A: Datasheet

Algorithm: pixelall_005

Developer: Guangzhou Pixel Solutions Co Ltd

Submission Date: 2021_03_23

Template size: 5120 bytes

Template time (2.5 percentile): 1237 msec

Template time (median): 1244 msec

Template time (97.5 percentile): 1272 msec

Investigation:

Frontal mugshot ranking 35 (out of 271) −− FNIR(1600000, 0, 1) = 0.0021 vs. lowest 0.0009 from sensetime_005

Mugshot webcam ranking 28 (out of 232) −− FNIR(1600000, 0, 1) = 0.0120 vs. lowest 0.0062 from sensetime_005

Mugshot profile ranking 41 (out of 201) −− FNIR(1600000, 0, 1) = 0.4241 vs. lowest 0.0591 from sensetime_005

Immigration visa−border ranking 71 (out of 160) −− FNIR(1600000, 0, 1) = 0.0121 vs. lowest 0.0013 from visionlabs_010

Immigration visa−kiosk ranking 71 (out of 157) −− FNIR(1600000, 0, 1) = 0.1523 vs. lowest 0.0568 from hr_000

Identification:

Frontal mugshot ranking 19 (out of 271) −− FNIR(1600000, T, L+1) = 0.0105, FPIR=0.001000 vs. lowest 0.0018 from sensetime_004

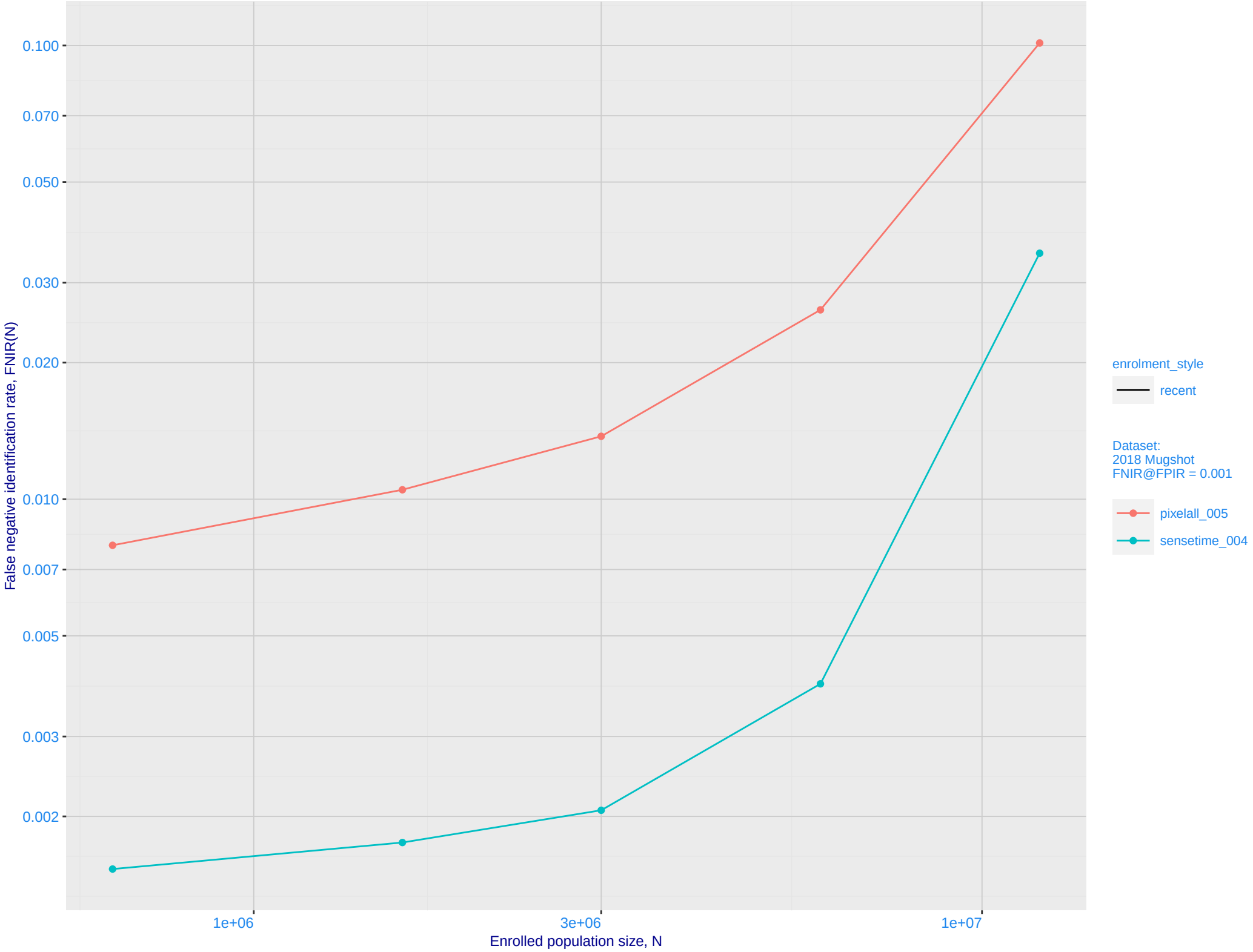
Mugshot webcam ranking 22 (out of 230) −− FNIR(1600000, T, L+1) = 0.0412, FPIR=0.001000 vs. lowest 0.0122 from sensetime_003

Mugshot profile ranking 111 (out of 200) −− FNIR(1600000, T, L+1) = 0.9974, FPIR=0.001000 vs. lowest 0.1331 from hr_000

