A: Datasheet

Algorithm: neurotechnology_008

Developer: Neurotechnology

Submission Date: 2021_03_22

Template size: 514 bytes

Template time (2.5 percentile): 799 msec

Template time (median): 800 msec

Template time (97.5 percentile): 817 msec

Investigation:

Frontal mugshot ranking 37 (out of 271) −− FNIR(1600000, 0, 1) = 0.0022 vs. lowest 0.0009 from sensetime_005

Mugshot webcam ranking 41 (out of 232) −− FNIR(1600000, 0, 1) = 0.0141 vs. lowest 0.0062 from sensetime_005

Mugshot profile ranking 43 (out of 201) −− FNIR(1600000, 0, 1) = 0.4569 vs. lowest 0.0591 from sensetime_005

Immigration visa−border ranking 30 (out of 160) −− FNIR(1600000, 0, 1) = 0.0039 vs. lowest 0.0013 from visionlabs_010

Immigration visa−kiosk ranking 29 (out of 157) −− FNIR(1600000, 0, 1) = 0.1014 vs. lowest 0.0568 from hr_000

Identification:

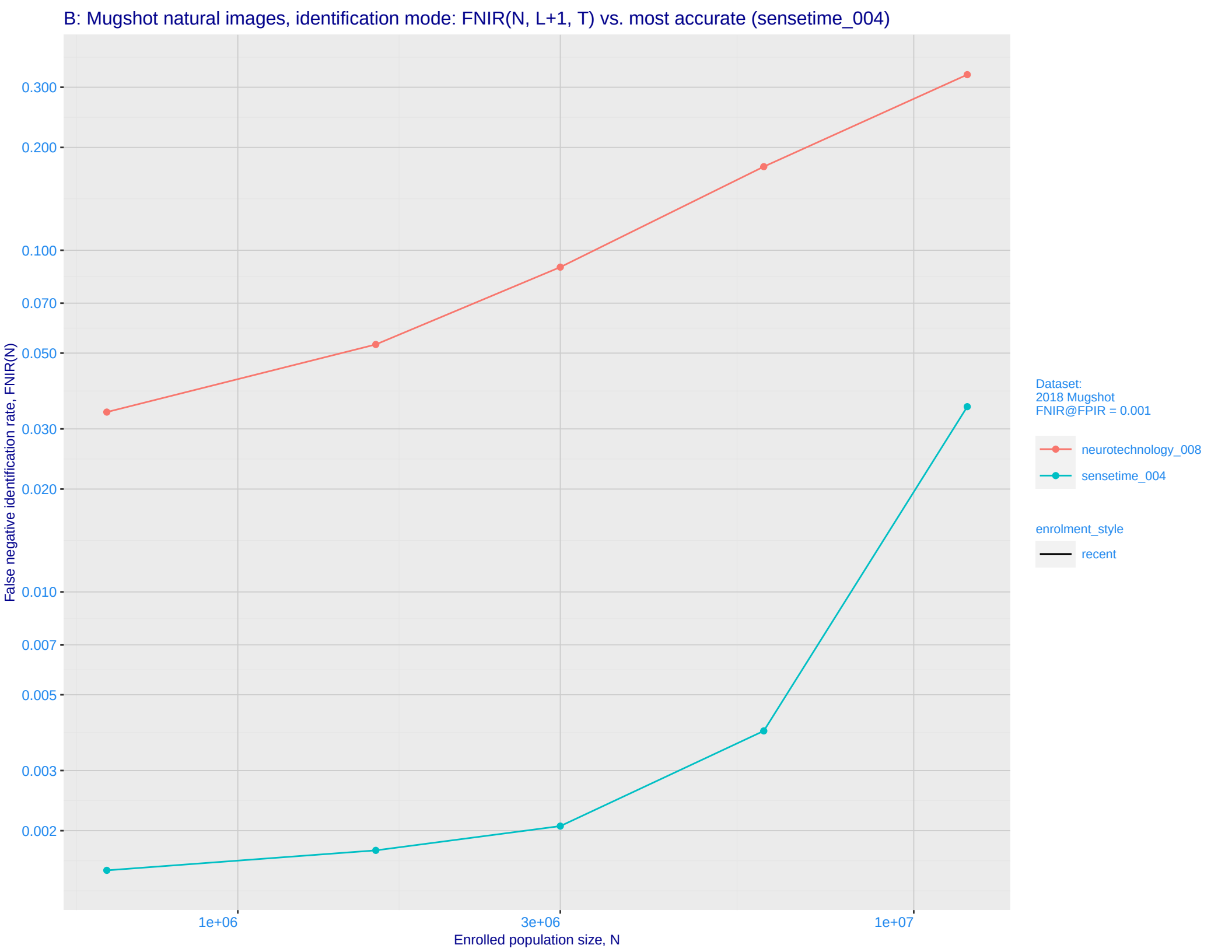
Frontal mugshot ranking 95 (out of 271) −− FNIR(1600000, T, L+1) = 0.0530, FPIR=0.001000 vs. lowest 0.0018 from sensetime_004

Mugshot webcam ranking 49 (out of 230) −− FNIR(1600000, T, L+1) = 0.0797, FPIR=0.001000 vs. lowest 0.0122 from sensetime_003

