A: Datasheet

Algorithm: gorilla_008

Developer: Gorilla Technology

Submission Date: 2022_10_31

Template size: 4242 bytes

Template time (2.5 percentile): 937 msec

Template time (median): 939 msec

Template time (97.5 percentile): 955 msec

Investigation:

Mugshot webcam ranking 52 (out of 343) −− FNIR(1600000, 0, 1) = 0.0098 vs. lowest 0.0055 from sensetime_008

Mugshot profile ranking 40 (out of 312) −− FNIR(1600000, 0, 1) = 0.0853 vs. lowest 0.0521 from sensetime_007

Immigration visa−border ranking 35 (out of 270) −− FNIR(1600000, 0, 1) = 0.0017 vs. lowest 0.0006 from cloudwalk_mt_001

Immigration visa−kiosk ranking 66 (out of 215) −− FNIR(1600000, 0, 1) = 0.0750 vs. lowest 0.0395 from cloudwalk_mt_001

Identification:

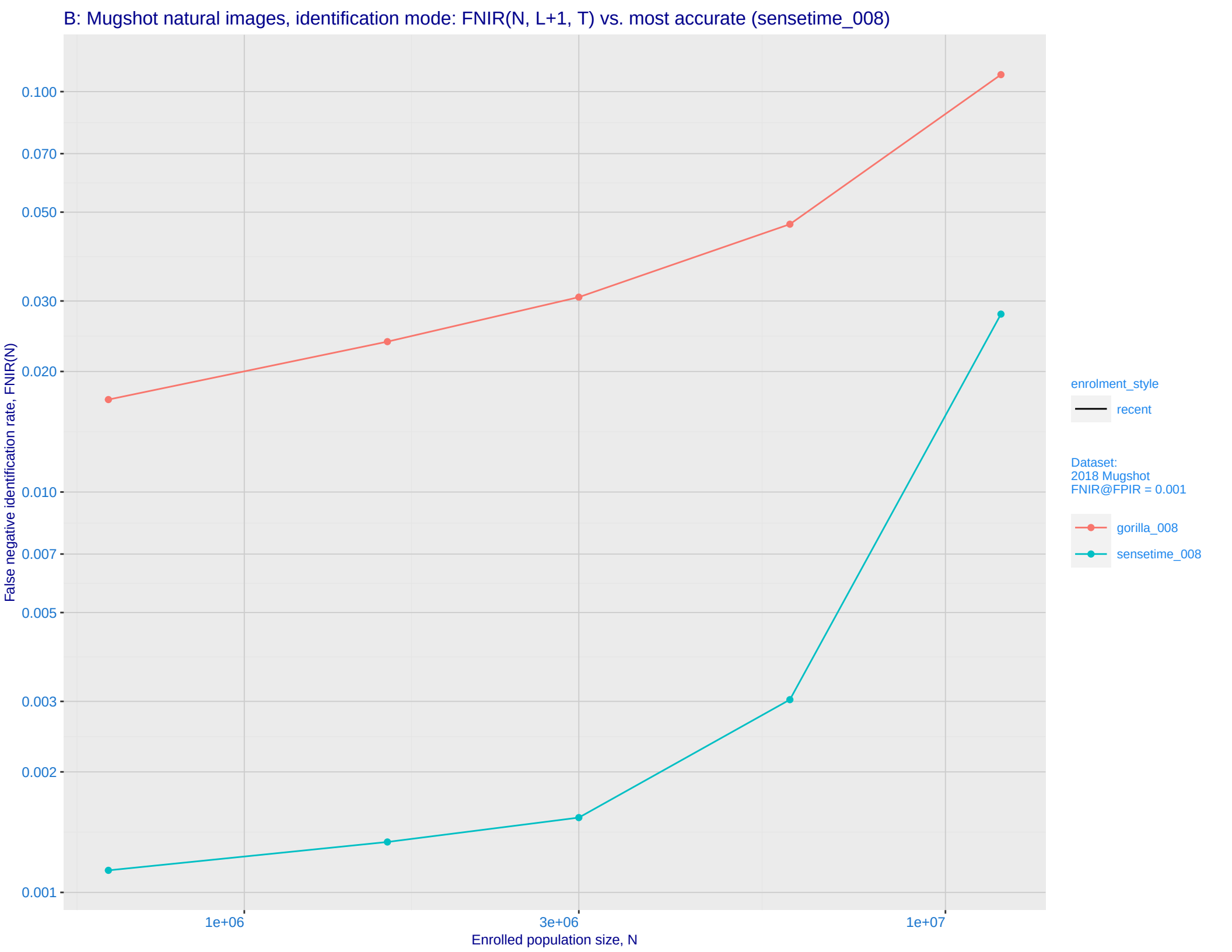
Frontal mugshot ranking 121 (out of 381) −− FNIR(1600000, T, L+1) = 0.0237, FPIR=0.001000 vs. lowest 0.0013 from sensetime_008

Mugshot webcam ranking 133 (out of 341) −− FNIR(1600000, T, L+1) = 0.0834, FPIR=0.001000 vs. lowest 0.0090 from sensetime_008

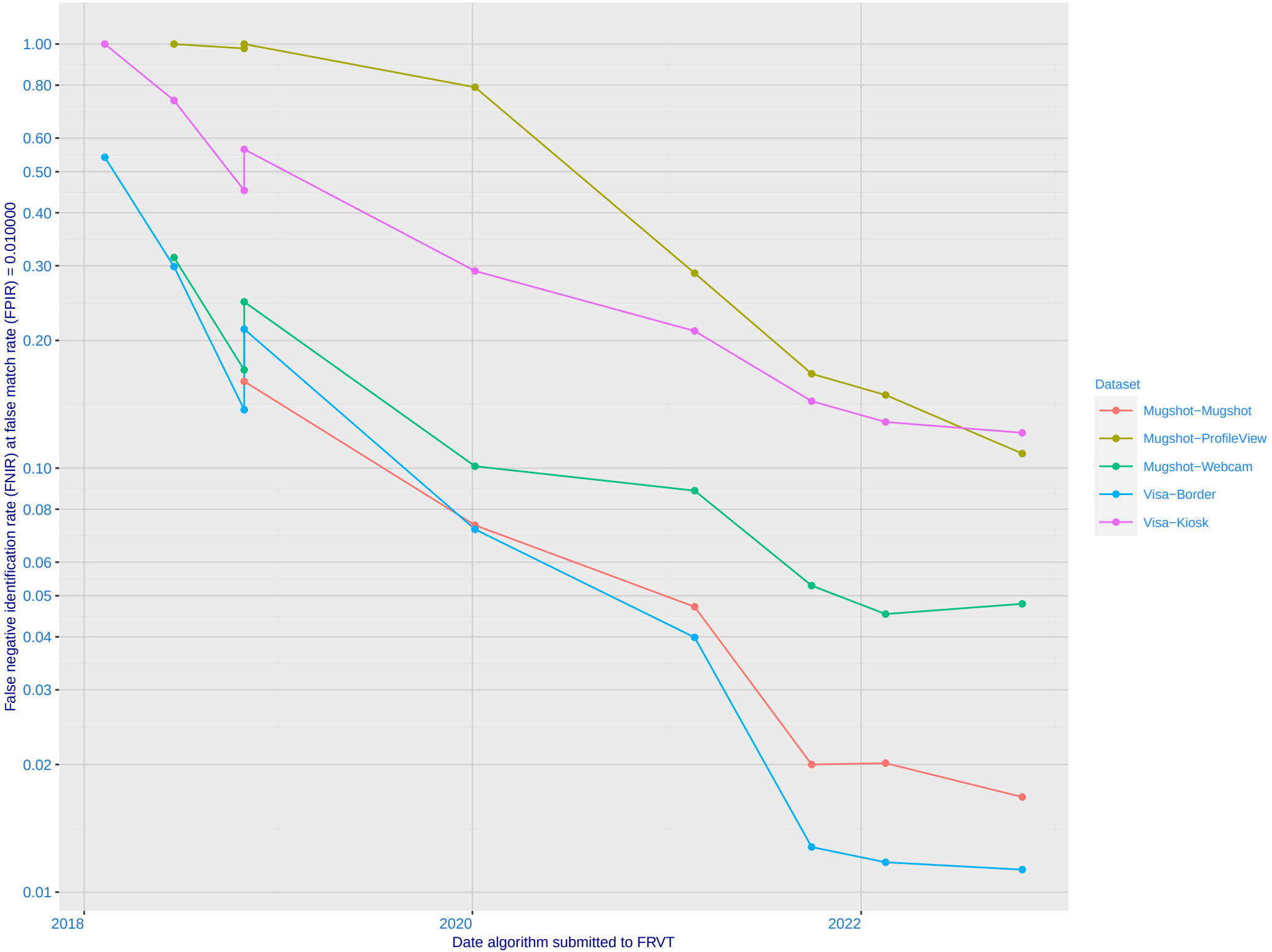
Mugshot profile ranking 31 (out of 311) −− FNIR(1600000, T, L+1) = 0.4630, FPIR=0.001000 vs. lowest 0.0698 from cloudwalk_mt_001