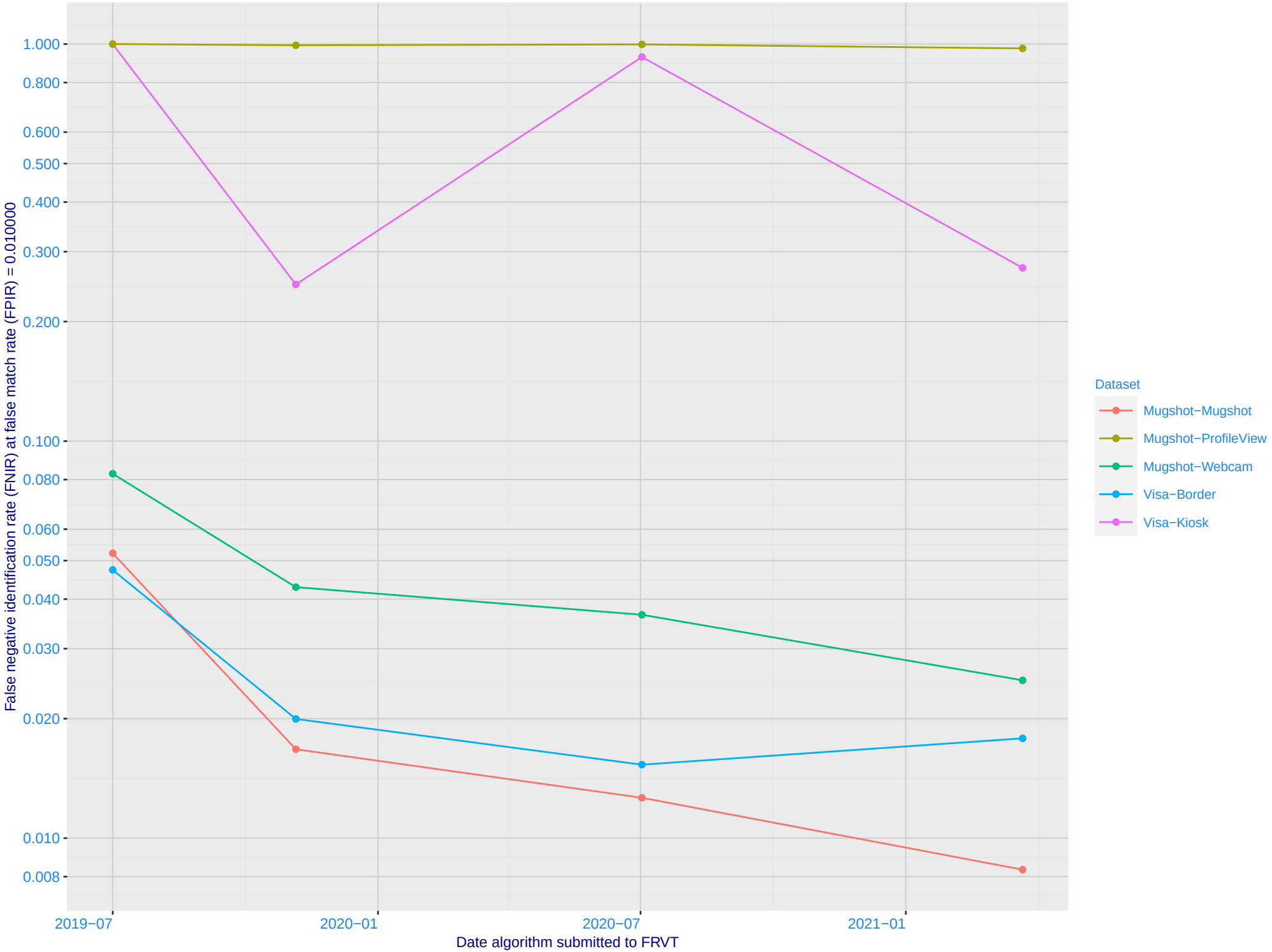
Immigration visa−border ranking 24 (out of 159) −− FNIR(1600000, T, L+1) = 0.0263, FPIR=0.001000 vs. lowest 0.0047 from idemia_008

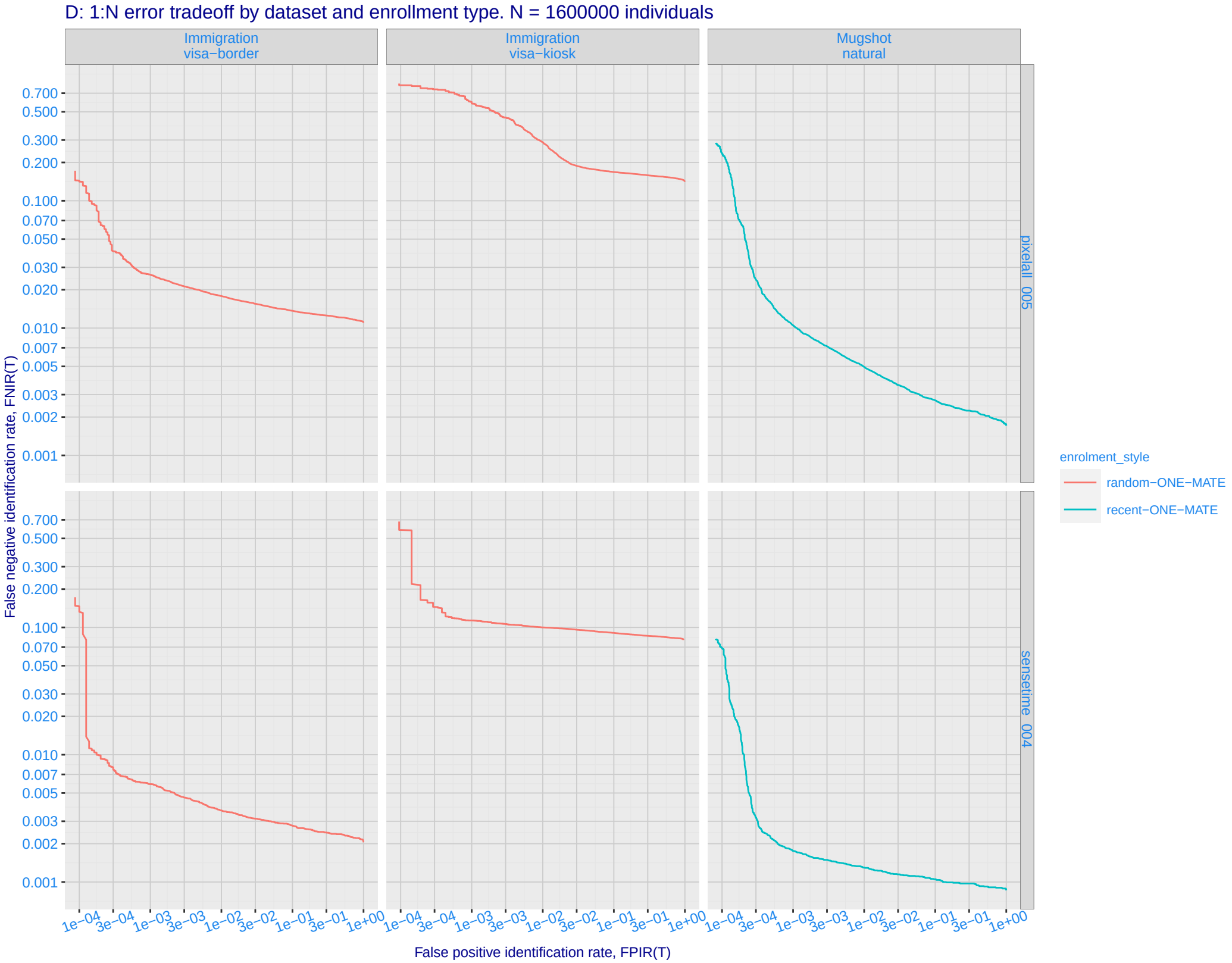
Immigration visa−kiosk ranking 78 (out of 154) −− FNIR(1600000, T, L+1) = 0.5982, FPIR=0.001000 vs. lowest 0.0996 from hr_000