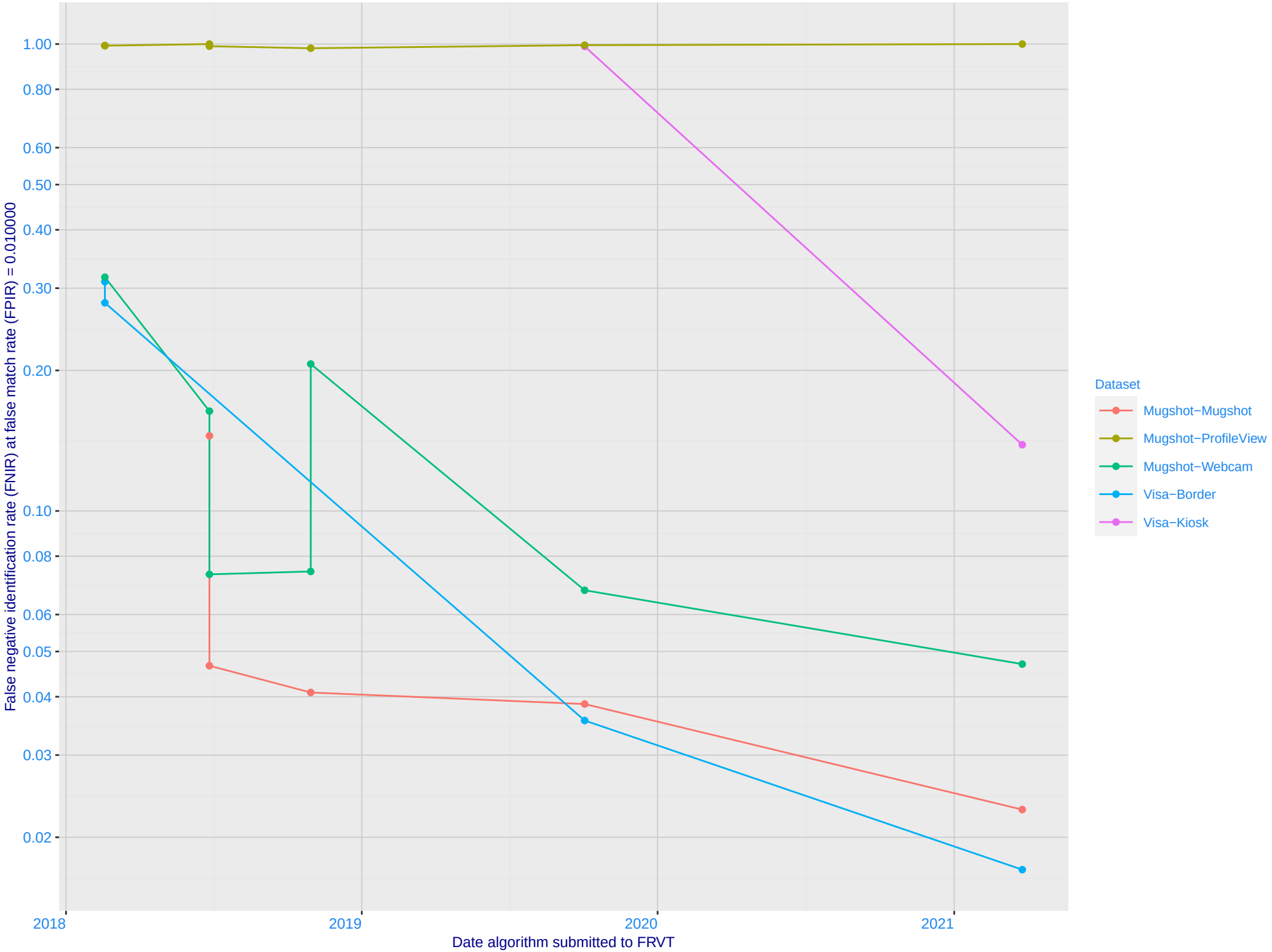
Mugshot profile ranking 180 (out of 200) −− FNIR(1600000, T, L+1) = 0.9999, FPIR=0.001000 vs. lowest 0.1331 from hr_000

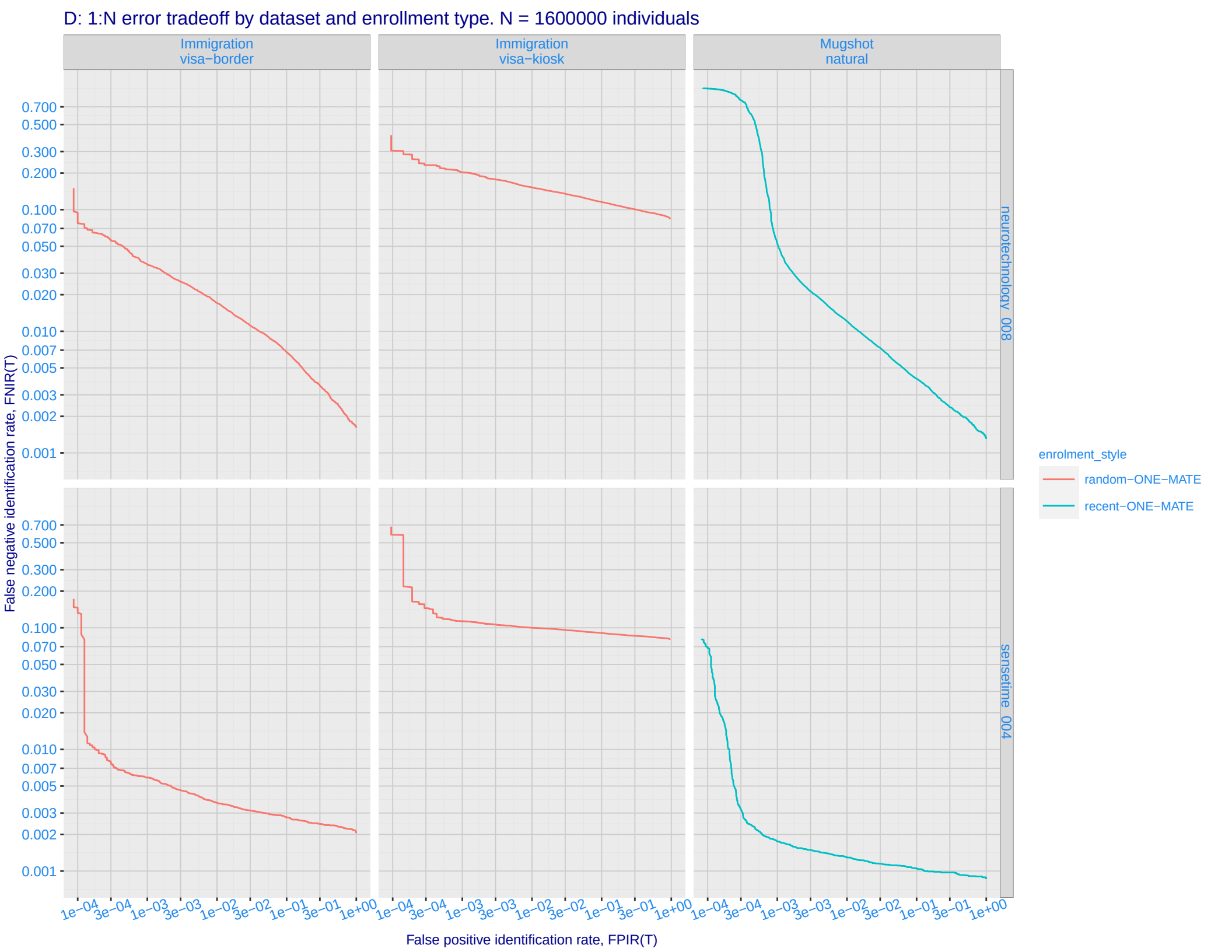
Immigration visa−border ranking 37 (out of 159) −− FNIR(1600000, T, L+1) = 0.0353, FPIR=0.001000 vs. lowest 0.0047 from idemia_008