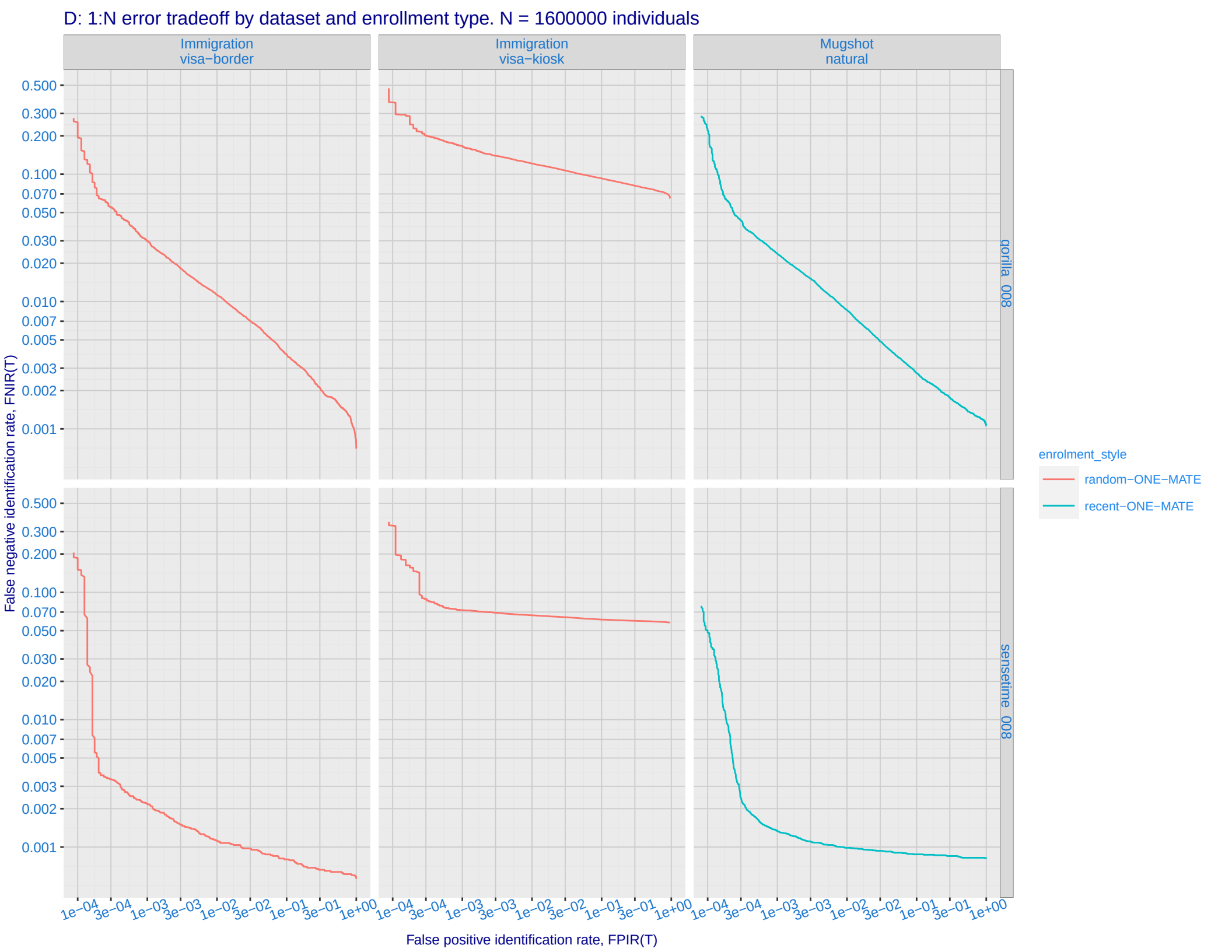
Immigration visa−border ranking 95 (out of 269) −− FNIR(1600000, T, L+1) = 0.0298, FPIR=0.001000 vs. lowest 0.0013 from cloudwalk_mt_001

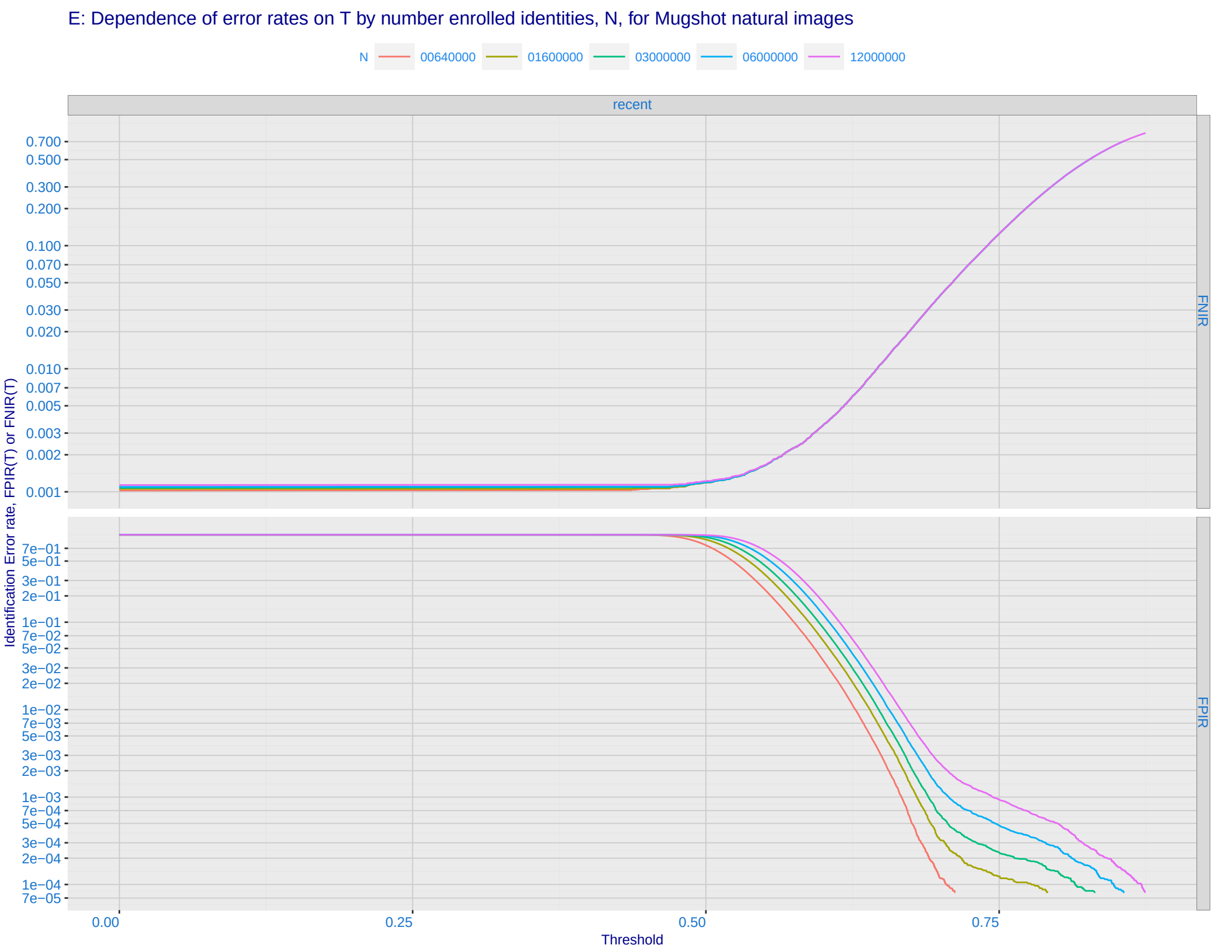
Immigration visa−kiosk ranking 64 (out of 215) −− FNIR(1600000, T, L+1) = 0.1667, FPIR=0.001000 vs. lowest 0.0532 from cloudwalk_mt_001

