# A: Datasheet

Algorithm: deepsea_001

Developer: Tencent Deepsea Lab

Submission Date: 2019_07_29

Template size: 2048 bytes

Template time (2.5 percentile): 731 msec

Template time (median): 738 msec

Template time (97.5 percentile): 1038 msec

Investigation:

Frontal mugshot ranking 126 (out of 329) −− FNIR(1600000, 0, 1) = 0.0043  vs. lowest 0.0009 from sensetime_006

Mugshot webcam ranking 96 (out of 291) −− FNIR(1600000, 0, 1) = 0.0159  vs. lowest 0.0057 from sensetime_006

Mugshot profile ranking 161 (out of 260) −− FNIR(1600000, 0, 1) = 0.8138  vs. lowest 0.0550 from sensetime_006

Immigration visa−border ranking 110 (out of 218) −− FNIR(1600000, 0, 1) = 0.0095  vs. lowest 0.0009 from sensetime_006

Immigration visa−kiosk ranking 113 (out of 215) −− FNIR(1600000, 0, 1) = 0.1398  vs. lowest 0.0487 from cubox_000

Identification:

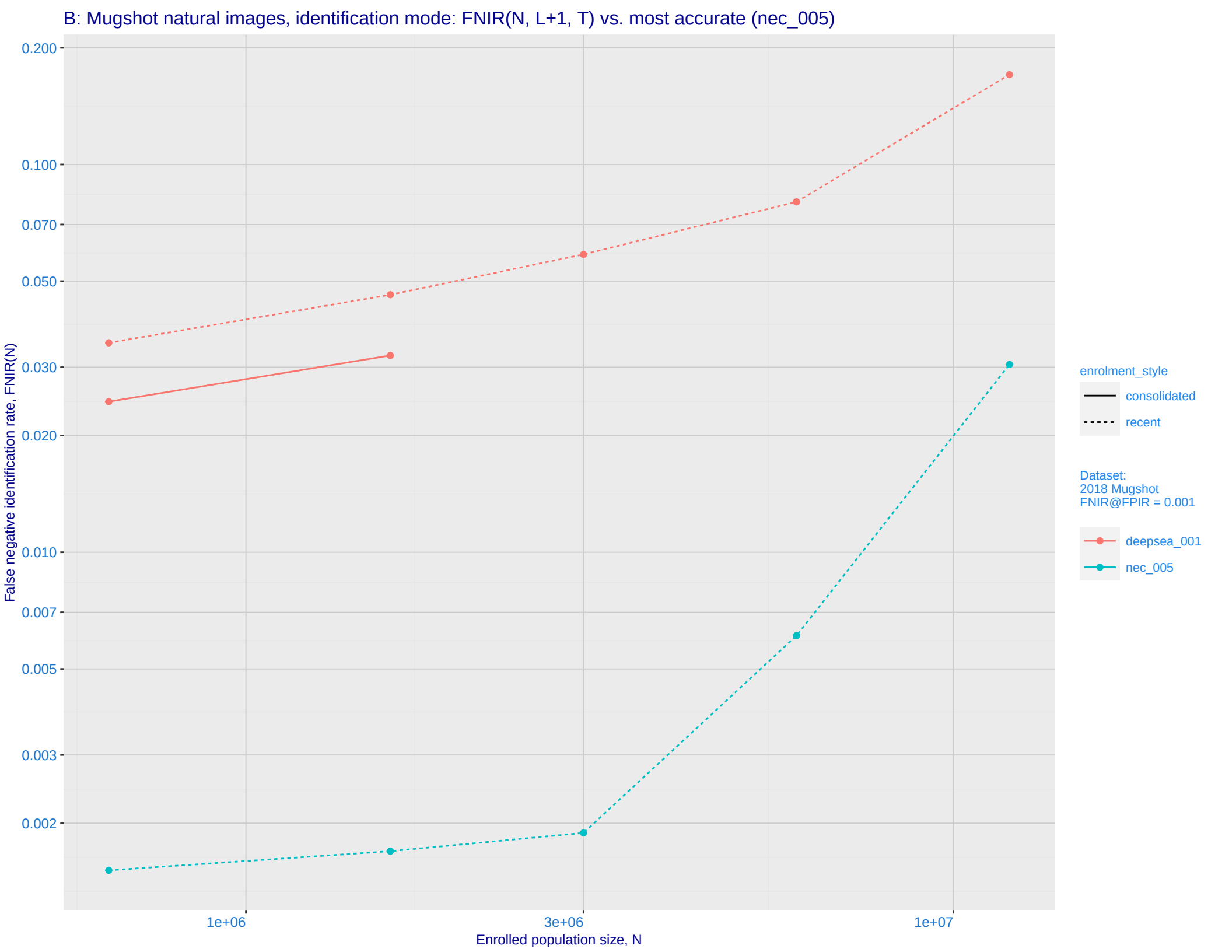
Frontal mugshot ranking 126 (out of 329) −− FNIR(1600000, T, L+1) = 0.0461, FPIR=0.001000  vs. lowest 0.0017 from nec_005

Mugshot webcam ranking 119 (out of 289) −− FNIR(1600000, T, L+1) = 0.1013, FPIR=0.001000  vs. lowest 0.0120 from nec_005