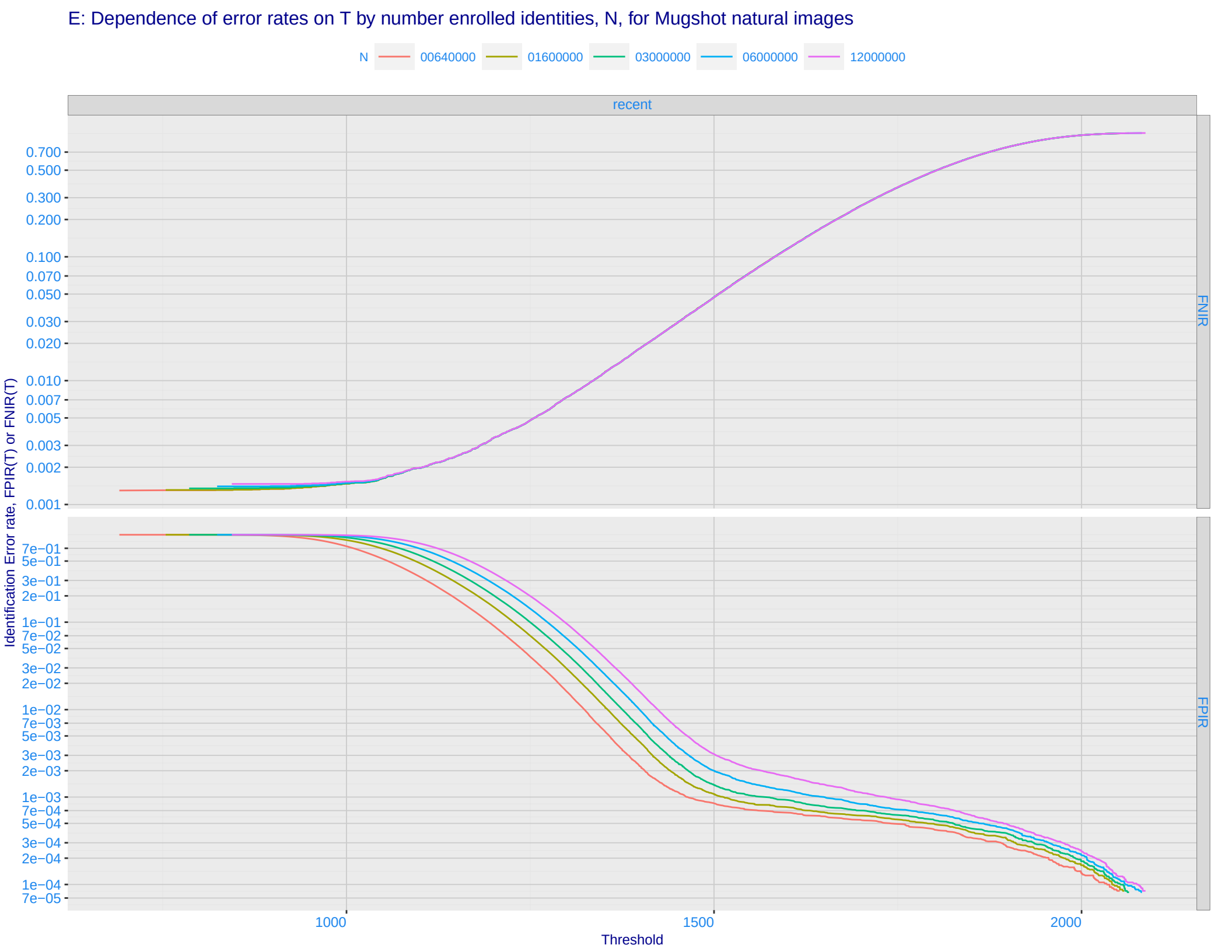
Immigration visa−kiosk ranking 22 (out of 154) −− FNIR(1600000, T, L+1) = 0.2027, FPIR=0.001000 vs. lowest 0.0996 from hr_000