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (sensetime_004)

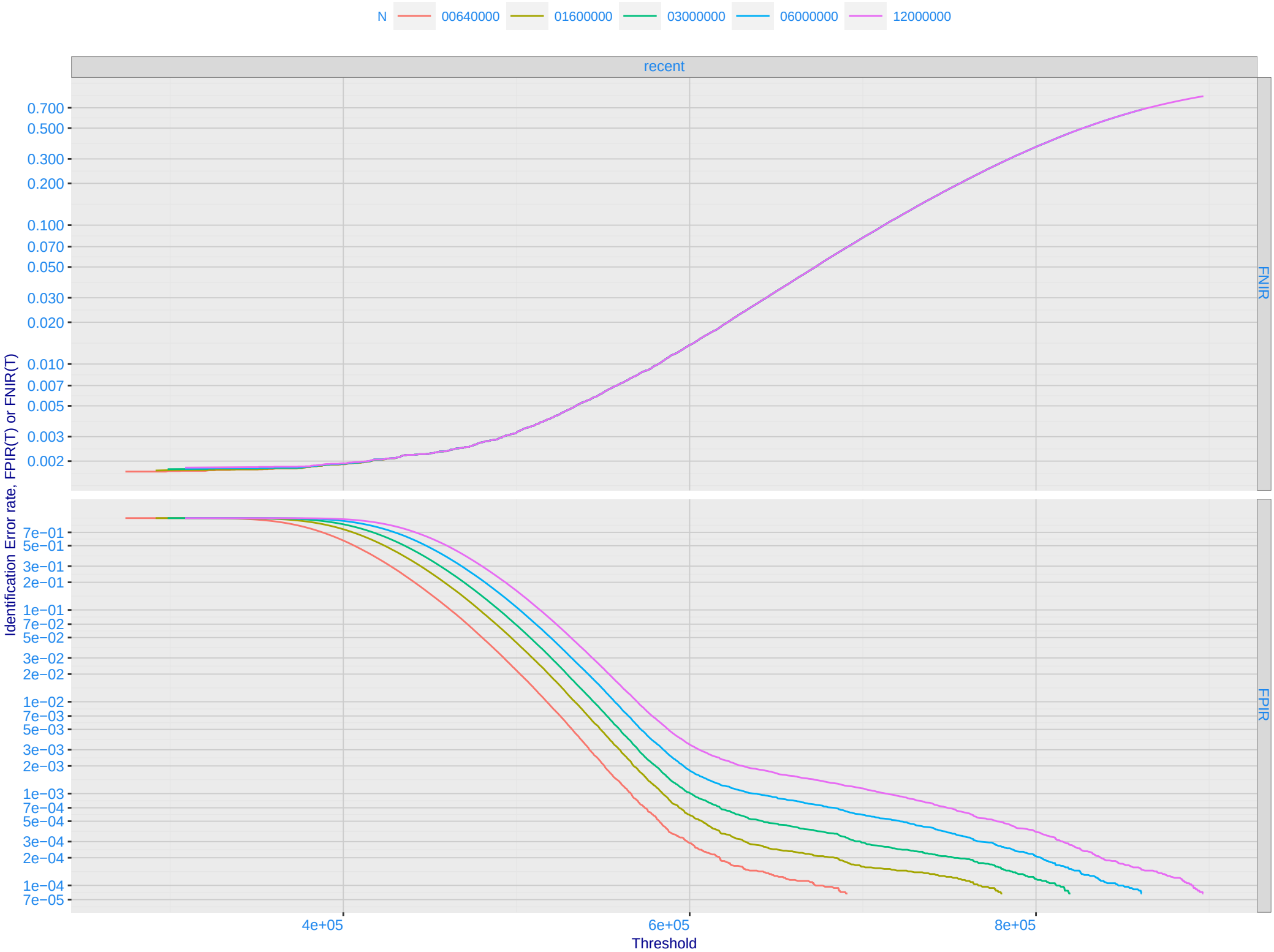


C: Evolution of accuracy for PIXELALL algorithms on three datasets 2018 − present