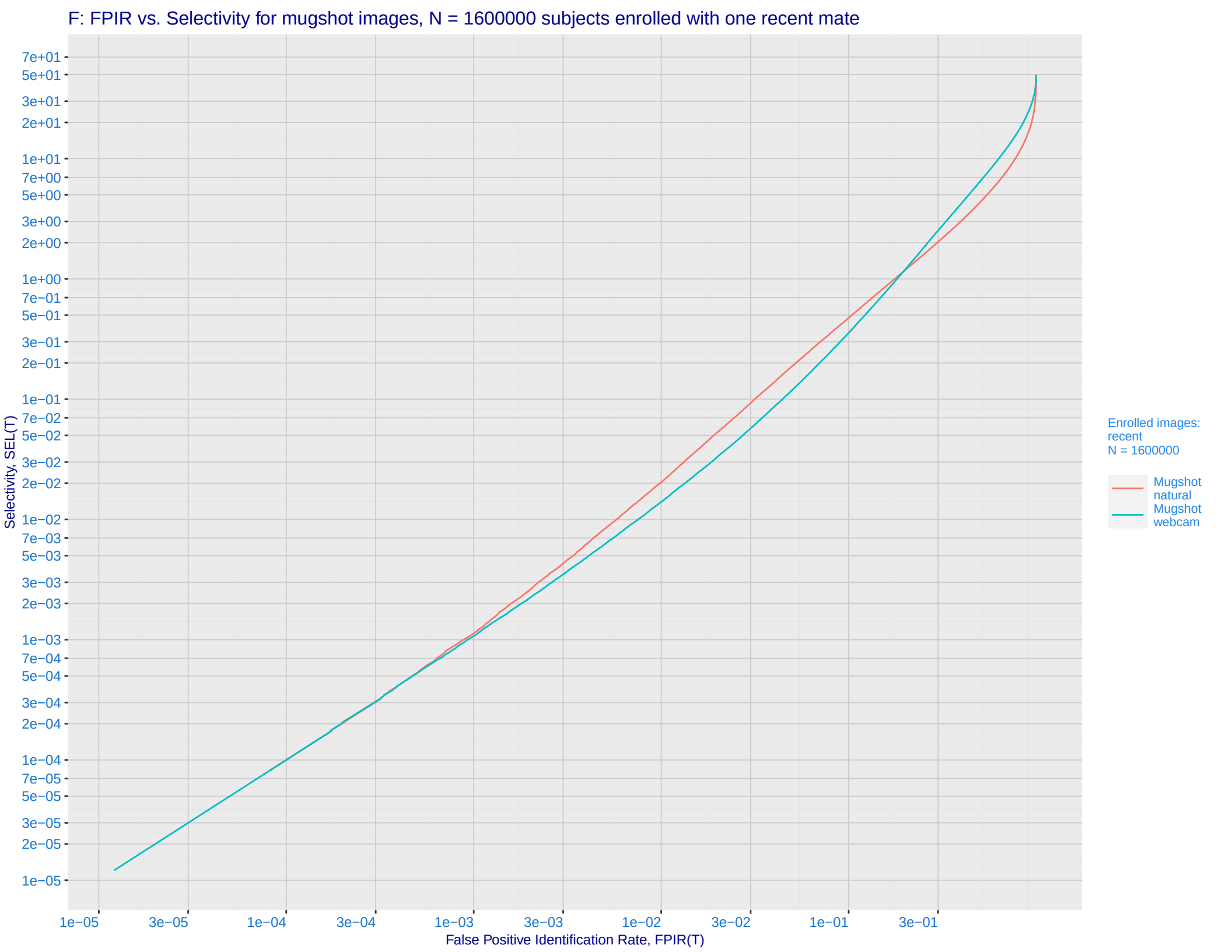

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (sensetime_008)
False negative identification rate, FNIR(N)
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e+06
3e+06
1e+07
Enrolled population size, N
enrolment_style
recent
Dataset:
2018 Mugshot
FNIR@FPIR = 0.001
gorilla_008
sensetime_008

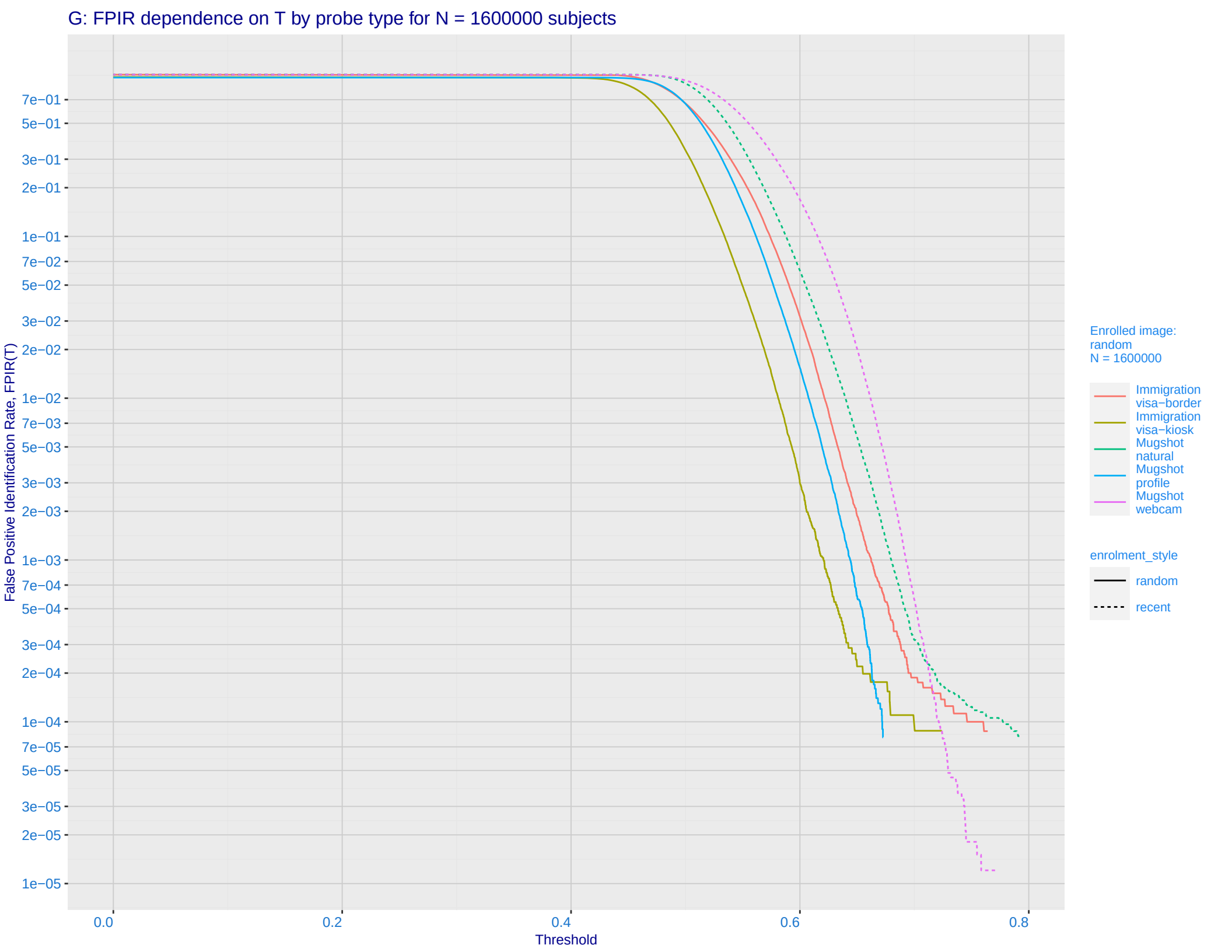
C: Evolution of accuracy for GORILLA algorithms on three datasets 2018 − present