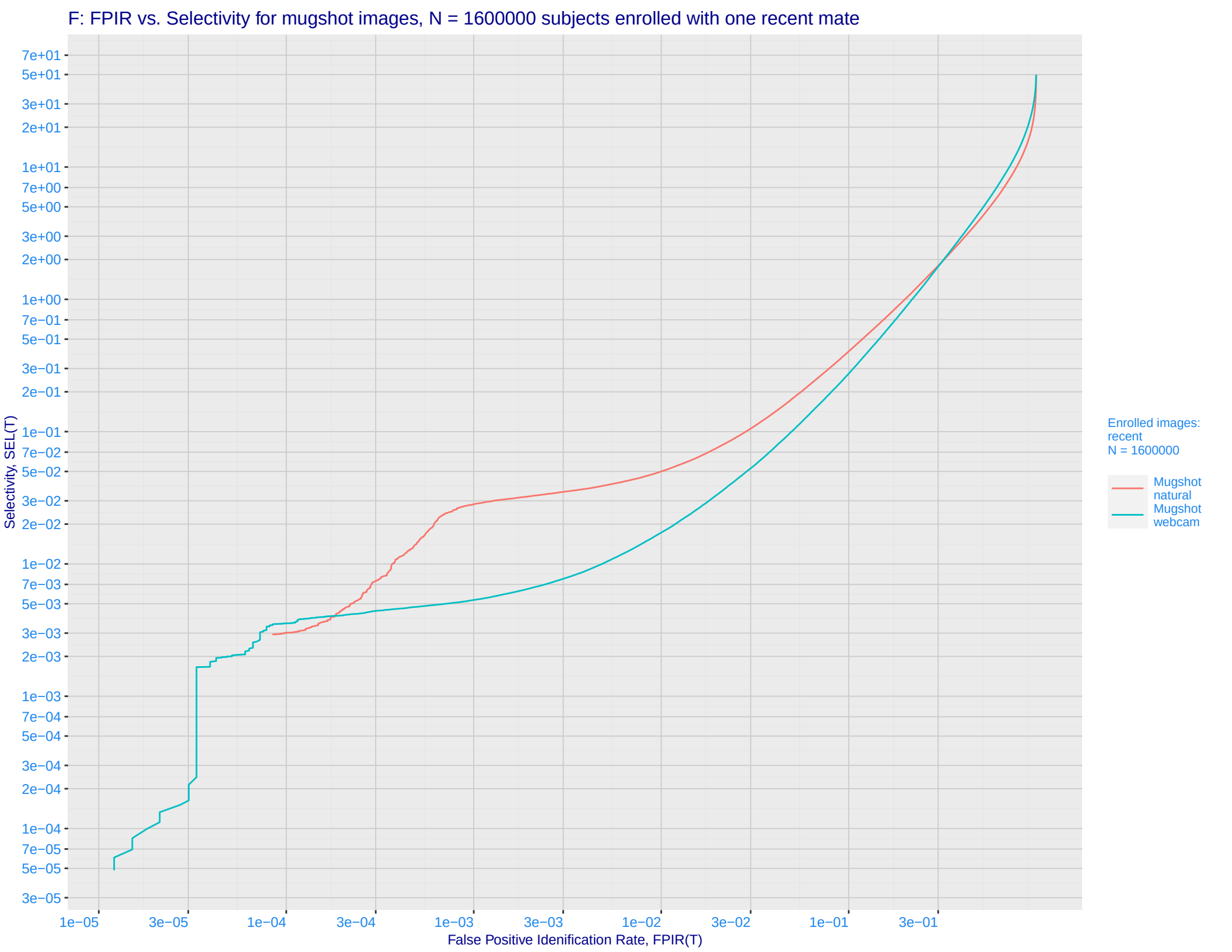

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (sensetime_004)
False negative identification rate, FNIR(N)
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
1e+06
3e+06
1e+07
Enrolled population size, N
Dataset:
2018 Mugshot
FNIR@FPIR = 0.001
neurotechnology_008
sensetime_004
enrolment_style
recent

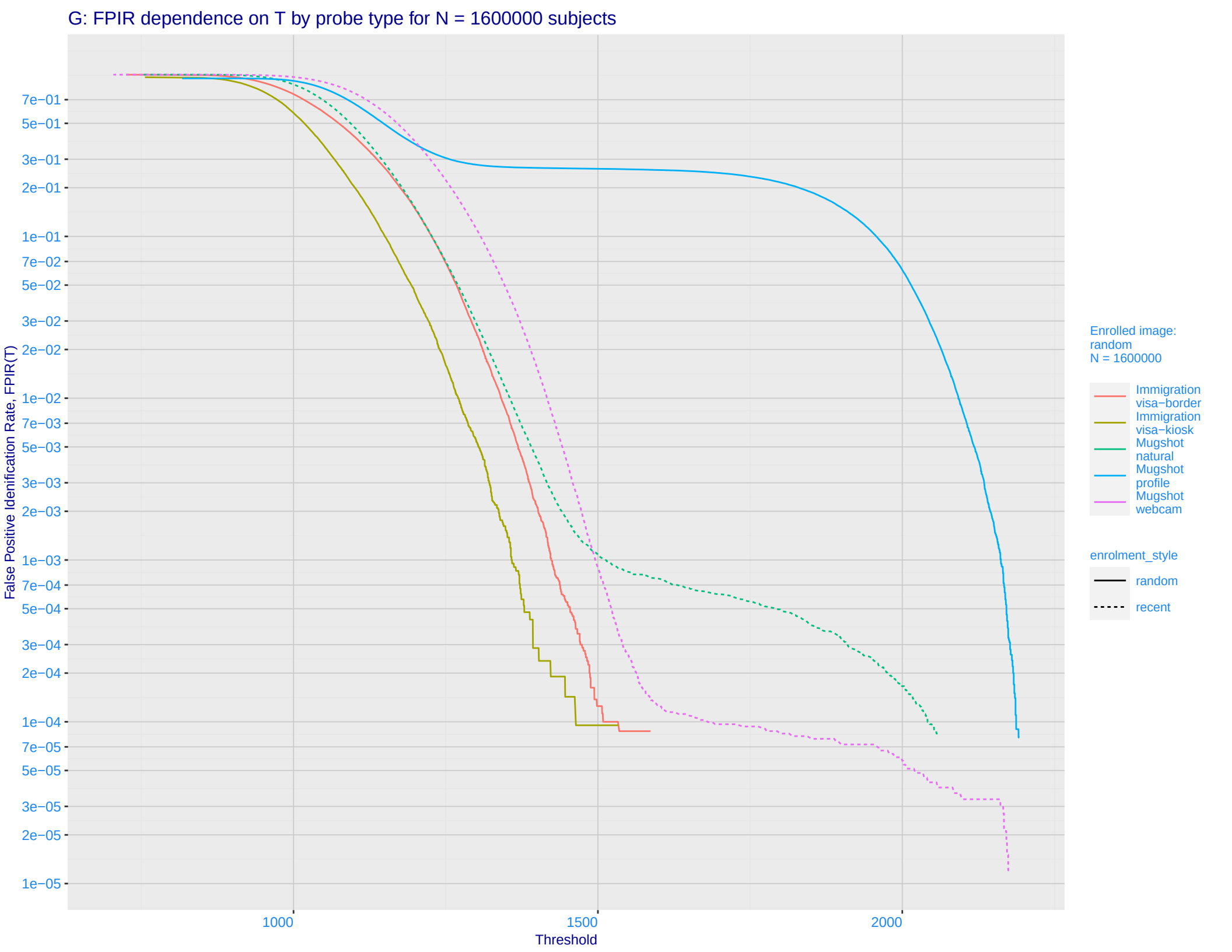
C: Evolution of accuracy for NEUROTECHNOLOGY algorithms on three datasets 2018 − present