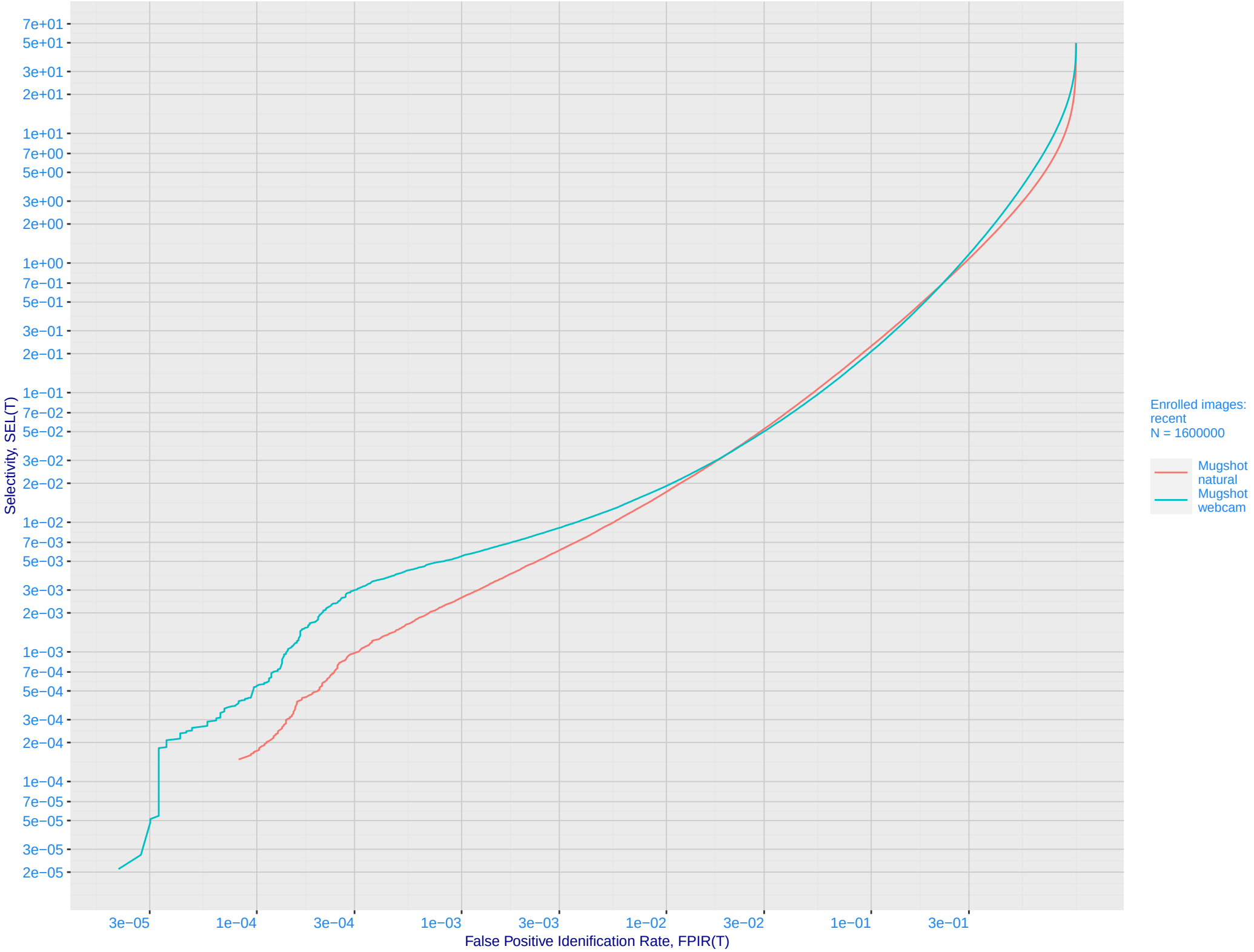


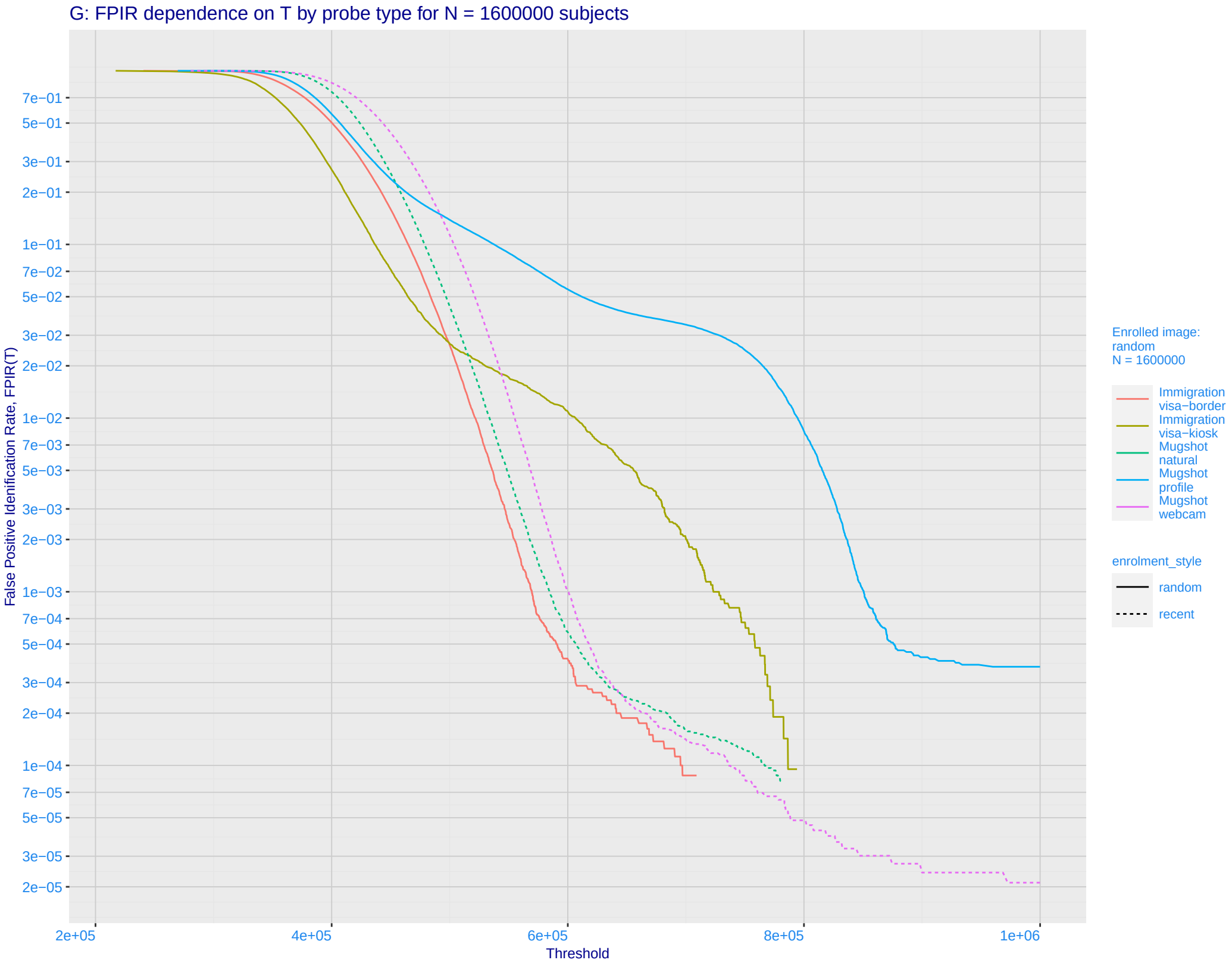

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
pixelall_005
sensetime_004
False negative identification rate, FNIR(T)
False positive identification rate, FPIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
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