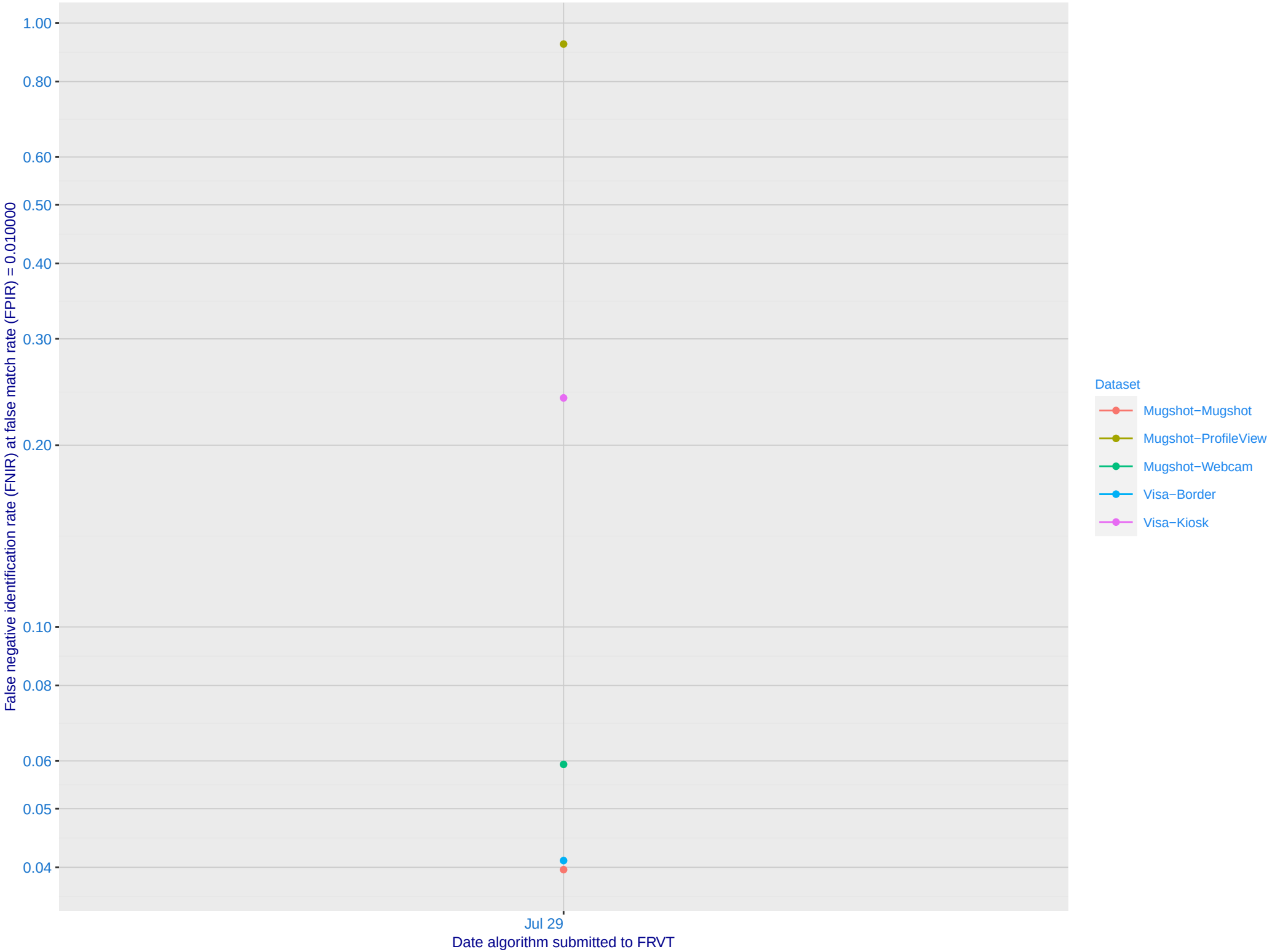
Mugshot profile ranking 96 (out of 259) −− FNIR(1600000, T, L+1) = 0.9846, FPIR=0.001000  vs. lowest 0.1331 from cloudwalk_hr_000