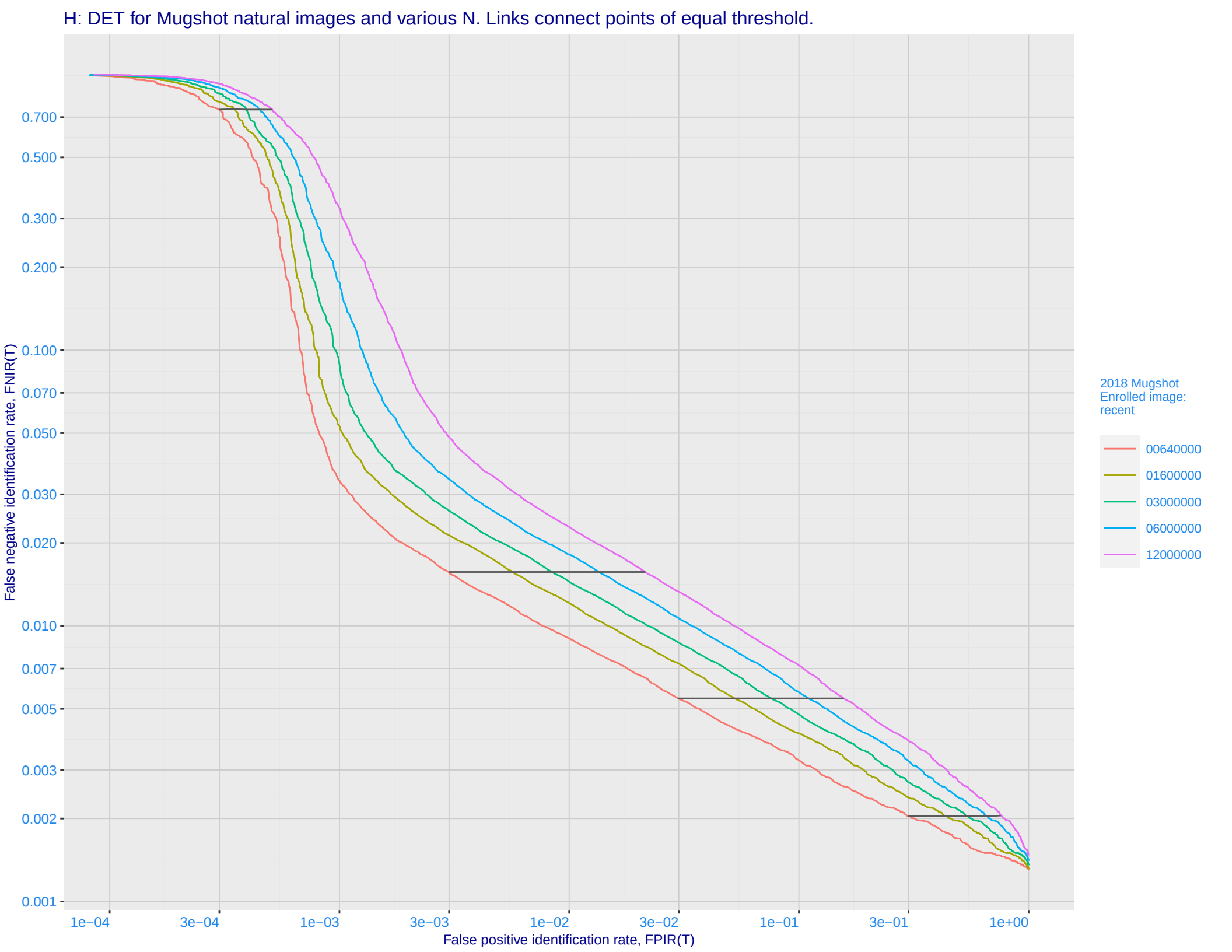


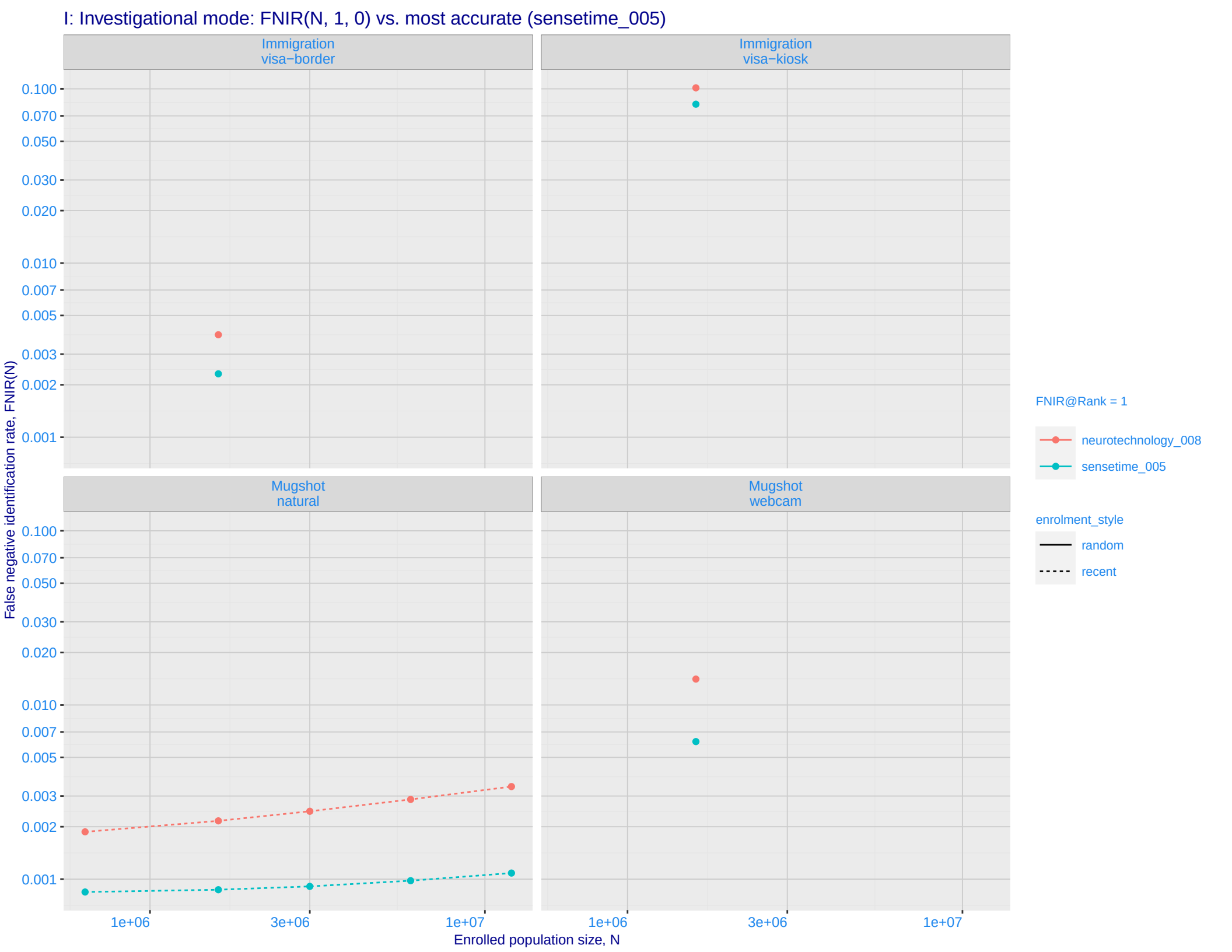

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
neurotechnology 008
sensetime 004
False negative identification rate, FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
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

