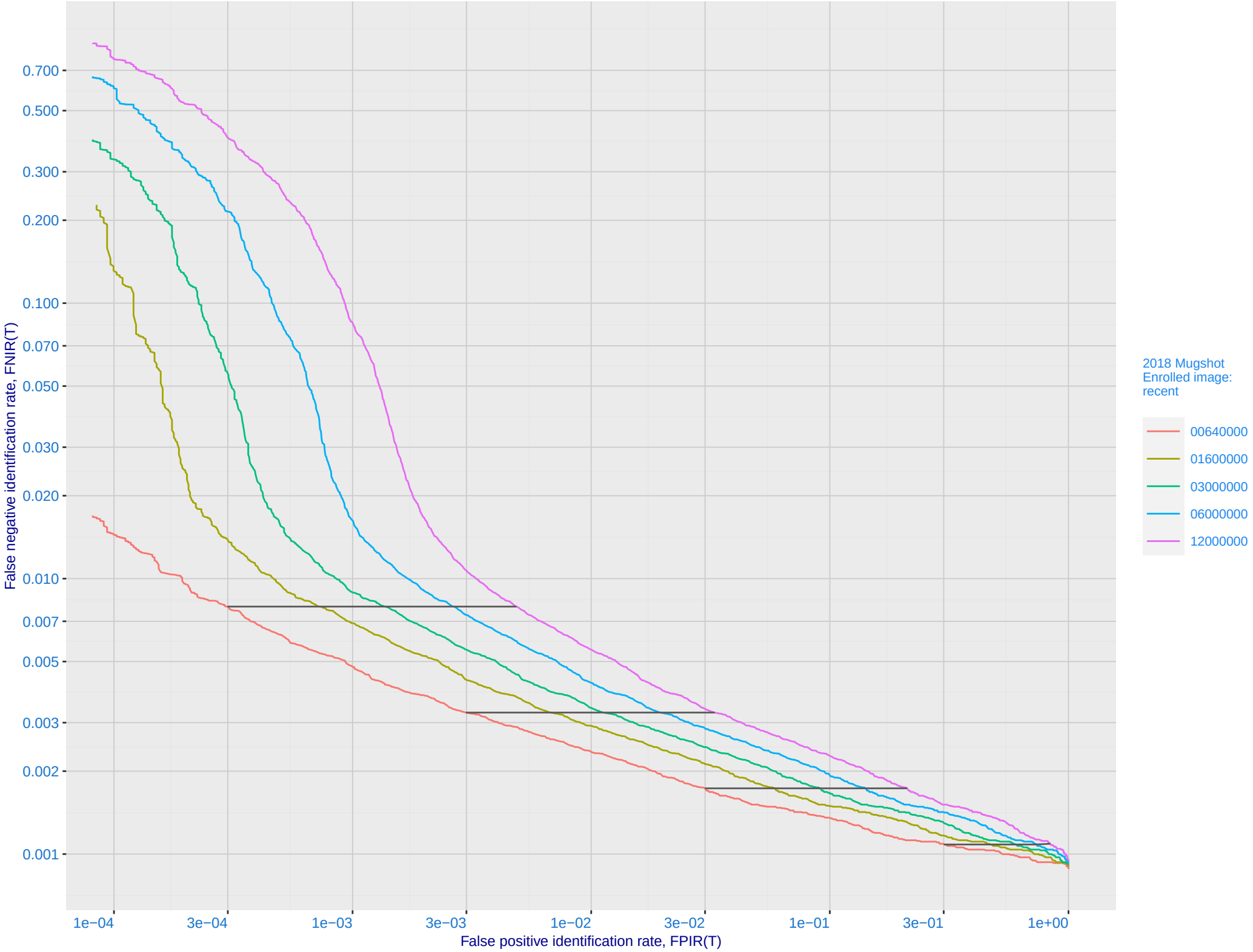
H: Reduced length candidate lists for human review
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image