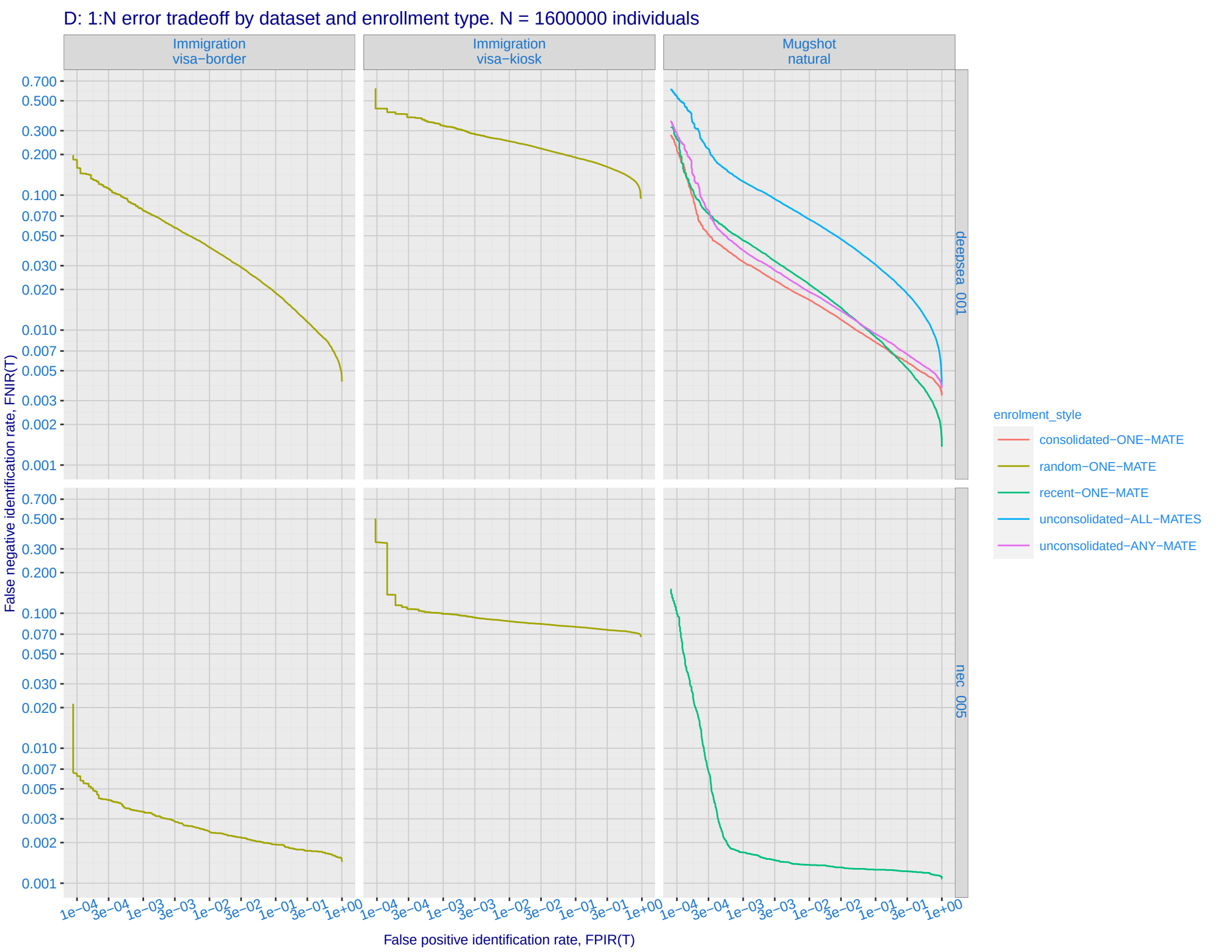
Immigration visa−border ranking 115 (out of 217) −− FNIR(1600000, T, L+1) = 0.0768, FPIR=0.001000  vs. lowest 0.0032 from paravision_009

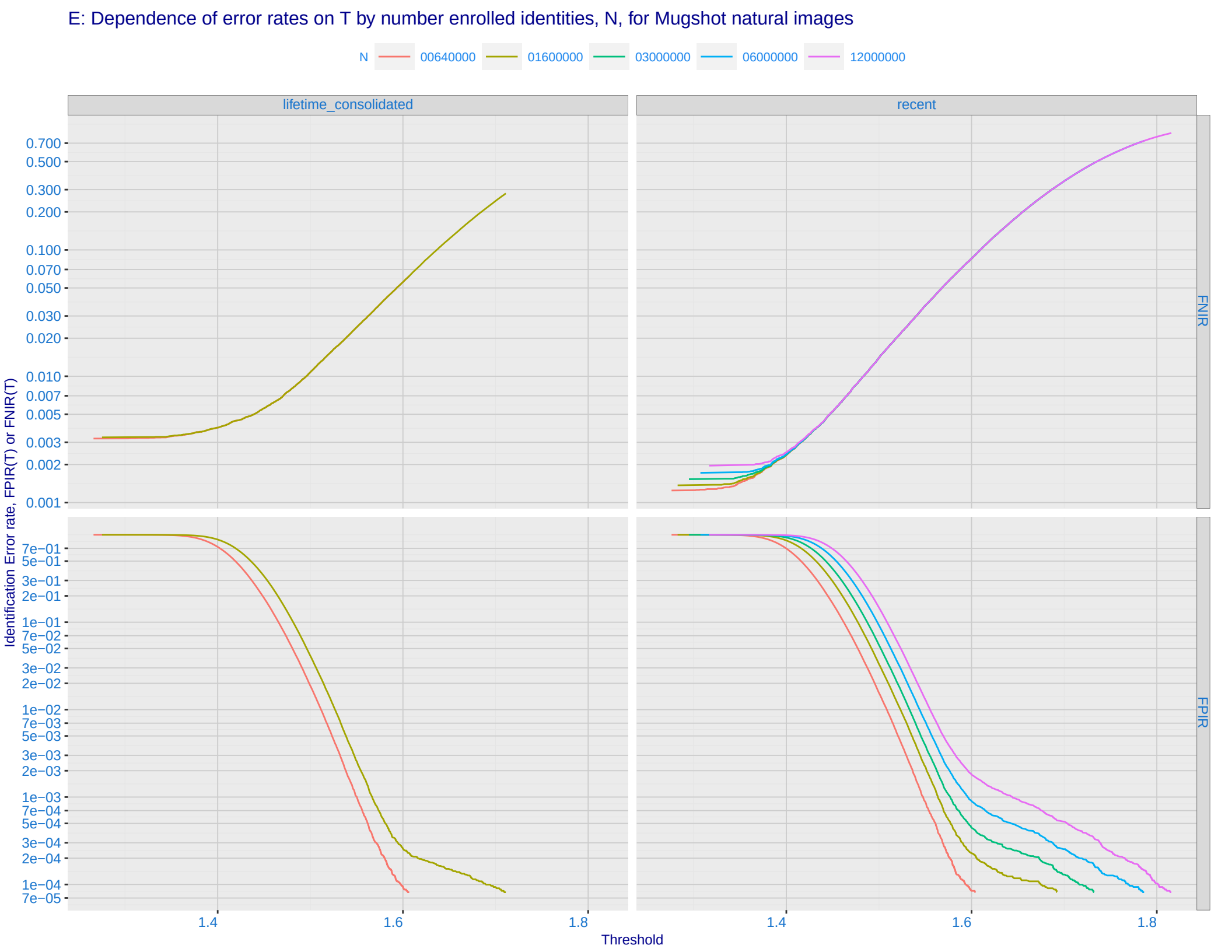
Immigration visa−kiosk ranking 84 (out of 212) −− FNIR(1600000, T, L+1) = 0.3280, FPIR=0.001000  vs. lowest 0.0728 from paravision_009