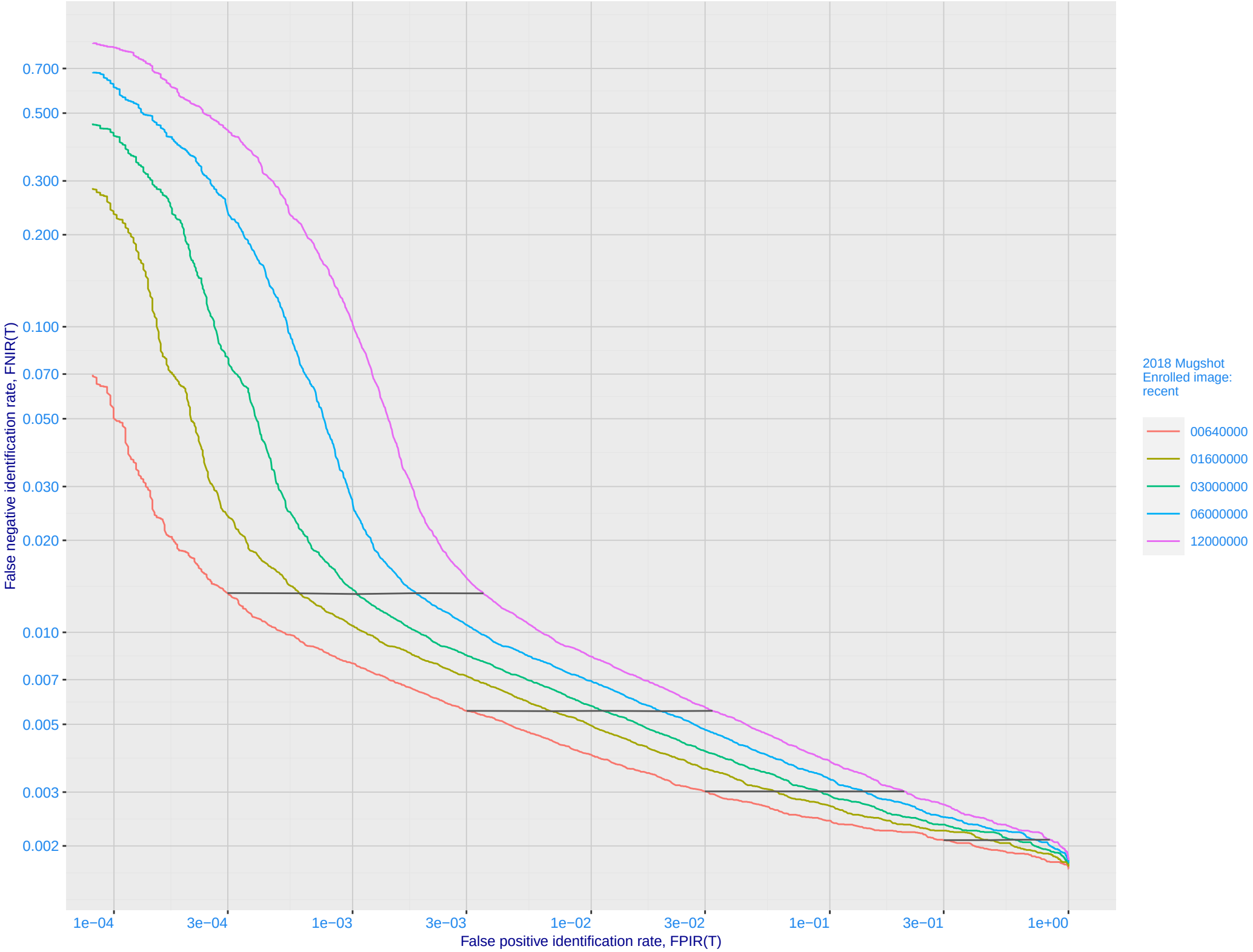


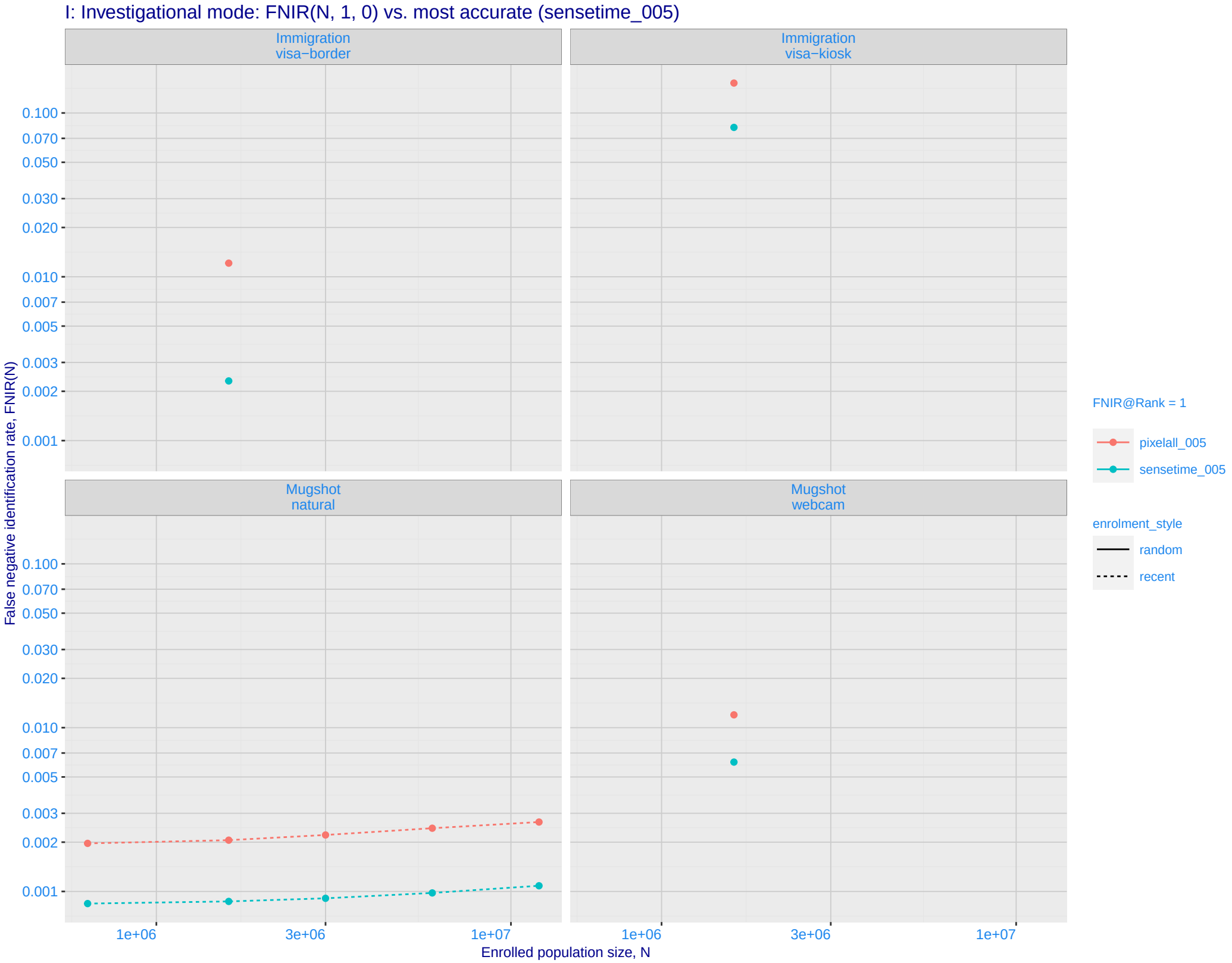
F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate