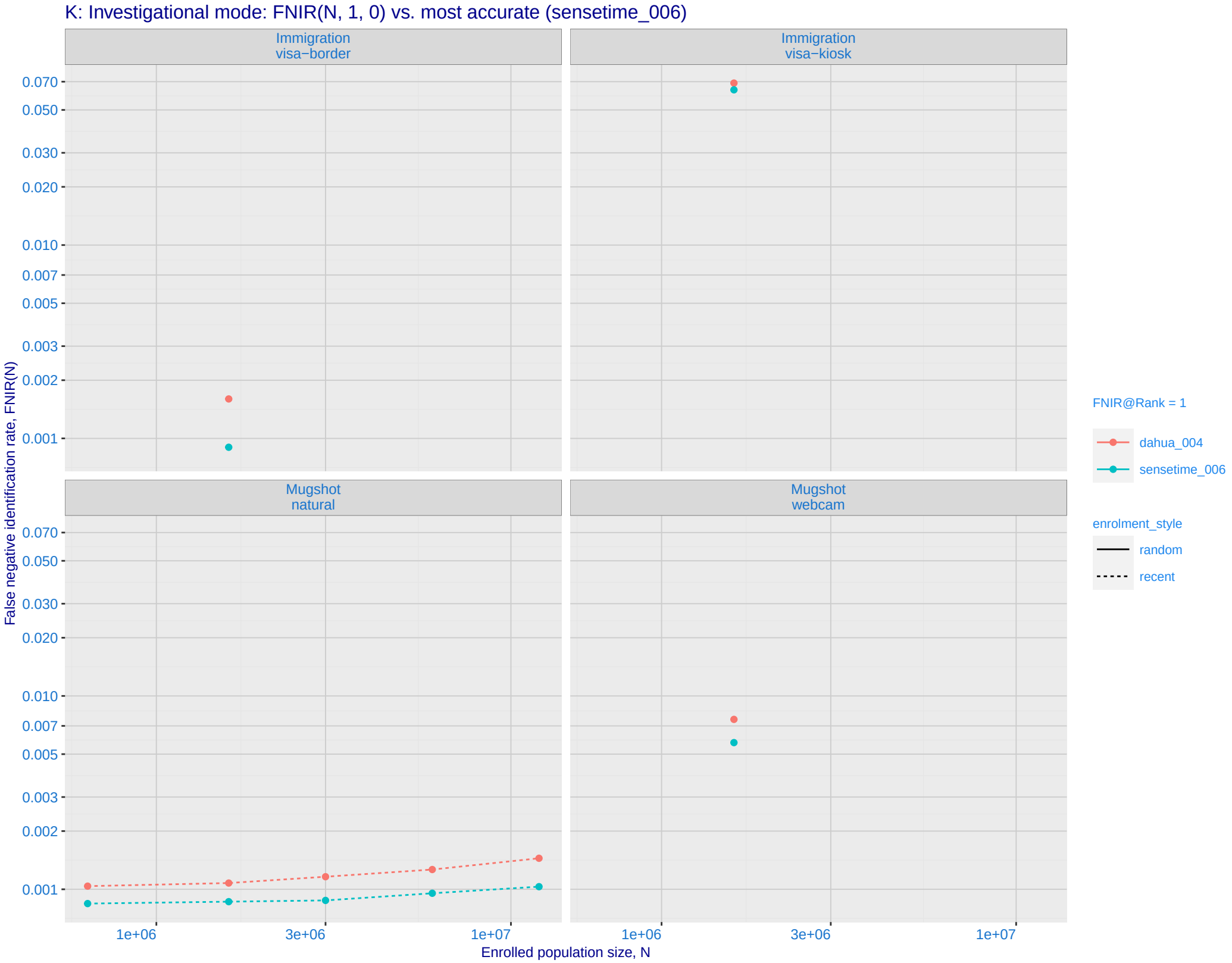


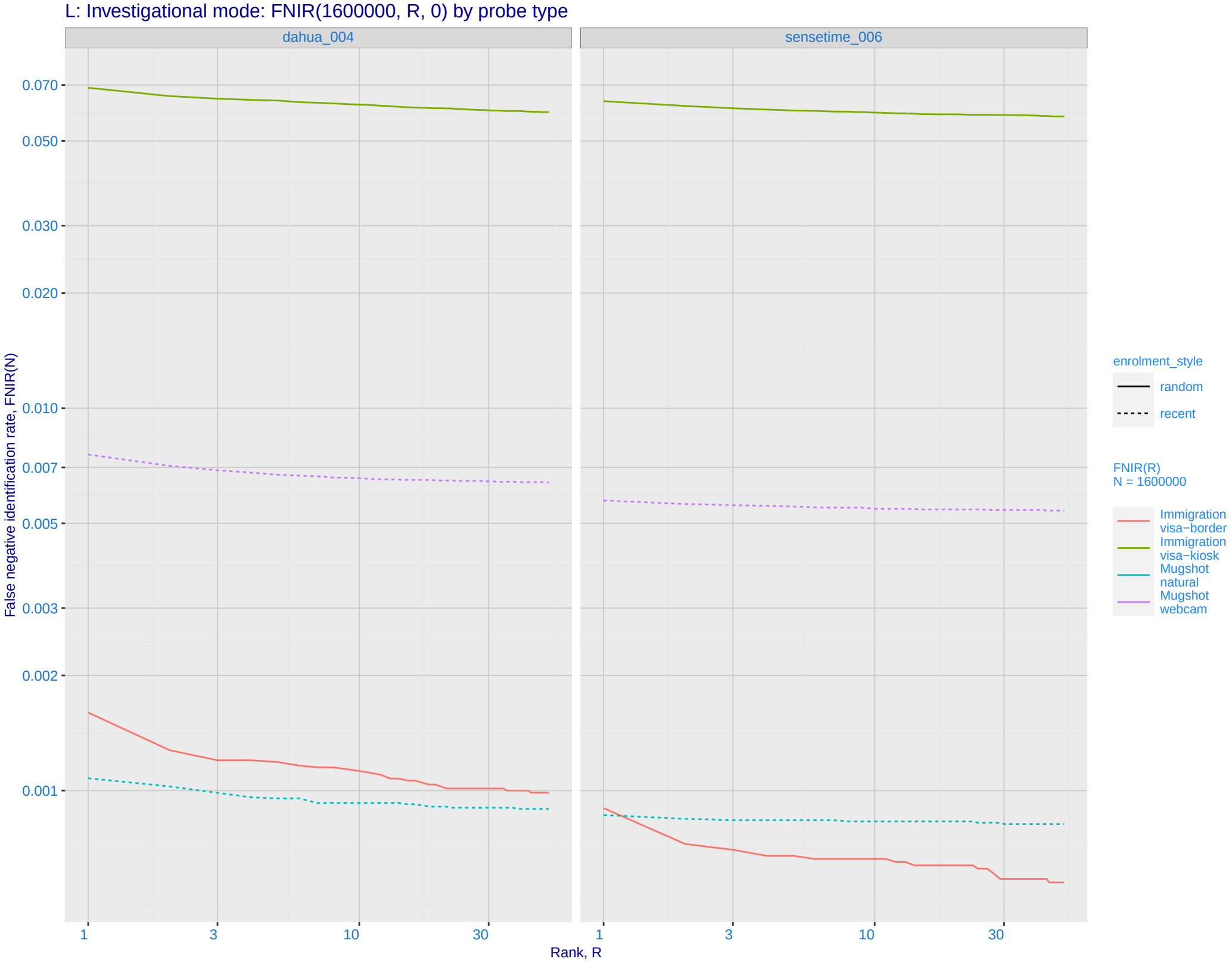
I: FNIR and FPIR dependence on threshold
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image