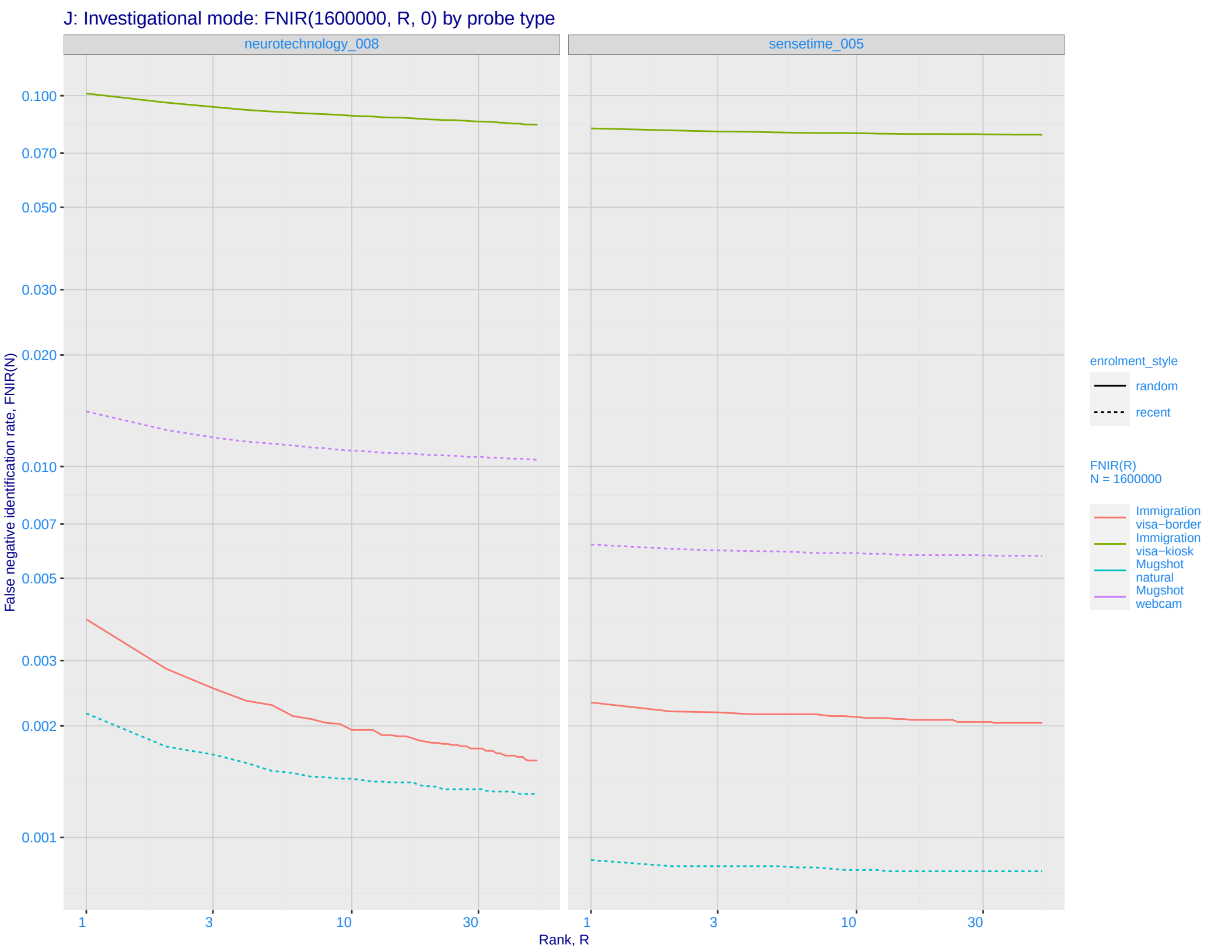

E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images
N
00640000
01600000
03000000
06000000
12000000
recent
FNIR
FPIR
Identification Error rate, FPIR(T) or FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
7e−01
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
1000
1500
2000
Threshold