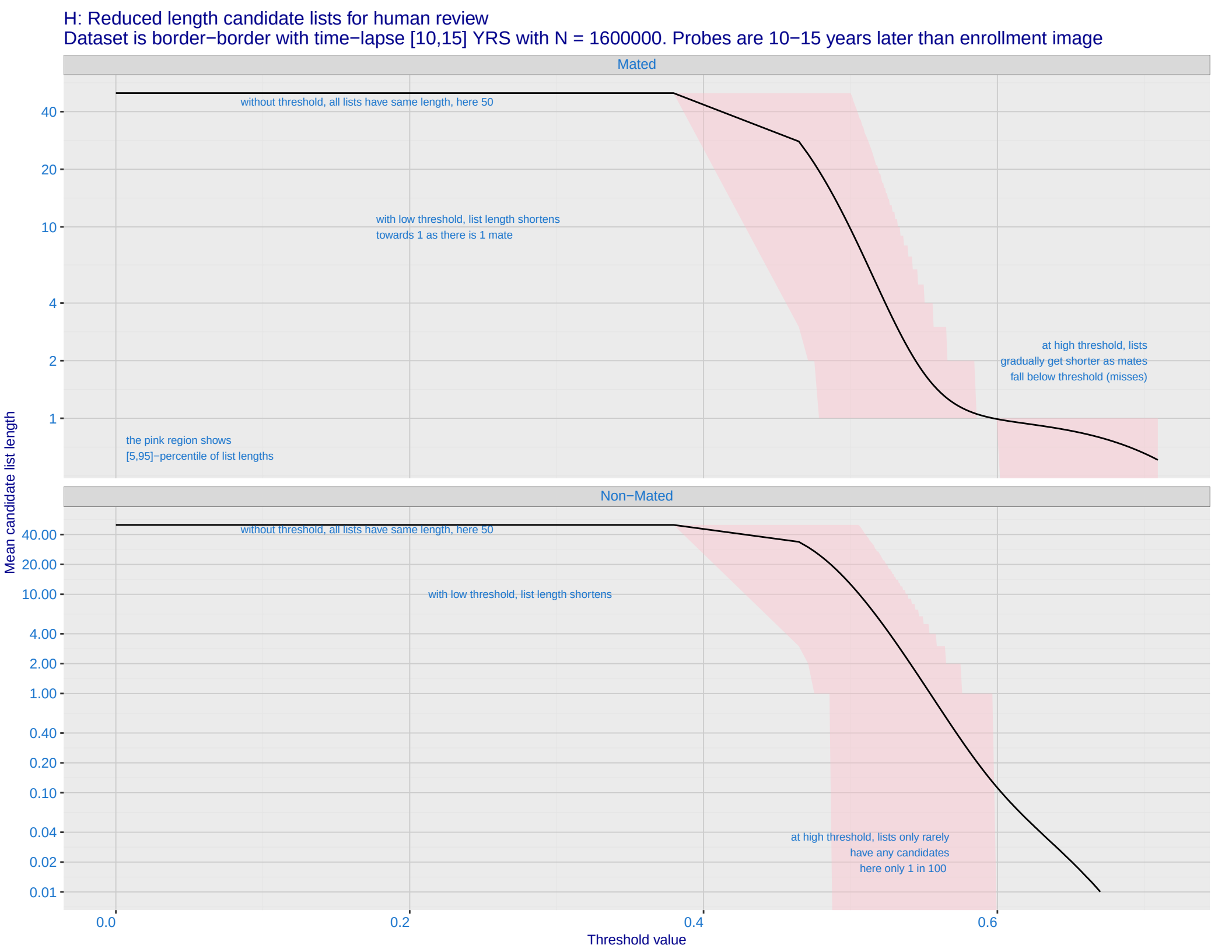


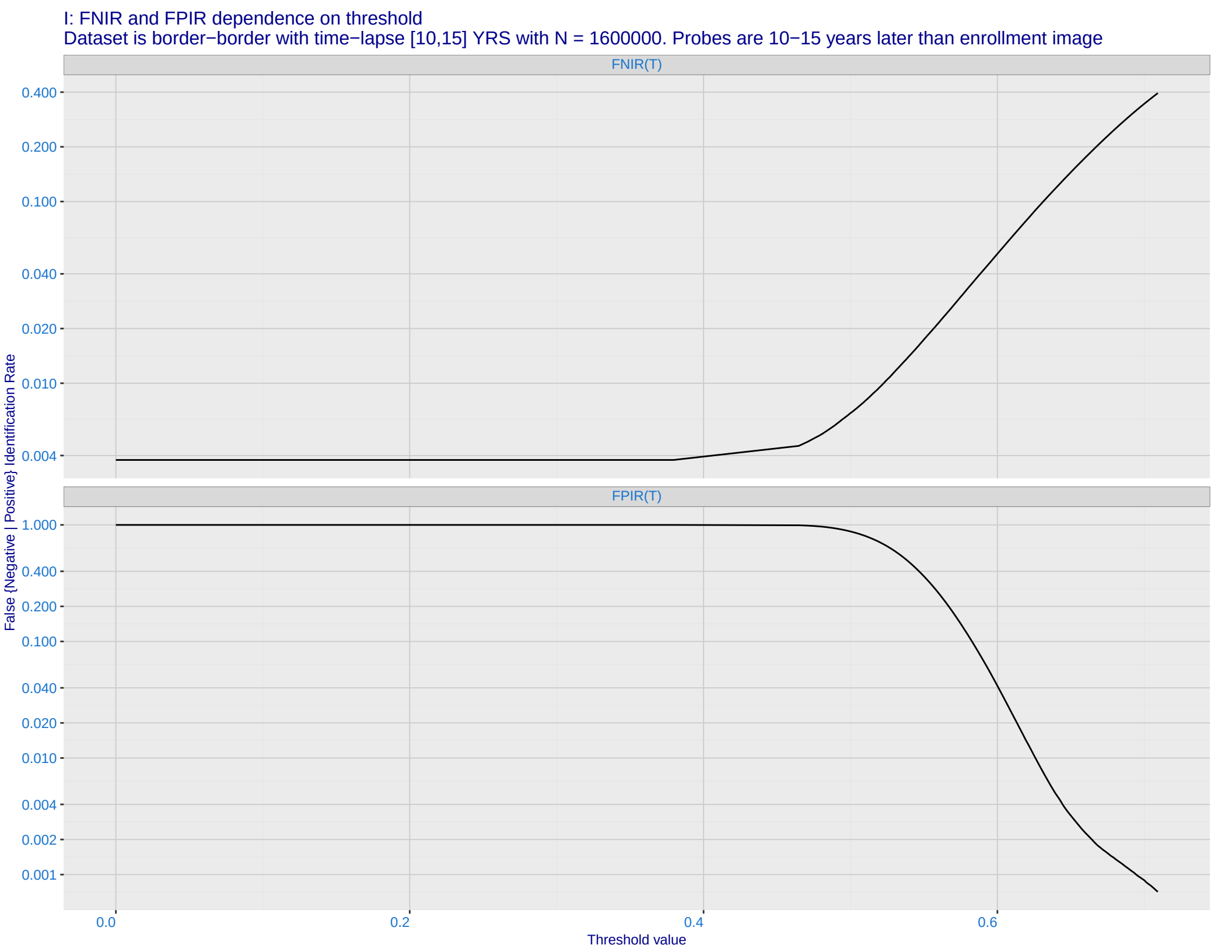

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
gorilla 008
sensetime 008
False negative identification rate, FNIR(T)
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e−04
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