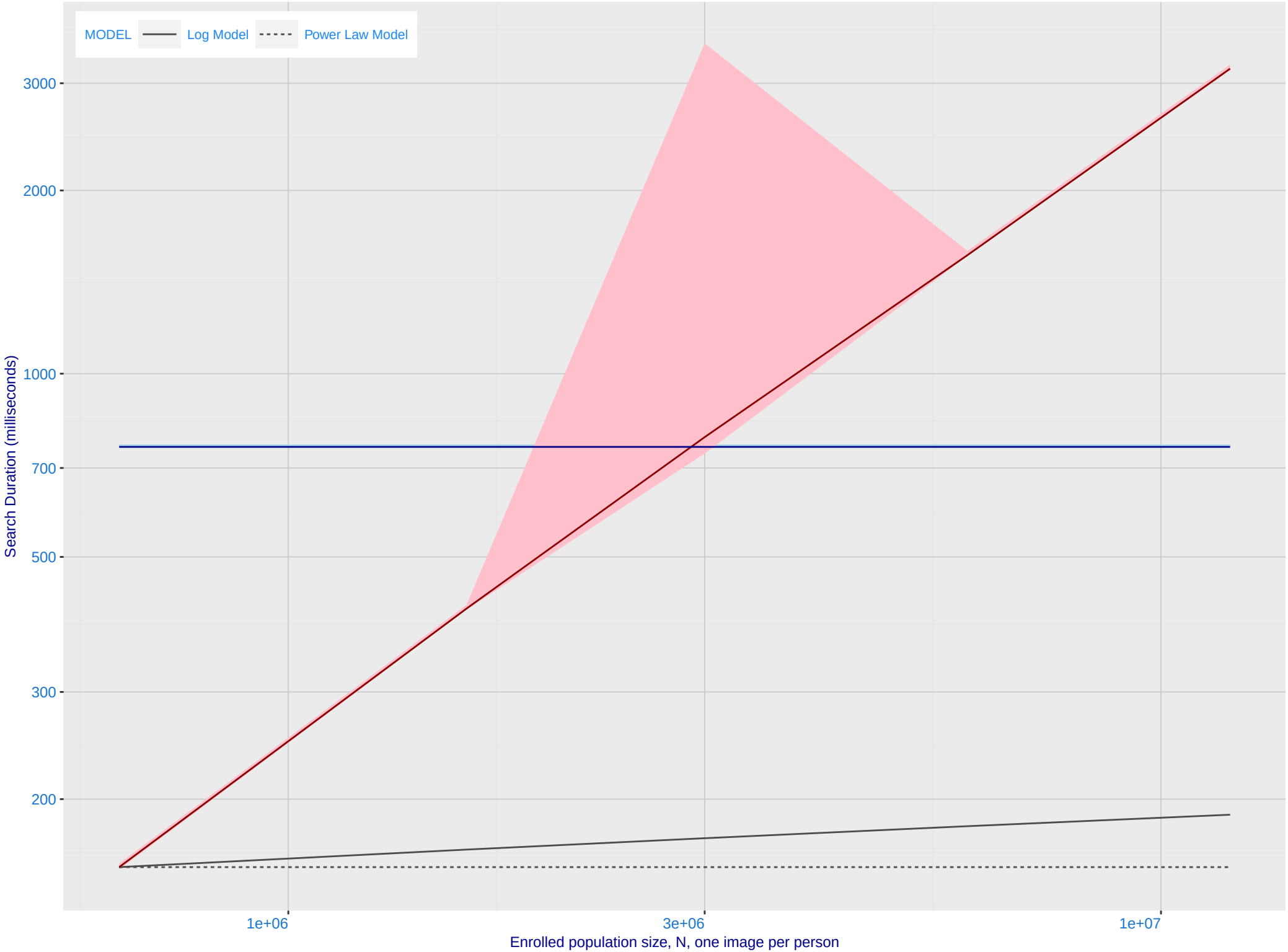
J: DET for Mugshot natural images and various N. Links connect points of equal threshold.




K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_006)
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
Mugshot webcam
False negative identification rate, FNIR(N)
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
dahua_004
sensetime_006
enrolment_style
random
recent


L: Investigational mode: FNIR(1600000, R, 0) by probe type
dahua_004
sensetime_006
False negative identification rate, FNIR(N)
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: dahua_004, Dataset: Border−Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)

−3.0 −2.5 −2.0 −1.5 −1.0 −0.5

FNIR(R=1, T=0)