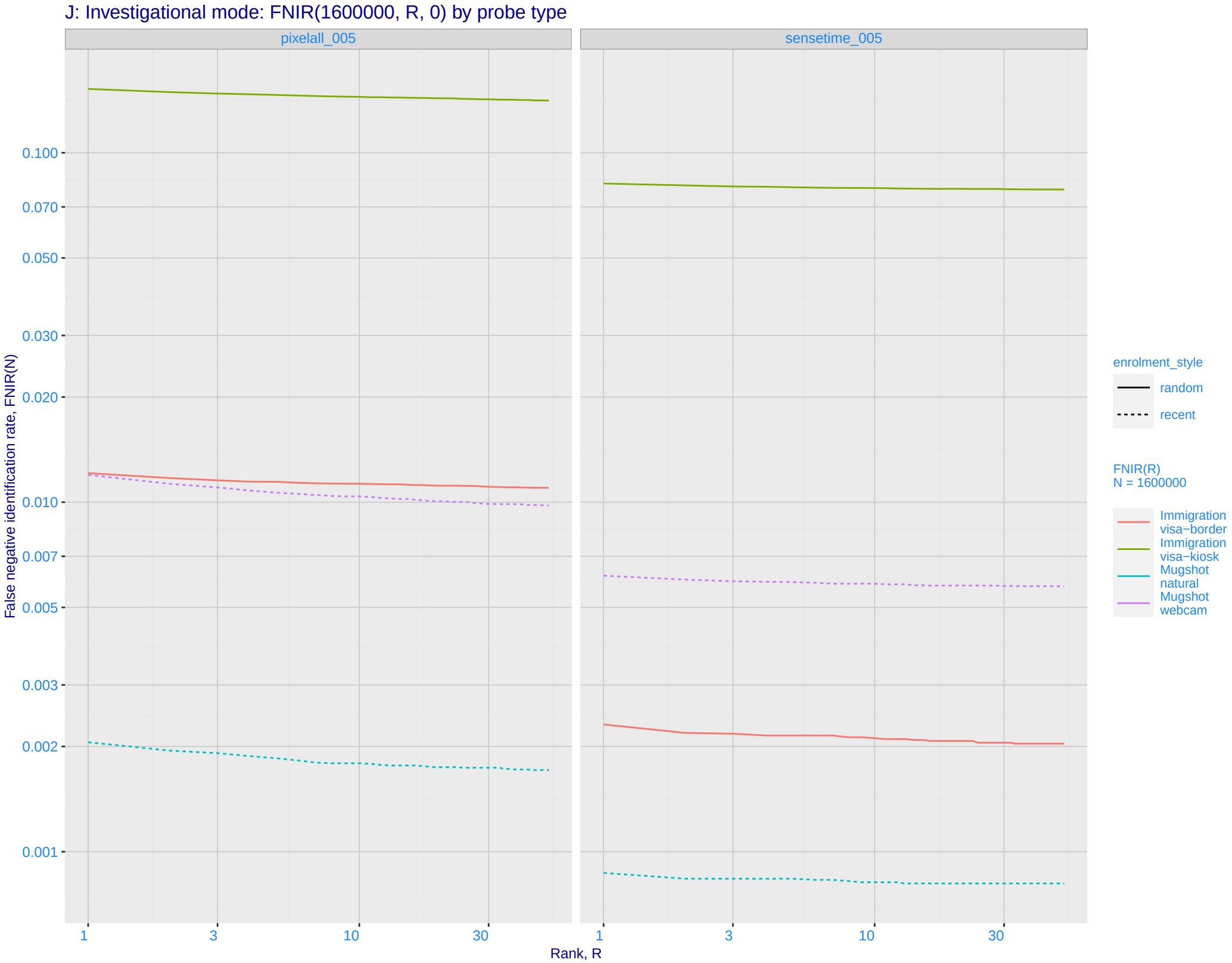



G: FPIR dependence on T by probe type for N = 1600000 subjects
False Positive Idenification Rate, FPIR(T)
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
5e−05
3e−05
2e−05
2e+05
4e+05
6e+05
8e+05
1e+06
Threshold
Enrolled image:
random
N = 1600000
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
Mugshot profile
Mugshot webcam
enrolment_style
random
recent

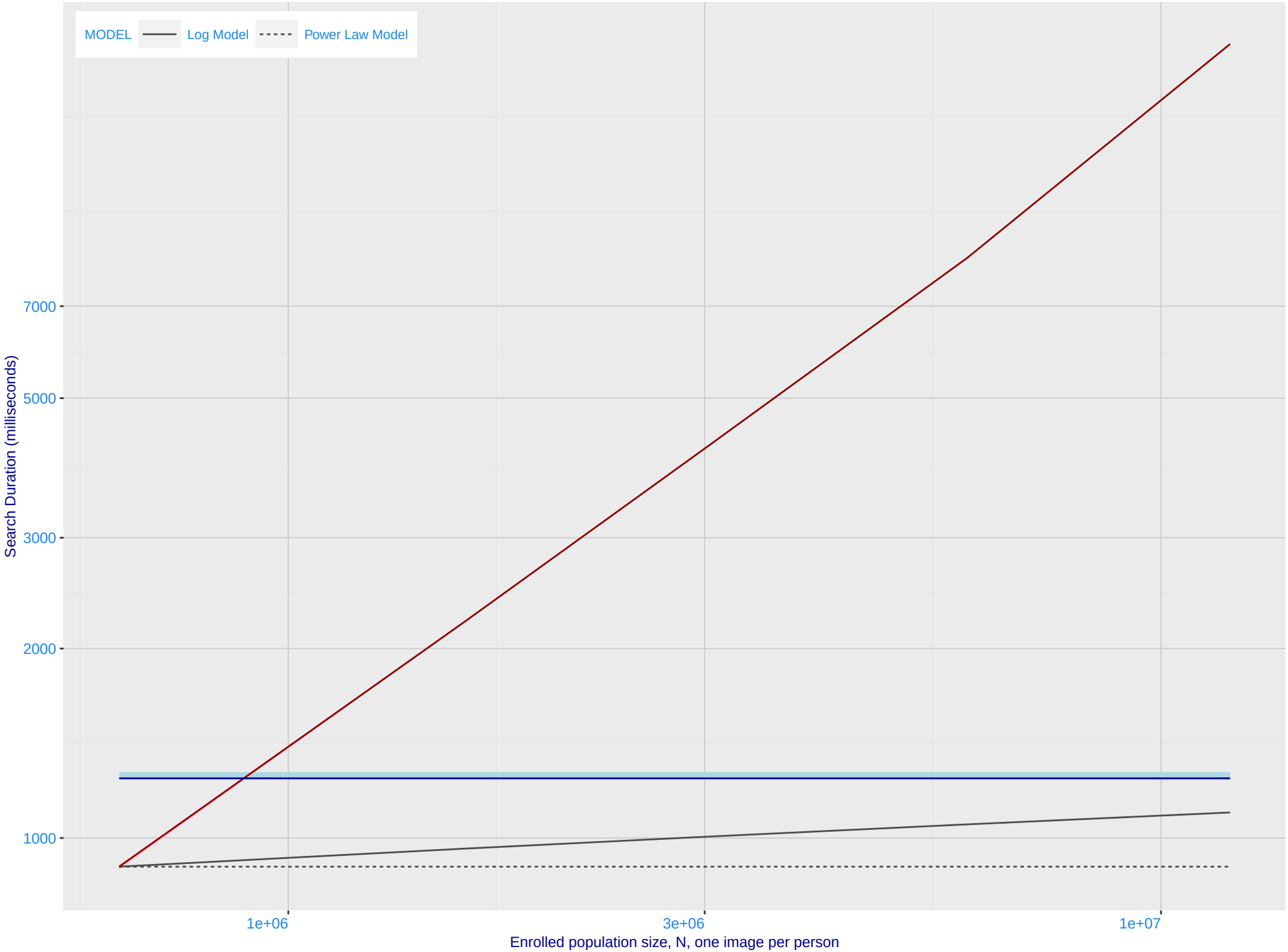
H: DET for Mugshot natural images and various N. Links connect points of equal threshold.