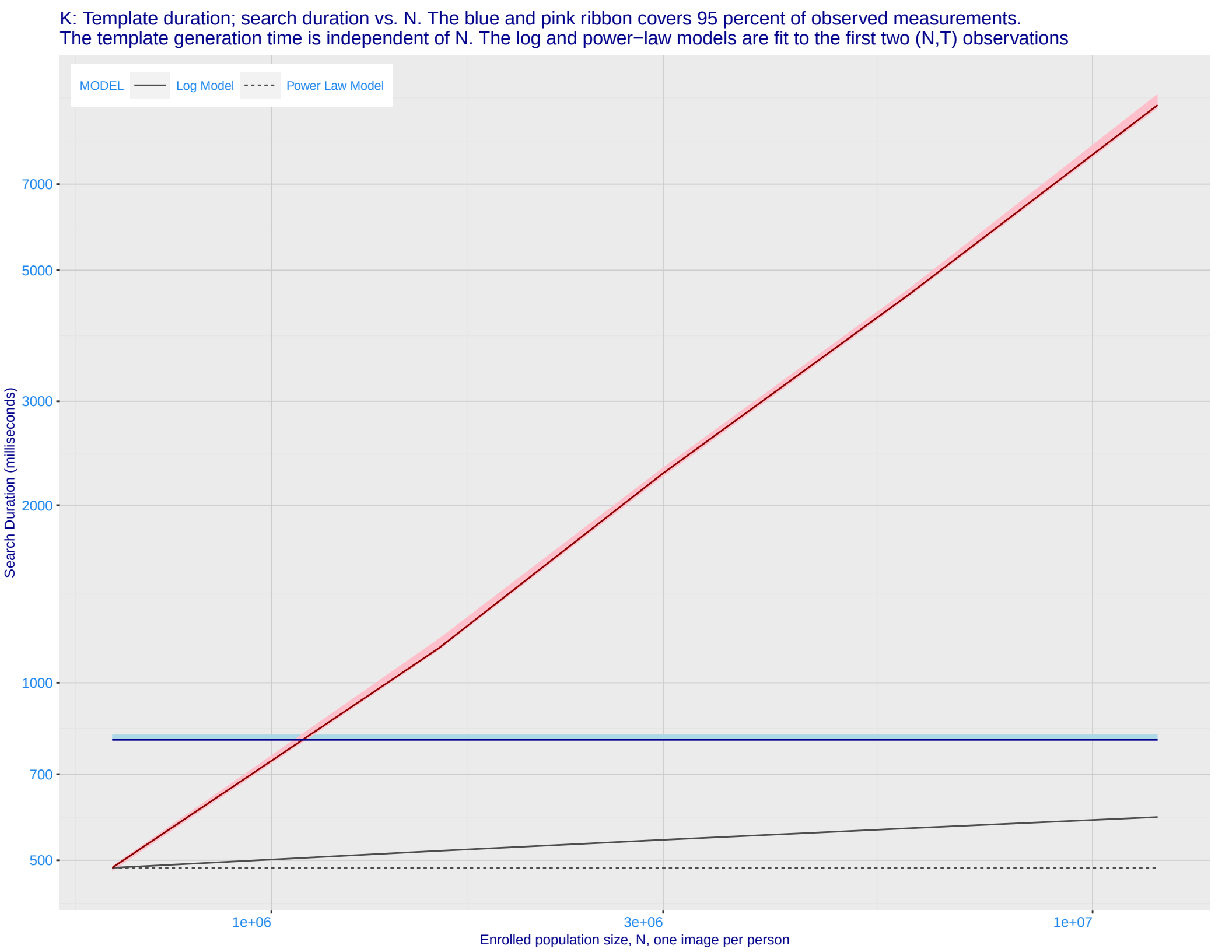

F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate
Selectivity, SEL(T)
7e+01
5e+01
3e+01
2e+01
1e+01
7e+00
5e+00
3e+00
2e+00
1e+00
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
5e−05
3e−05
1e−05
3e−05
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
False Positive Idenification 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 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
1000
1500
2000
Threshold
Enrolled image:
random
N = 1600000
Immigration
visa−border
Immigration
visa−kiosk
Mugshot
natural
Mugshot
profile
Mugshot
webcam
enrolment_style
random
recent


H: 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


I: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_005)
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
neurotechnology_008
sensetime_005
enrolment_style
random
recent


J: Investigational mode: FNIR(1600000, R, 0) by probe type
neurotechnology_008
sensetime_005
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


K: 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
MODEL
Log Model
Power Law Model
7000
5000
3000
2000
1000
700
500
Search Duration (milliseconds)
1e+06
3e+06
1e+07
Enrolled population size, N, one image per person