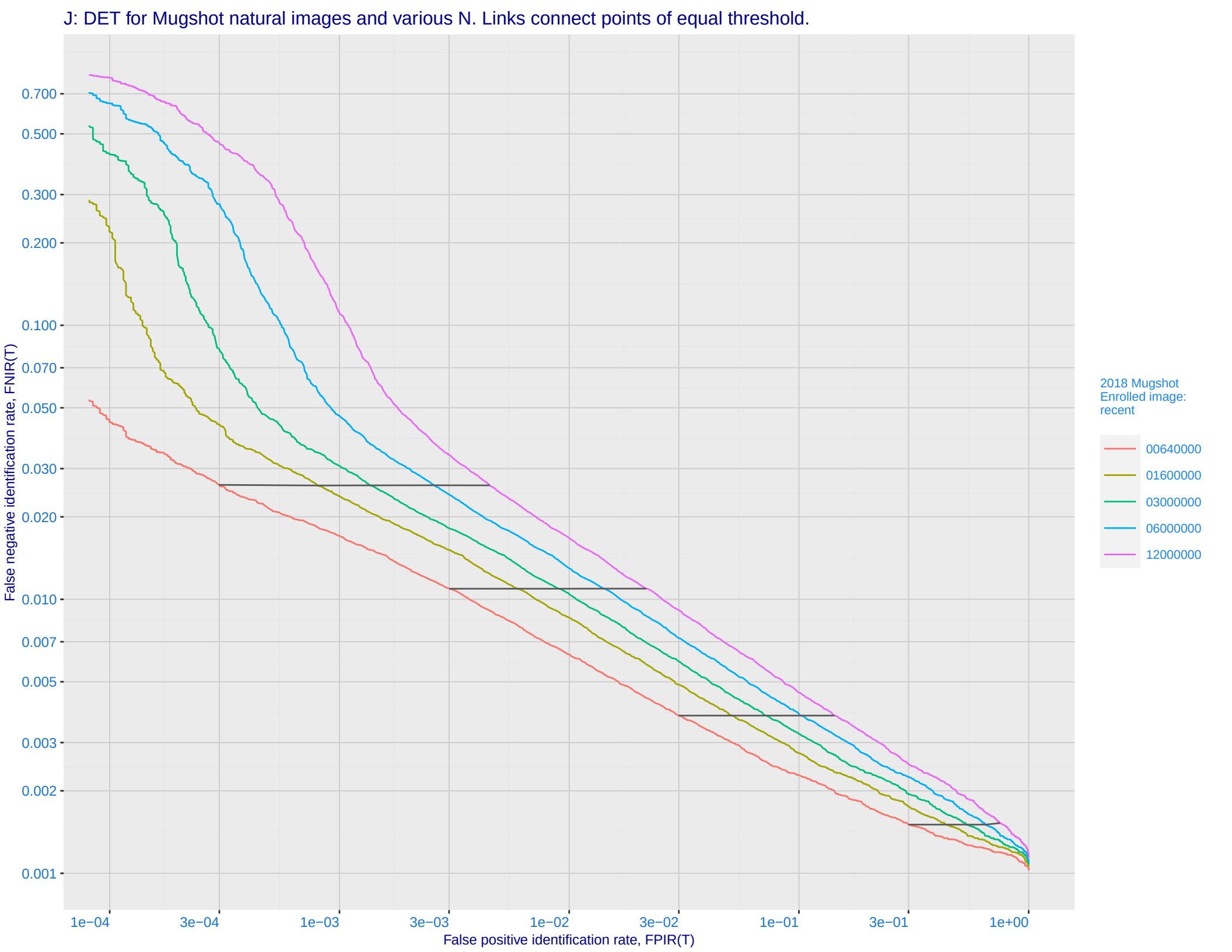

E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images
N
00640000
01600000
03000000
06000000
12000000
recent
FNIR
FPIR
Identification Error rate, FPIR(T) or FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
7e−01
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
0.00
0.25
0.50
0.75
Threshold

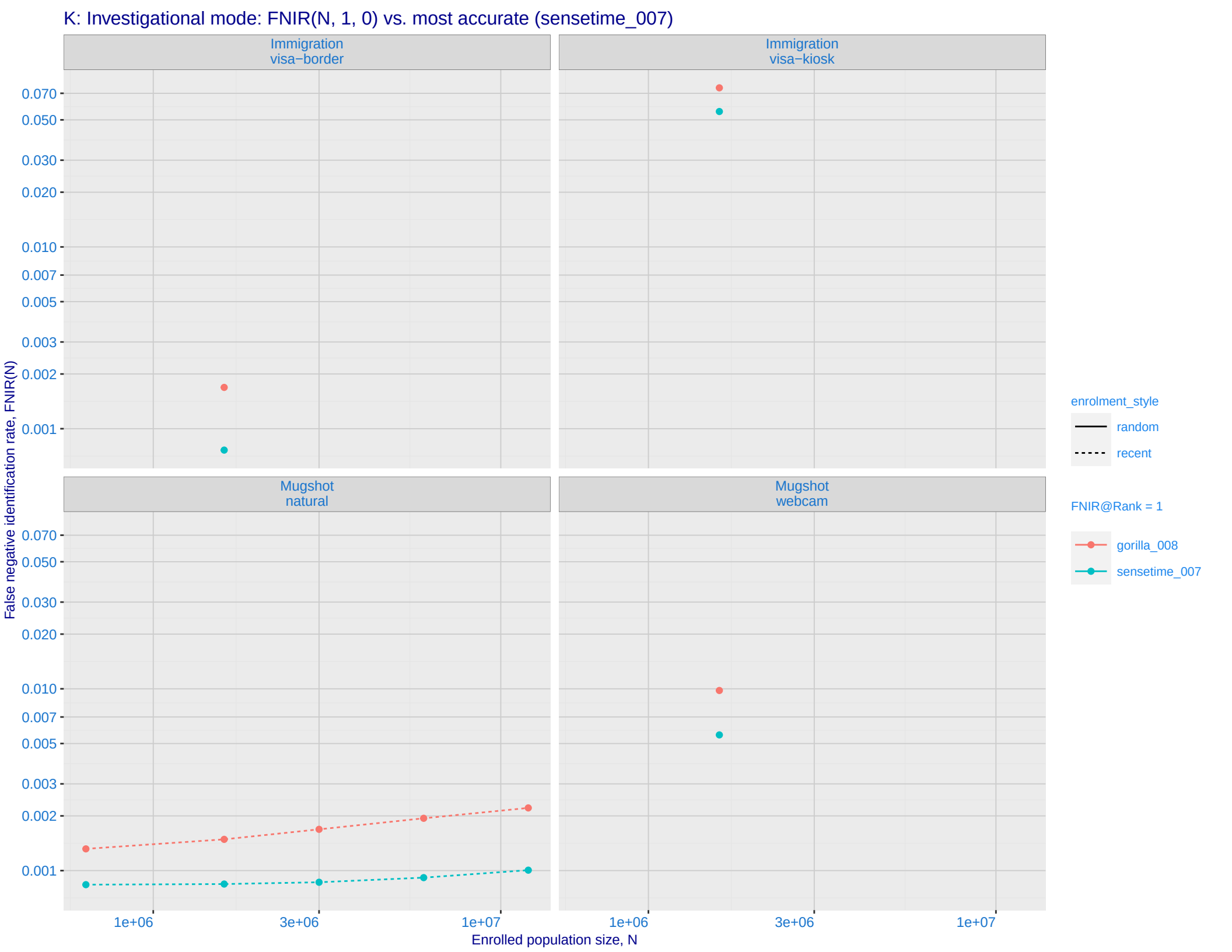

F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate
Selectivity, SEL(T)
7e+01
5e+01
3e+01
2e+01
1e+01
7e+00
5e+00
3e+00
2e+00
1e+00
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05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