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
pixelall_005
sensetime_005
enrolment_style
random
recent


J: Investigational mode: FNIR(1600000, R, 0) by probe type
pixelall_005
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



M−A: FNIR(T, N = 1.6 million) by sex, age and time−lapse

Algorithm: pixelall_005, Dataset: Border−Crossing Ageing
Threshold: 579831.536301 set to achieve FPIR(30−45, Male) = 0.001

Color encodes log(FNIR)

Age group at time of enrollment	Female						Male					
	10	11	12	13	14	15	10	11	12	13	14	15
(60:99]	0.098	0.098	0.120	0.128	0.146	0.176	0.063	0.066	0.071	0.088	0.084	0.106
(45:60]	0.089	0.090	0.103	0.120	0.133	0.149	0.055	0.056	0.064	0.073	0.082	0.083
(30:45]	0.109	0.113	0.127	0.144	0.157	0.156	0.056	0.056	0.066	0.077	0.087	0.087
(21:30]	0.145	0.144	0.160	0.179	0.194	0.196	0.082	0.084	0.098	0.116	0.133	0.129
(18:21]	0.221	0.221	0.235	0.262	0.274	0.256	0.201	0.196	0.226	0.260	0.293	0.309
(15:18]	0.280	0.275	0.291	0.327	0.345	0.277	0.375	0.380	0.417	0.461	0.495	0.544
(12:15]	0.366	0.348	0.358	0.394	0.418	0.416	0.543	0.552	0.600	0.626	0.675	0.681

Time between probe and enrollment (years)

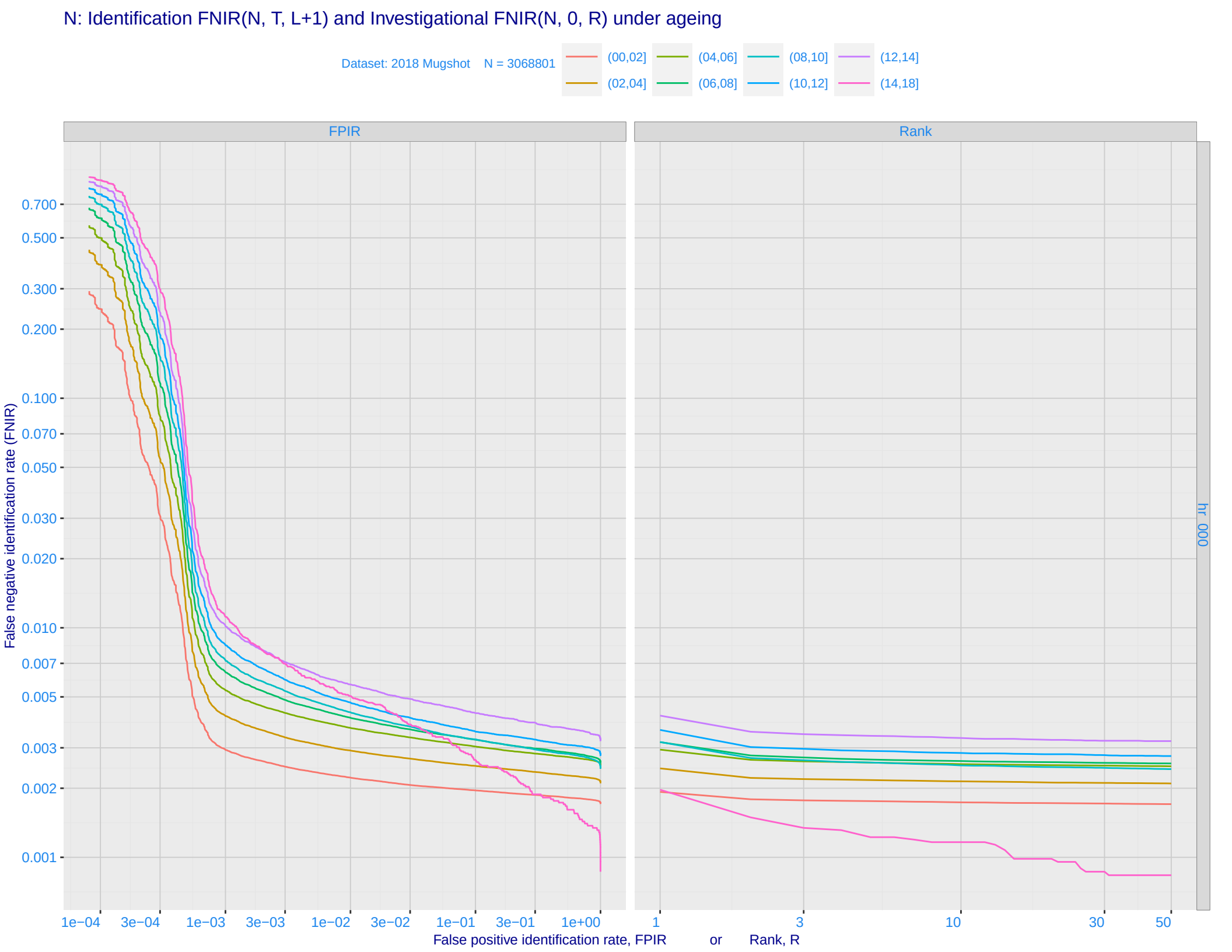
M−B: FPIR(T, N = 1.6 million) by sex and age

Algorithm: pixelall_005, Dataset: Border−Crossing Ageing
Threshold: 579831.536301 set to achive FPIR(30−45, Male) = 0.001

Color encodes log(FPIR)

Age group of person in non−mate probe	Female	Male
(60:99]	0.0037	0.0013
(45:60]	0.0016	0.0009
(30:45]	0.0009	0.0010
(21:30]	0.0014	0.0008
(18:21]	0.0013	0.0013
(15:18]	0.0016	0.0010
(12:15]	0.0017	0.0011

Sex of person in non−mate probe


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
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