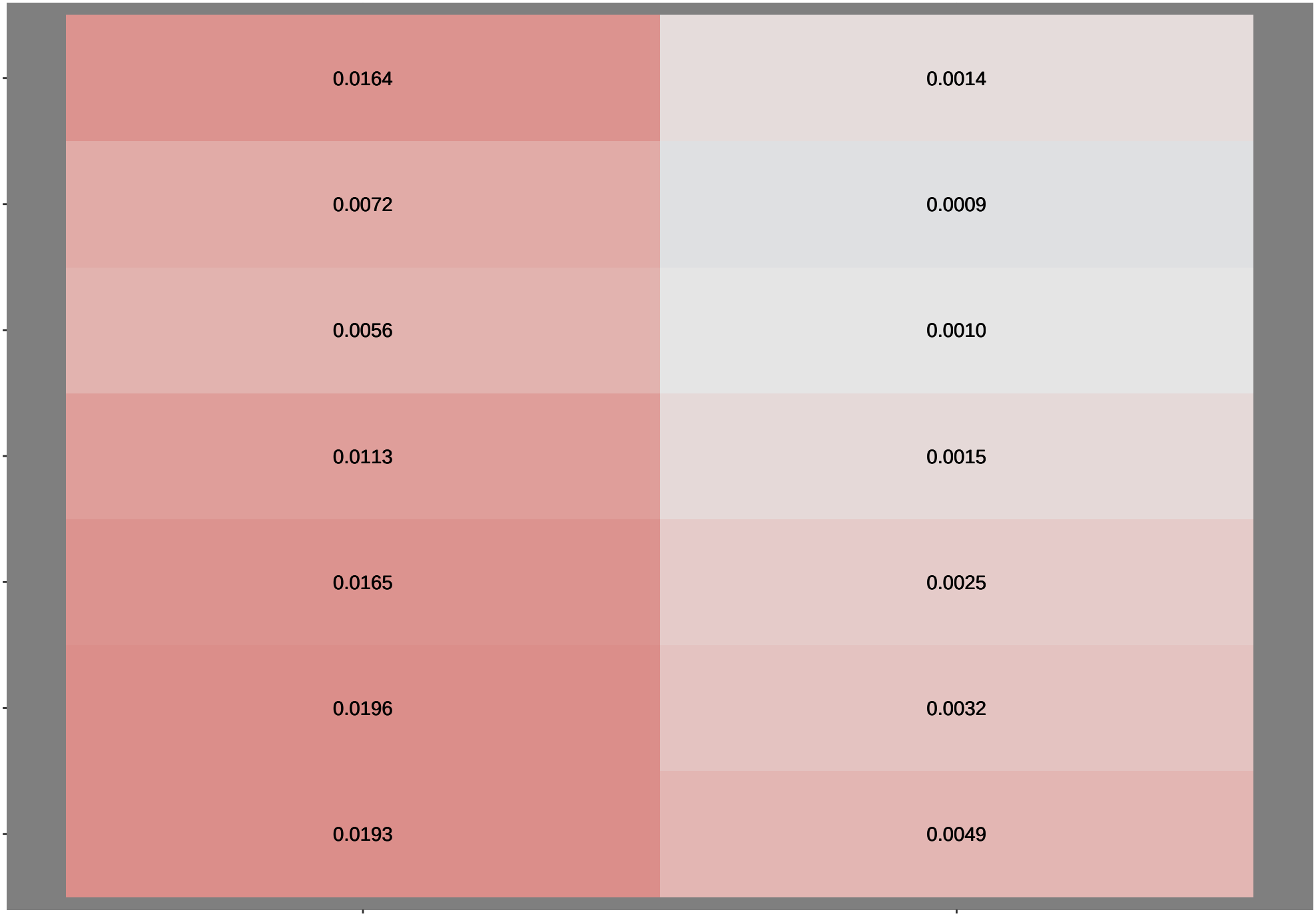

M−A: FNIR(T, N = 1.6 million) by sex, age and time−lapse
Algorithm: neurotechnology_008, Dataset: Border−Crossing Ageing
Threshold: 1384.000000 set to achieve FPIR(30−45, Male) = 0.001
Color encodes log(FNIR)
−3
−2
−1
Female
Male
(60:99]
(45:60]
(30:45]
(21:30]
(18:21]
(15:18]
(12:15]
0.114 0.116 0.140 0.154 0.178 0.225
0.109 0.112 0.134 0.155 0.171 0.182
0.129 0.136 0.157 0.182 0.200 0.202
0.171 0.172 0.196 0.223 0.235 0.242
0.267 0.255 0.278 0.310 0.324 0.332
0.333 0.322 0.346 0.377 0.398 0.354
0.412 0.410 0.439 0.470 0.480 0.430
0.072 0.074 0.081 0.104 0.098 0.104
0.062 0.066 0.079 0.095 0.102 0.109
0.068 0.067 0.085 0.105 0.120 0.117
0.099 0.103 0.126 0.152 0.174 0.172
0.255 0.247 0.283 0.324 0.356 0.383
0.449 0.450 0.486 0.537 0.577 0.628
0.645 0.640 0.679 0.726 0.746 0.696
Age group at time of enrollment
10 11 12 13 14 15
Time between probe and enrollment (years)

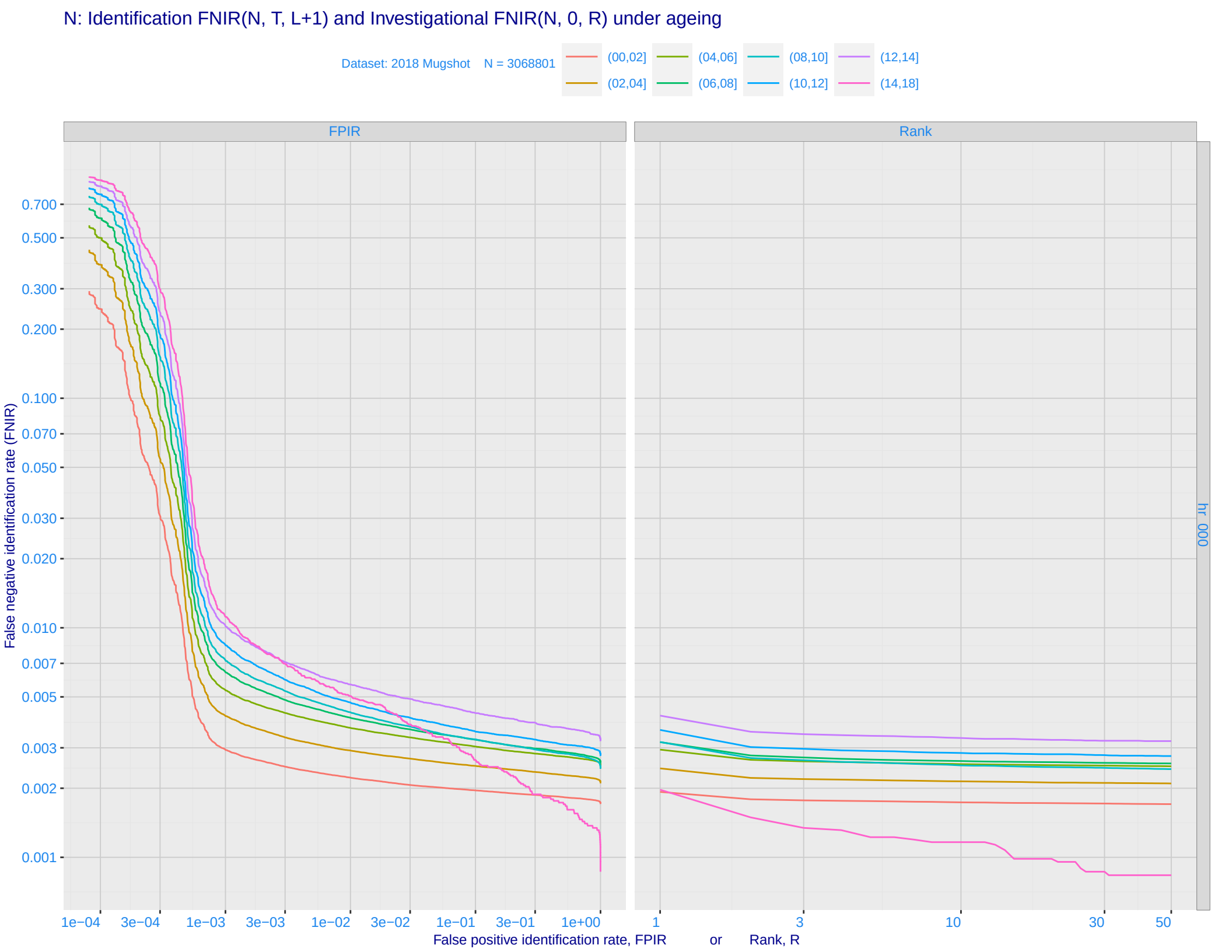
M−B: FPIR(T, N = 1.6 million) by sex and age

Algorithm: neurotechnology_008, Dataset: Border−Crossing Ageing
Threshold: 1384.000000 set to achive FPIR(30−45, Male) = 0.001

Color encodes log(FPIR)

−4 −3 −2 −1




N: 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
br 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