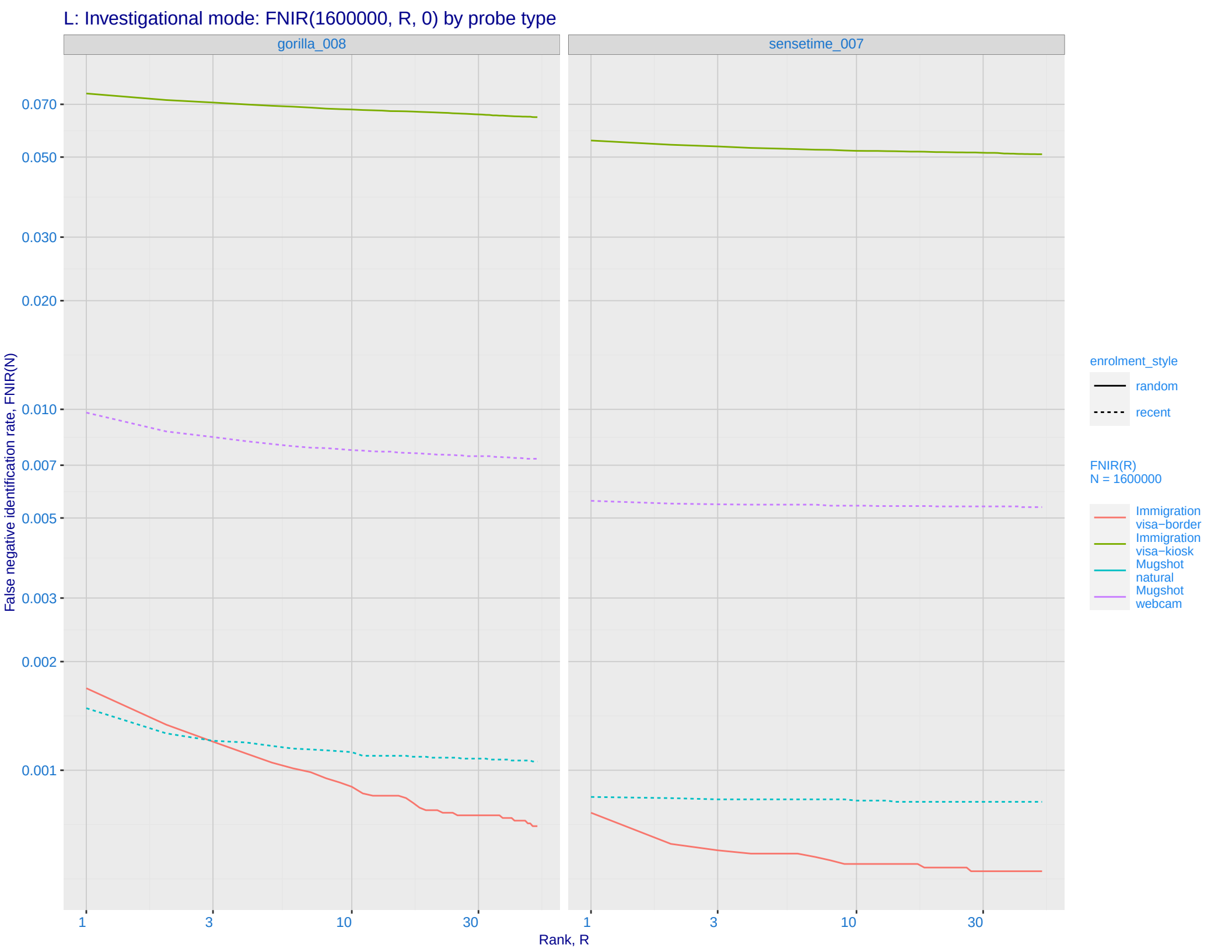

G: FPIR dependence on T by probe type for N = 1600000 subjects
False Positive Identification Rate, FPIR(T)
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
5e−05
3e−05
2e−05
1e−05
0.0
0.2
0.4
0.6
0.8
Threshold
Enrolled image:
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
40
20
10
4
2
1
40.00
20.00
10.00
4.00
2.00
1.00
0.40
0.20
0.10
0.04
0.02
0.01
0.0
0.2
0.4
0.6