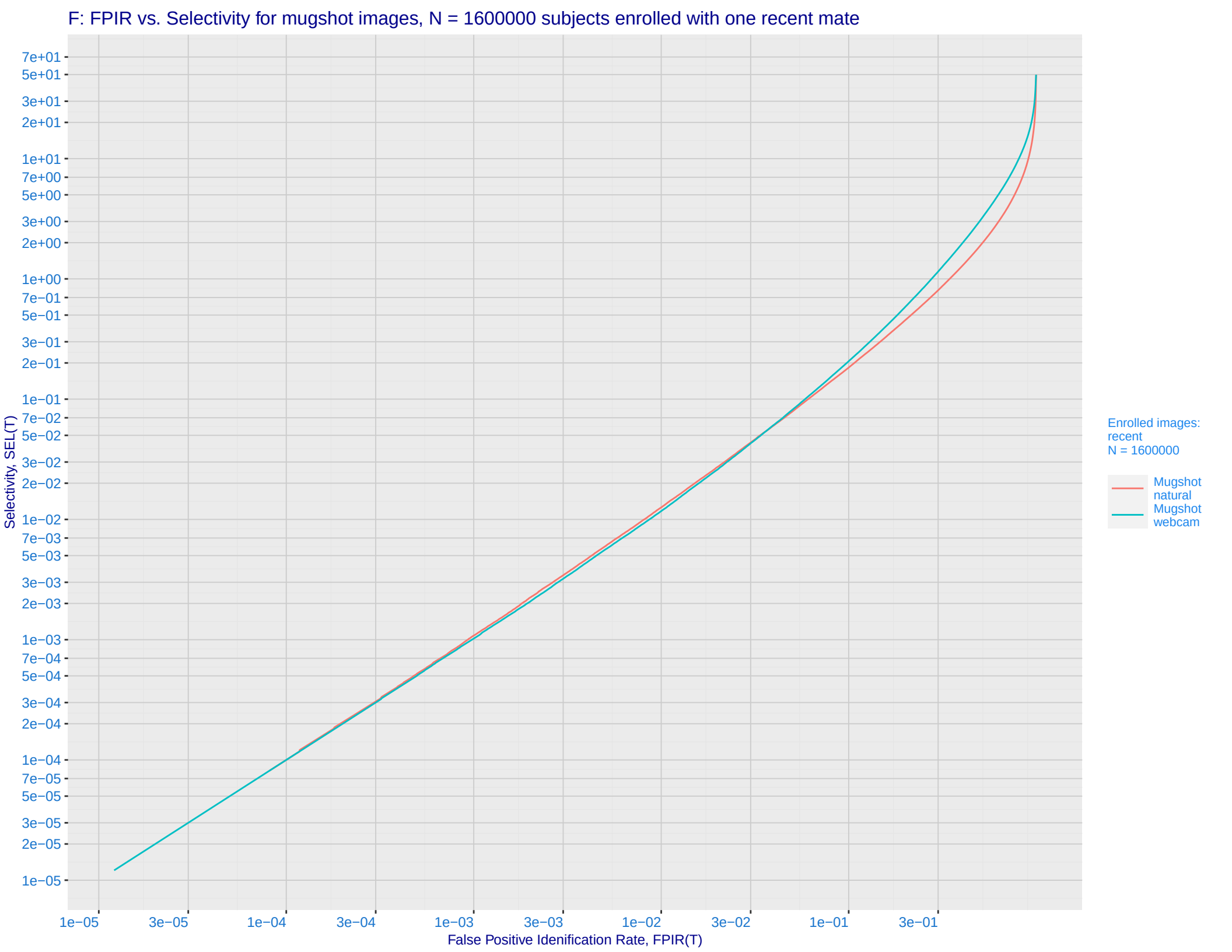

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (nec_005)
False negative identification rate, FNIR(N)
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
1e+06
3e+06
1e+07
Enrolled population size, N
enrolment_style
consolidated
recent
Dataset:
2018 Mugshot
FNIR@FPIR = 0.001
deepsea_001
nec_005