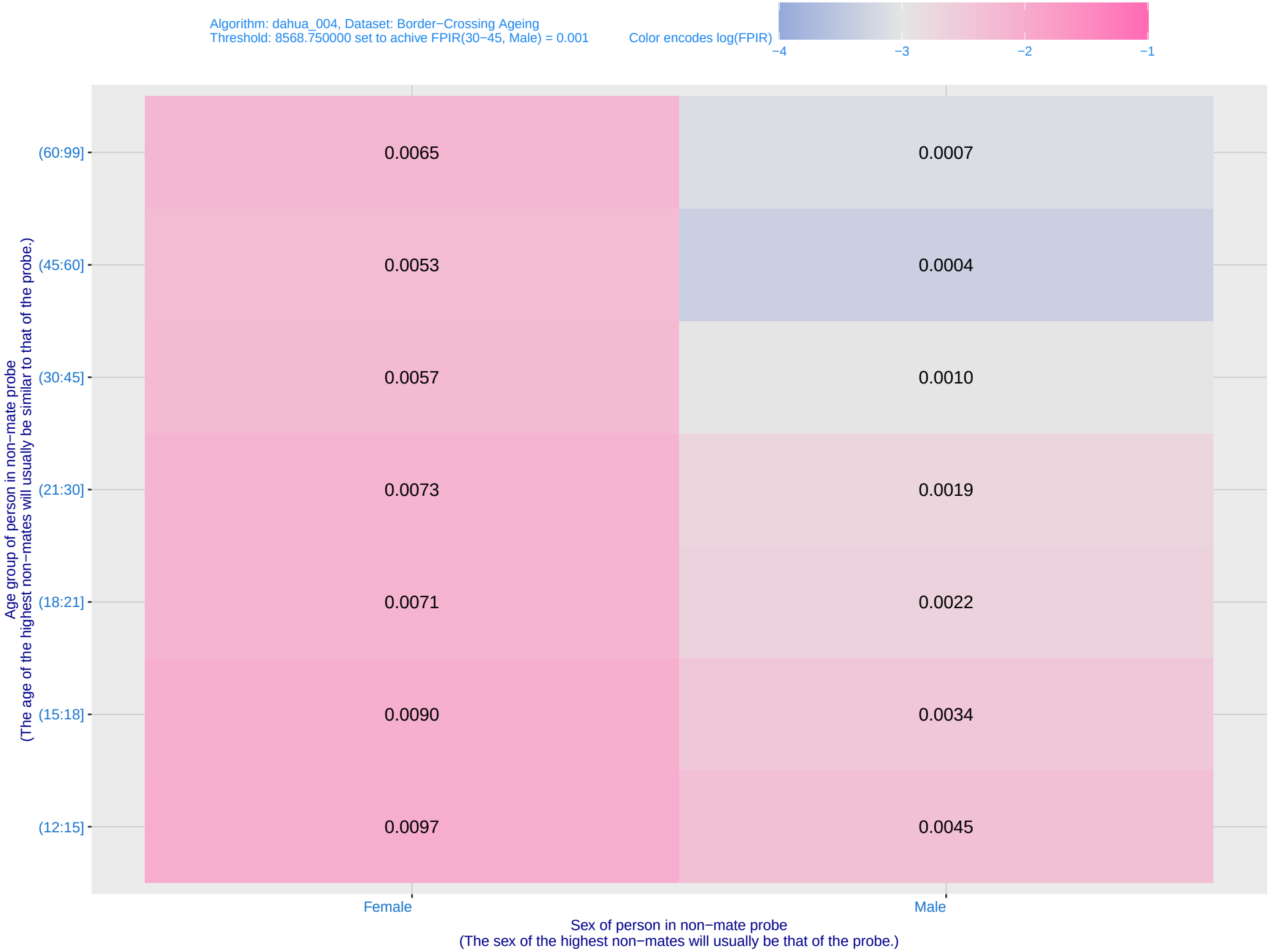
Age group at time of enrollment	Female 10	Female 11	Female 12	Female 13	Female 14	Female 15	Male 10	Male 11	Male 12	Male 13	Male 14	Male 15
(60:99]	0.007	0.008	0.010	0.010	0.012	0.011	0.003	0.003	0.002	0.003	0.003	0.008
(45:60]	0.005	0.005	0.006	0.007	0.009	0.006	0.002	0.002	0.003	0.003	0.003	0.002
(30:45]	0.005	0.005	0.006	0.007	0.008	0.008	0.003	0.002	0.003	0.003	0.003	0.002
(21:30]	0.008	0.007	0.008	0.010	0.011	0.009	0.004	0.003	0.003	0.003	0.004	0.003
(18:21]	0.015	0.013	0.014	0.016	0.018	0.015	0.006	0.006	0.008	0.008	0.008	0.007
(15:18]	0.023	0.020	0.022	0.022	0.025	0.028	0.019	0.014	0.017	0.024	0.022	0.026
(12:15]	0.033	0.022	0.029	0.038	0.038	0.023	0.041	0.031	0.043	0.052	0.043	0.014