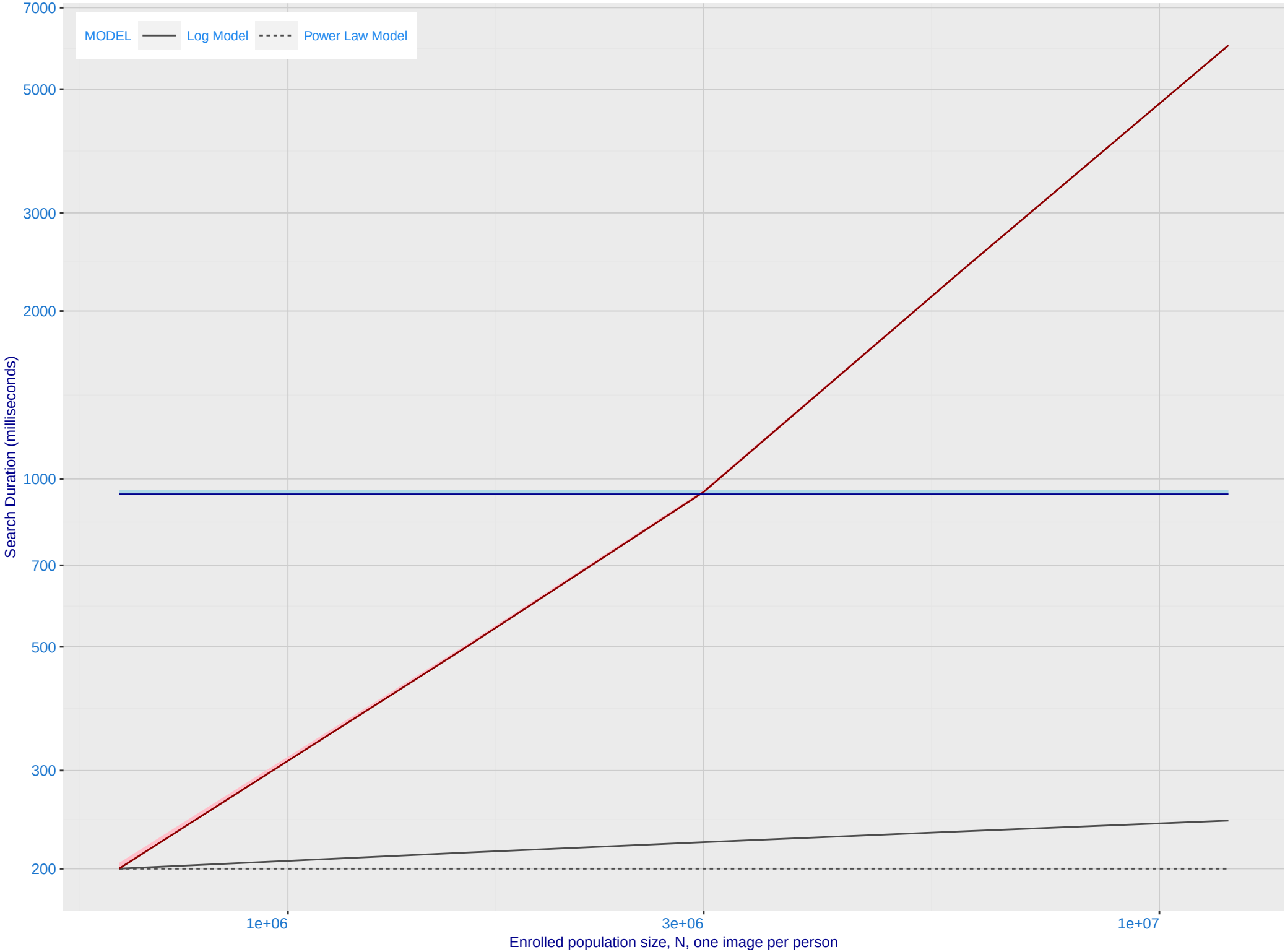

I: FNIR and FPIR dependence on threshold
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image
FNIR(T)
FPIR(T)
False {Negative | Positive} Identification Rate
0.400
0.200
0.100
0.040
0.020
0.010
0.004
1.000
0.400
0.200
0.100
0.040
0.020
0.010
0.004
0.002
0.001
0.0
0.2
0.4
0.6
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)
0.070
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
gorilla_008
sensetime_007


L: Investigational mode: FNIR(1600000, R, 0) by probe type
gorilla_008
sensetime_007
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

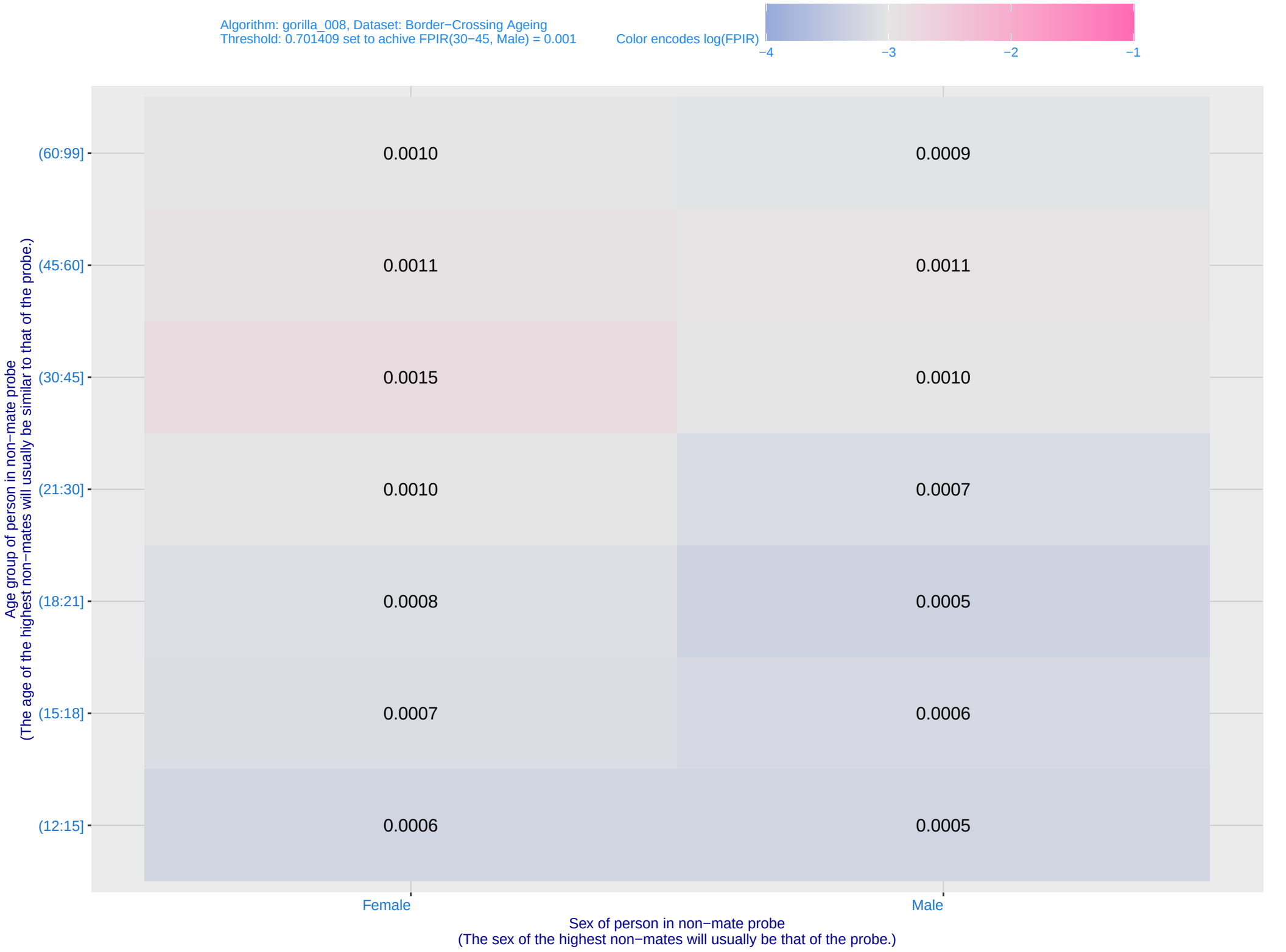
M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements.
The template generation time is independent of N. The log and power−law models are fit to the first two (N,T) observations