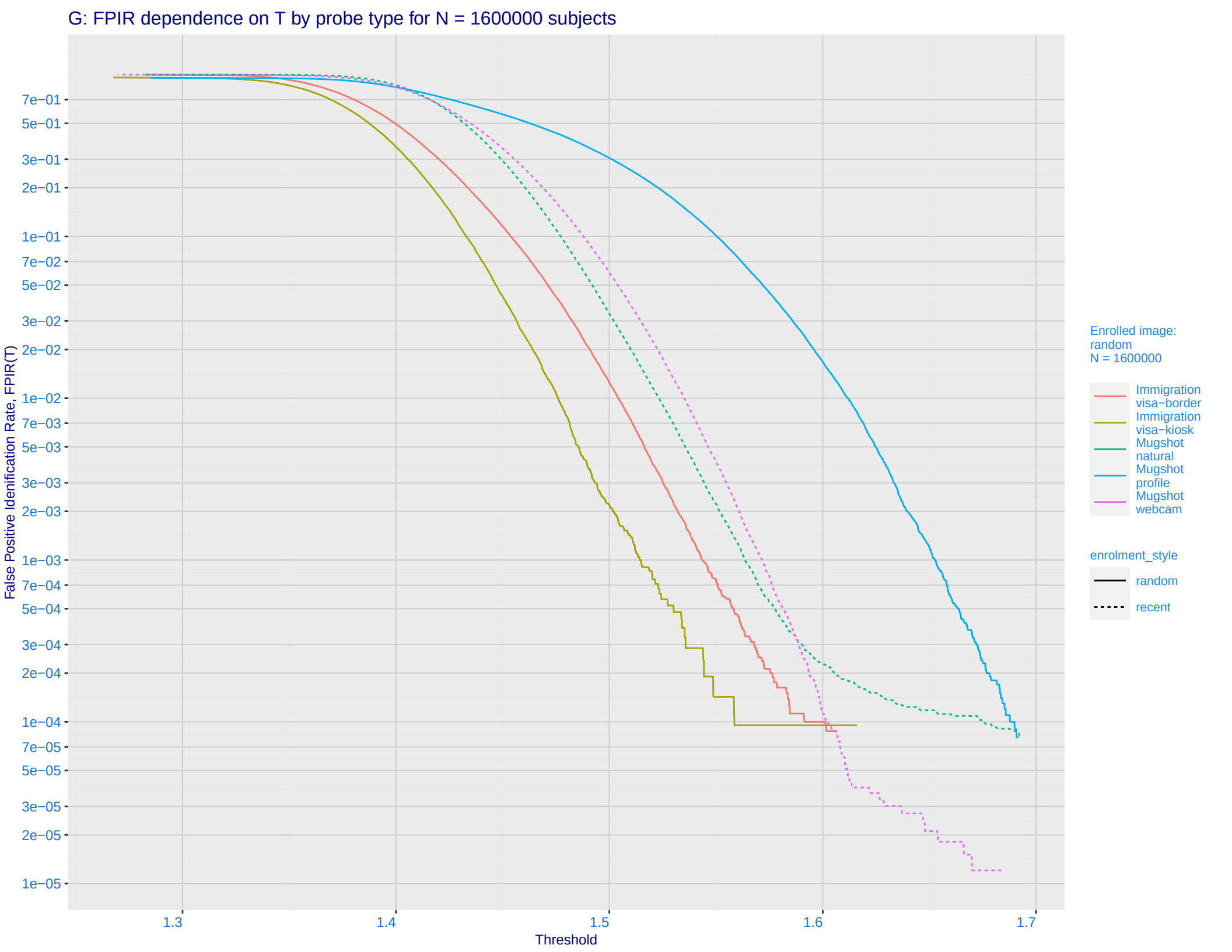
## C: Evolution of accuracy for DEEPSEA algorithms on three datasets 2018 − present