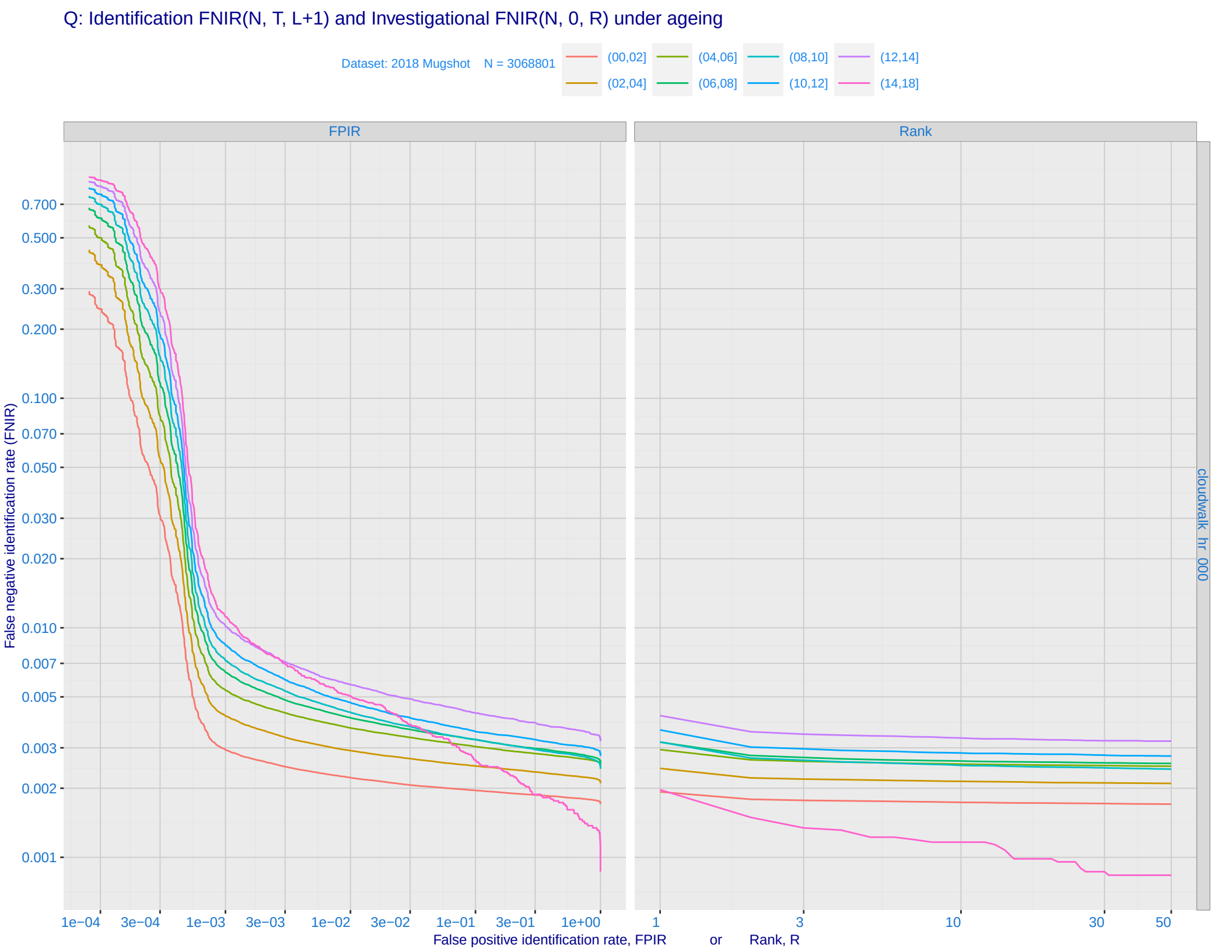
FNIR(R=50, T=8568.750000), FPIR(30−45, Male) = 0.001

Age group at time of enrollment	Female 10	Female 11	Female 12	Female 13	Female 14	Female 15	Male 10	Male 11	Male 12	Male 13	Male 14	Male 15
(60:99]	0.025	0.028	0.037	0.038	0.043	0.058	0.014	0.014	0.015	0.020	0.018	0.033
(45:60]	0.021	0.021	0.026	0.031	0.035	0.037	0.009	0.010	0.012	0.015	0.018	0.018
(30:45]	0.023	0.025	0.030	0.036	0.040	0.044	0.010	0.009	0.012	0.015	0.018	0.019
(21:30]	0.035	0.034	0.041	0.047	0.051	0.061	0.016	0.015	0.019	0.023	0.029	0.023
(18:21]	0.063	0.060	0.069	0.081	0.082	0.093	0.046	0.044	0.052	0.063	0.070	0.062
(15:18]	0.092	0.086	0.096	0.108	0.111	0.095	0.125	0.125	0.139	0.174	0.180	0.187
(12:15]	0.133	0.110	0.132	0.147	0.159	0.109	0.243	0.217	0.270	0.289	0.310	0.326

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.




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
cloudwalk_hr_000
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