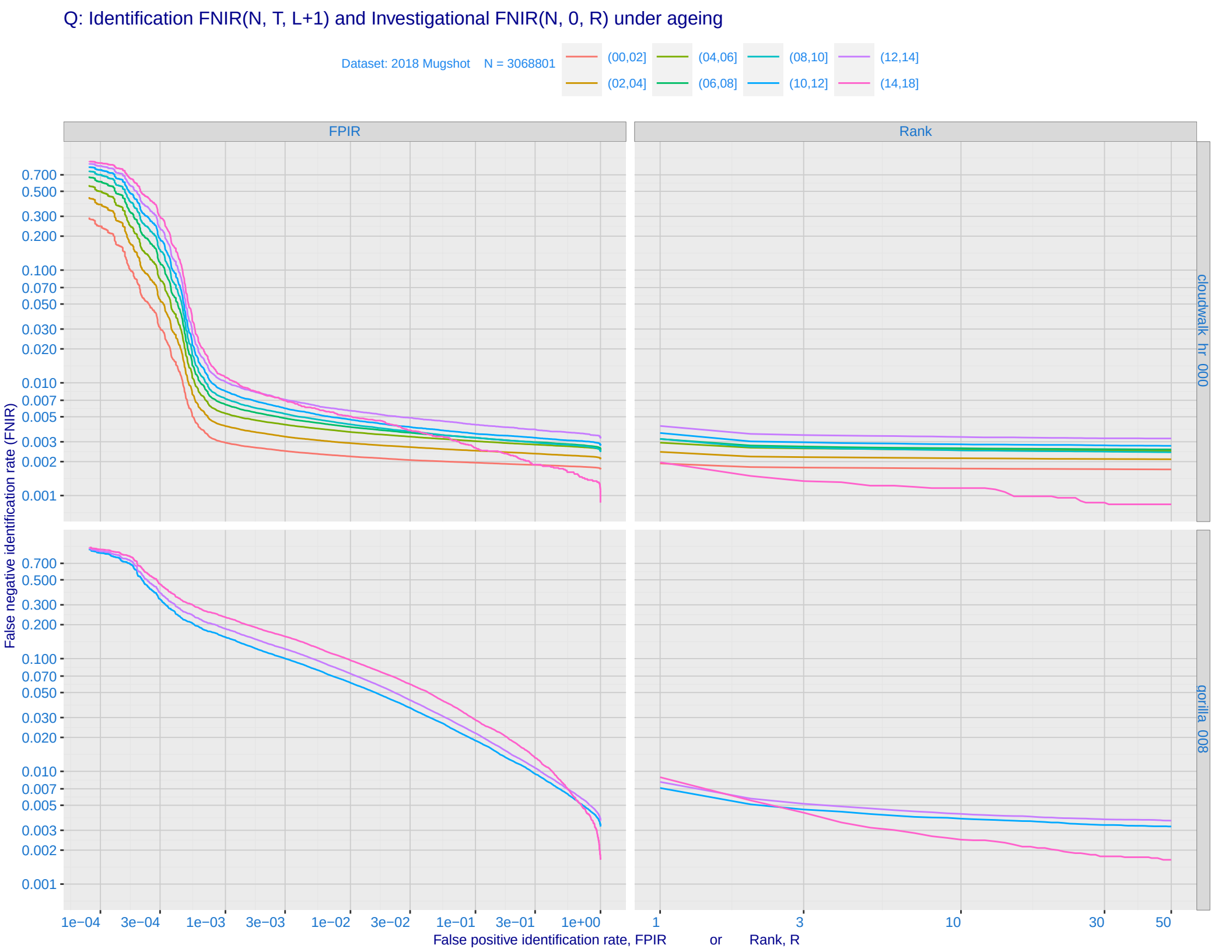


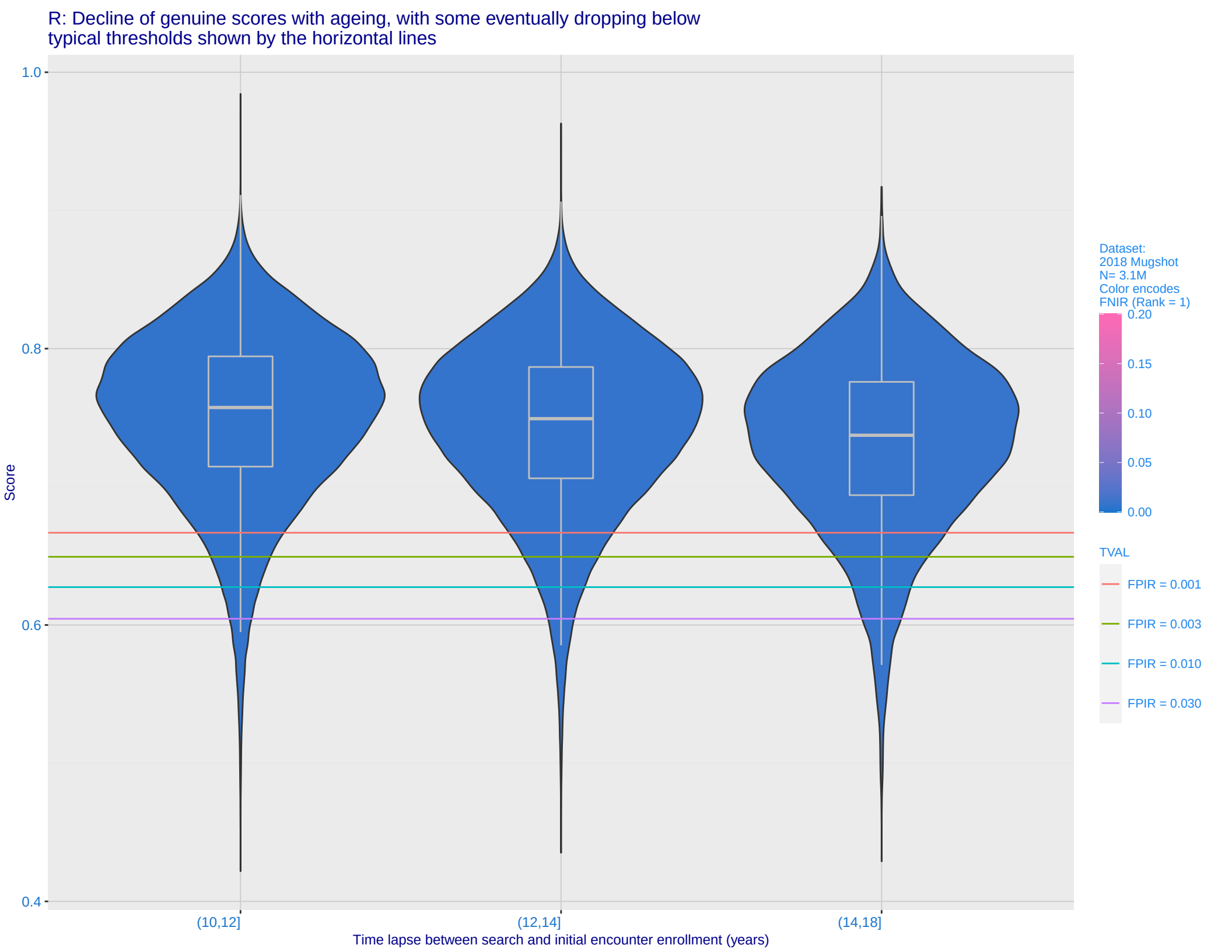
O: FNIR(T, N = 1.6 million) by sex, age and time−lapse. The top row gives investigational rank−1 miss rates.
The bottom panels give high threshold for more lights−out identification with low FPIR.

Age group at time of enrollment	Female						Male					
	Time between probe and enrollment (years)											
	10	11	12	13	14	15	10	11	12	13	14	15
FNIR(R=1, T=0)												
(60:99]	0.010	0.012	0.016	0.017	0.019	0.018	0.005	0.004	0.004	0.005	0.006	0.005
(45:60]	0.010	0.010	0.012	0.014	0.017	0.014	0.003	0.004	0.004	0.004	0.006	0.006
(30:45]	0.010	0.011	0.012	0.015	0.016	0.017	0.004	0.003	0.004	0.005	0.006	0.006
(21:30]	0.016	0.015	0.017	0.018	0.021	0.018	0.005	0.005	0.006	0.006	0.007	0.005
(18:21]	0.028	0.026	0.028	0.034	0.033	0.037	0.010	0.012	0.013	0.014	0.015	0.012
(15:18]	0.045	0.040	0.041	0.043	0.049	0.049	0.035	0.029	0.030	0.044	0.044	0.052
(12:15]	0.062	0.052	0.058	0.067	0.083	0.050	0.068	0.059	0.082	0.081	0.084	0.043
FNIR(R=50, T=0.701409), FPIR(30−45, Male) = 0.001												
(60:99]	0.276	0.283	0.334	0.361	0.386	0.449	0.230	0.237	0.268	0.309	0.327	0.361
(45:60]	0.271	0.281	0.317	0.357	0.384	0.399	0.209	0.223	0.256	0.296	0.319	0.310
(30:45]	0.318	0.328	0.362	0.402	0.435	0.450	0.217	0.221	0.259	0.307	0.335	0.334
(21:30]	0.367	0.372	0.405	0.444	0.463	0.473	0.260	0.274	0.313	0.356	0.398	0.392
(18:21]	0.490	0.479	0.502	0.546	0.561	0.565	0.455	0.455	0.492	0.542	0.594	0.588
(15:18]	0.569	0.556	0.585	0.626	0.645	0.589	0.652	0.663	0.703	0.742	0.775	0.794
(12:15]	0.652	0.656	0.681	0.685	0.716	0.688	0.804	0.809	0.836	0.867	0.889	0.891

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
gorilla 008
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


R: Decline of genuine scores with ageing, with some eventually dropping below typical thresholds shown by the horizontal lines
1.0
0.8
0.6
0.4
Score
(10,12]
(12,14]
(14,18]
Time lapse between search and initial encounter enrollment (years)
Dataset:
2018 Mugshot
N= 3.1M
Color encodes
FNIR (Rank = 1)
0.20
0.15
0.10
0.05
0.00
TVAL
FPIR = 0.001
FPIR = 0.003
FPIR = 0.010
FPIR = 0.030