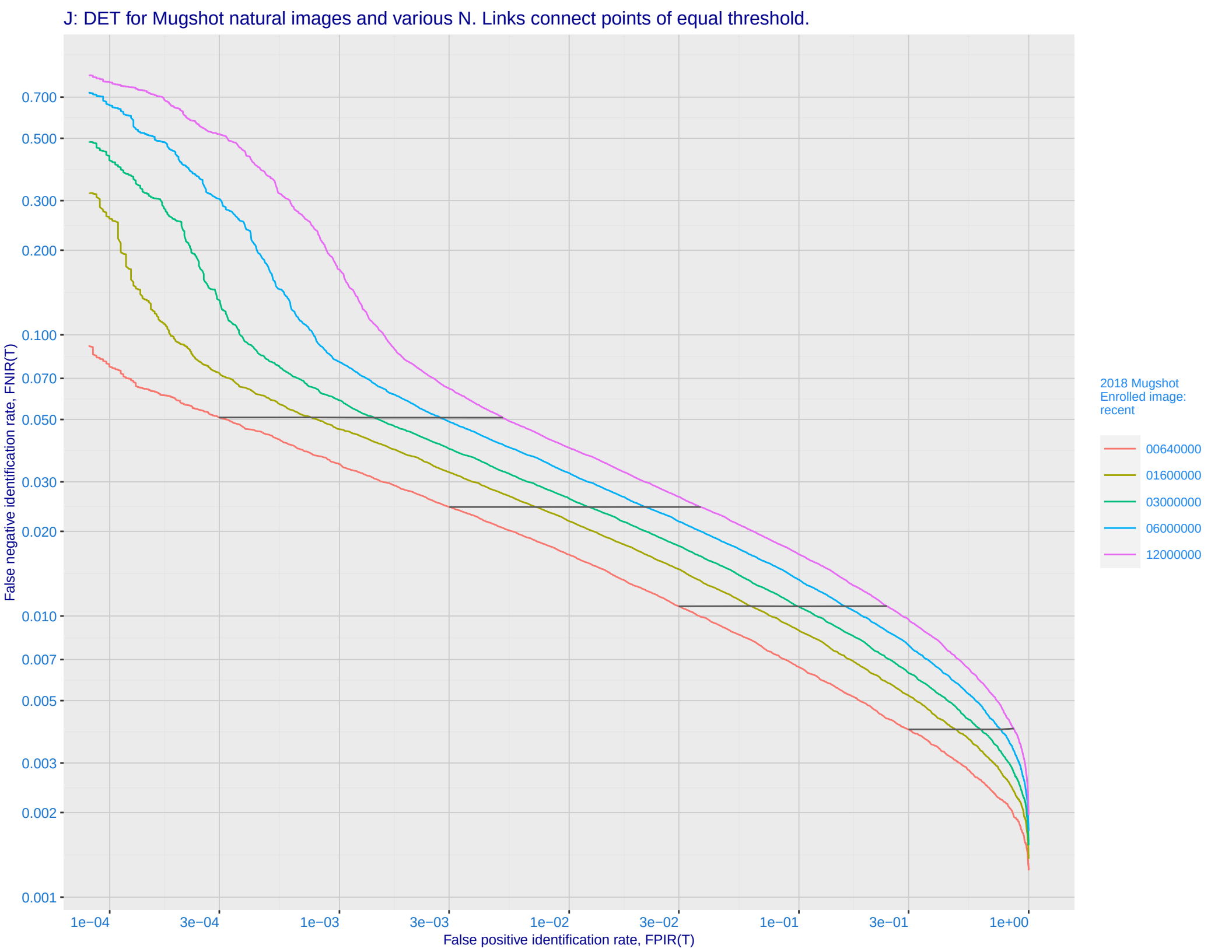


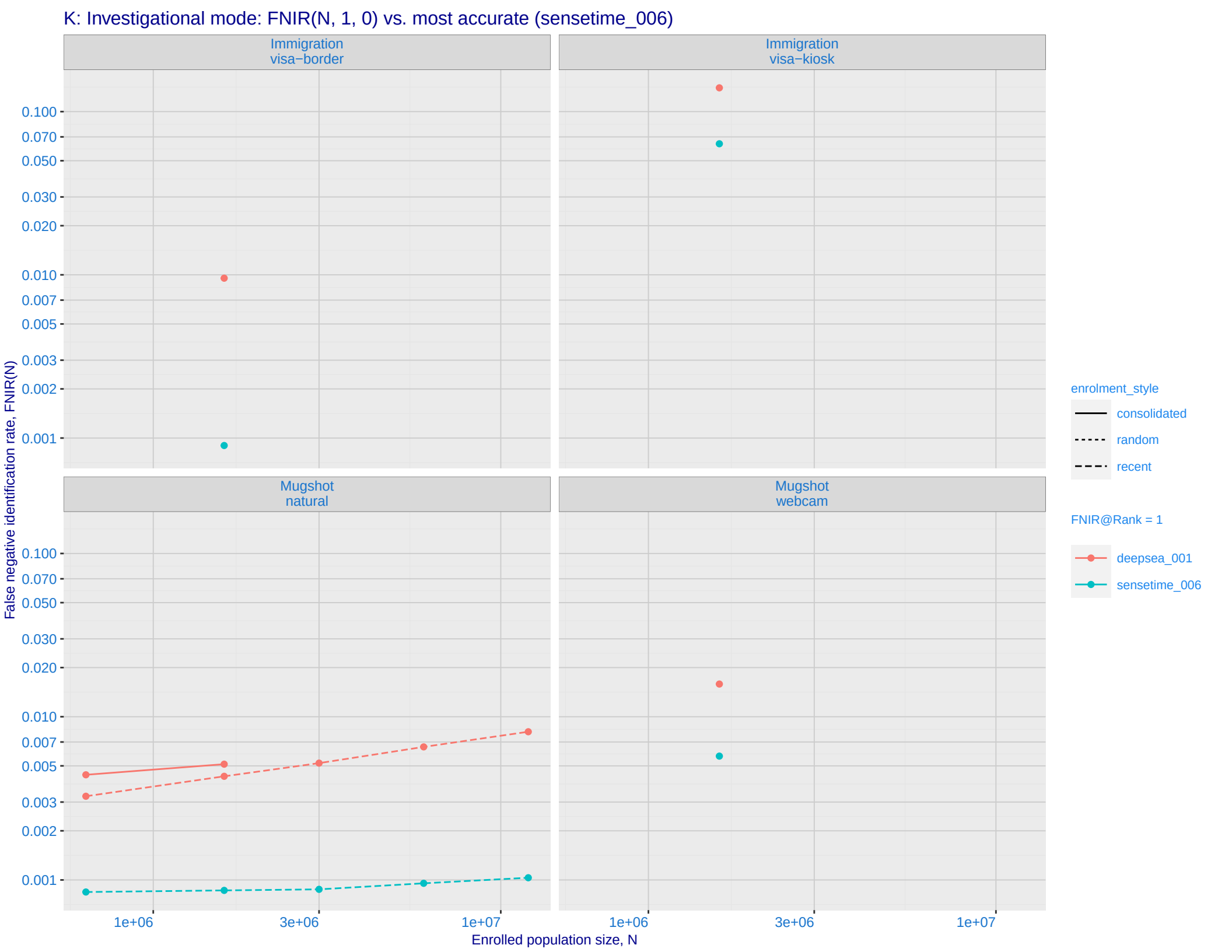

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
Immigration visa−border
Immigration visa−kiosk
Mugshot natural
deepsea 001
nec 005
False negative identification rate, FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
1e+00
False positive identification rate, FPIR(T)
enrolment_style
consolidated−ONE−MATE
random−ONE−MATE
recent−ONE−MATE
unconsolidated−ALL−MATES
unconsolidated−ANY−MATE

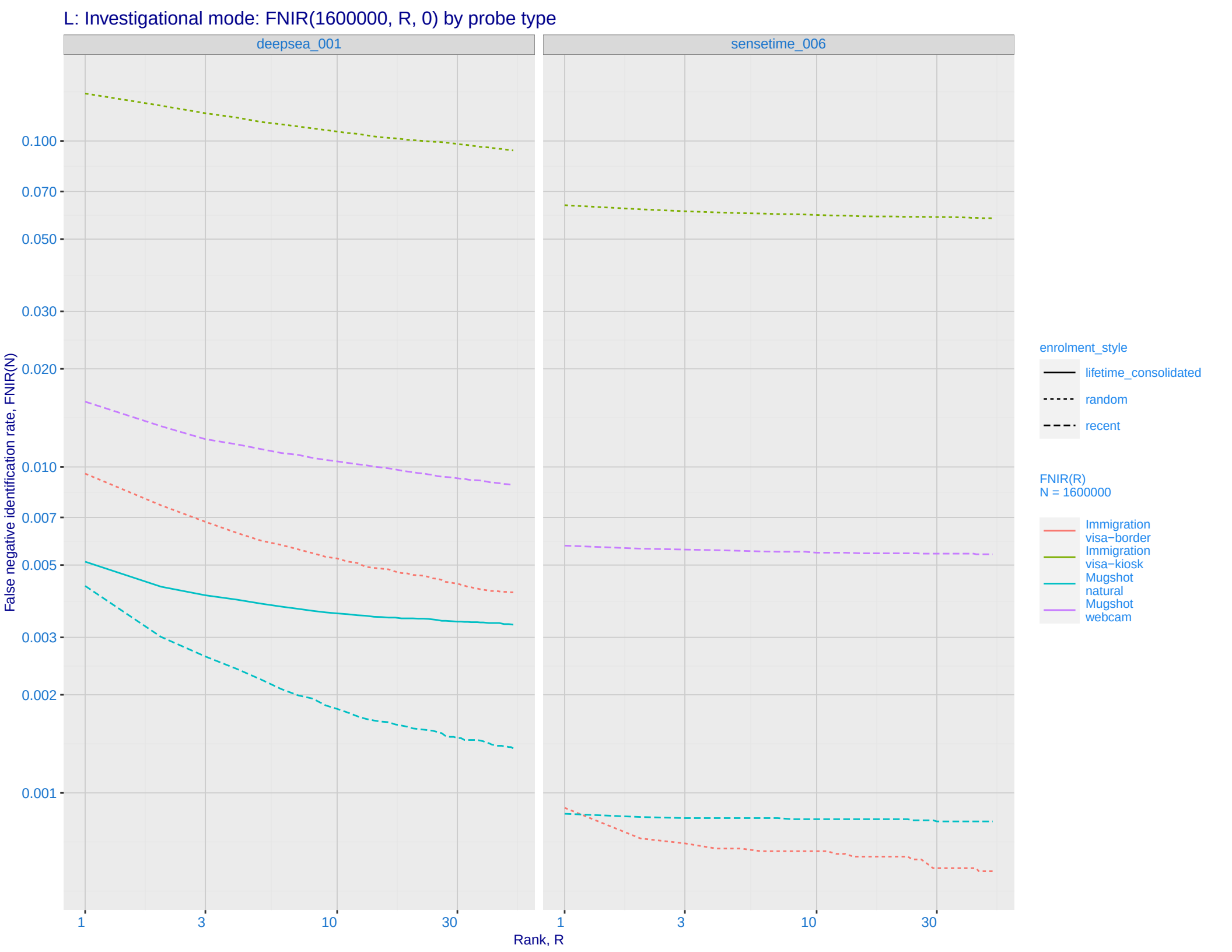

E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images
N
00640000
01600000
03000000
06000000
12000000
lifetime_consolidated
recent
FNIR
FPIR
Identification Error rate, FPIR(T) or FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
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
1.4
1.6
1.8
Threshold

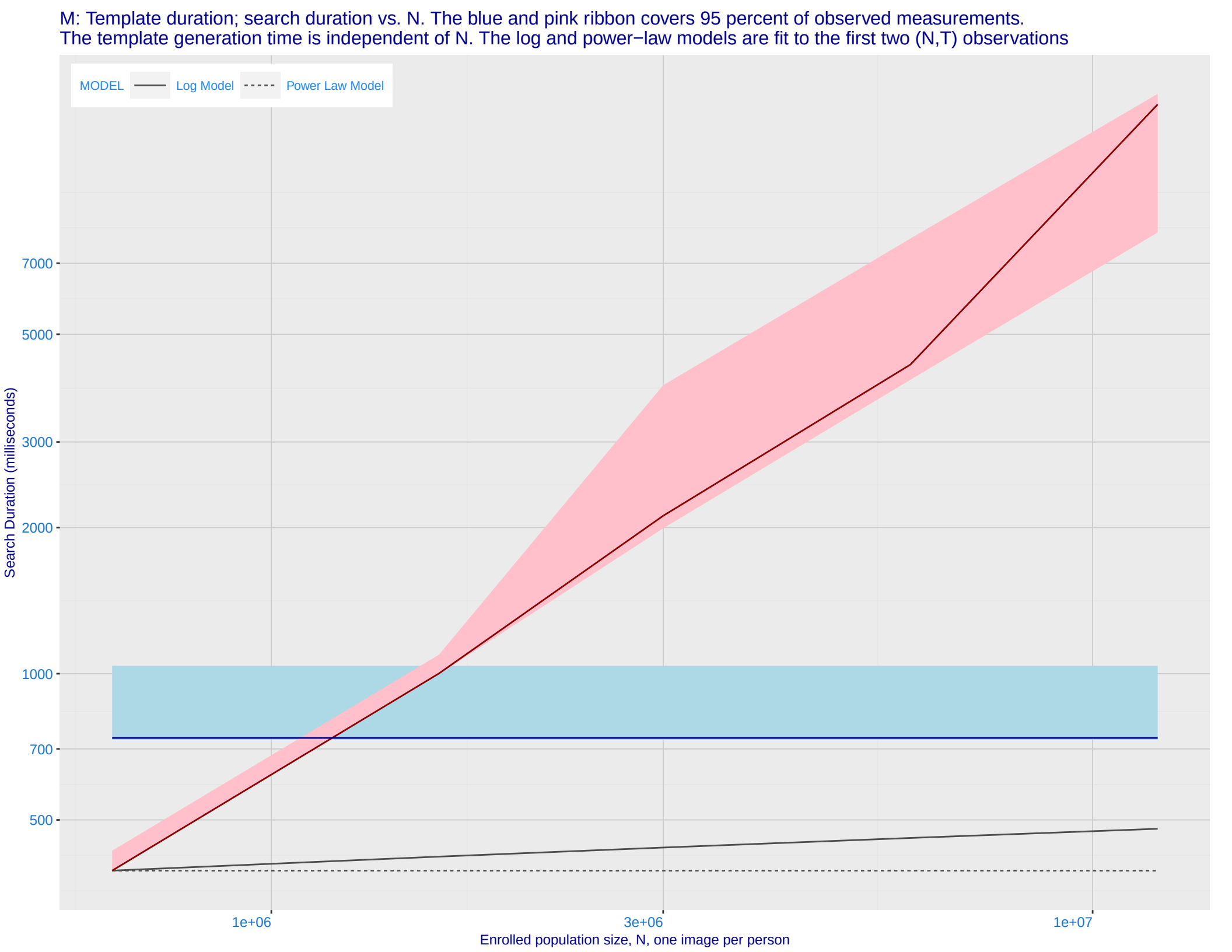

F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate
Selectivity, SEL(T)
7e+01
5e+01
3e+01
2e+01
1e+01
7e+00
5e+00
3e+00
2e+00
1e+00
7e−01
5e−01
3e−01
2e−01
1e−01
7e−02
5e−02
3e−02
2e−02
1e−02
7e−03
5e−03
3e−03
2e−03
1e−03
7e−04
5e−04
3e−04
2e−04
1e−04
7e−05
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 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
1.3
1.4
1.5
1.6
1.7
Threshold
Enrolled image:
random
N = 1600000
Immigration
visa−border
Immigration
visa−kiosk
Mugshot
natural
Mugshot
profile
Mugshot
webcam
enrolment_style
random
recent

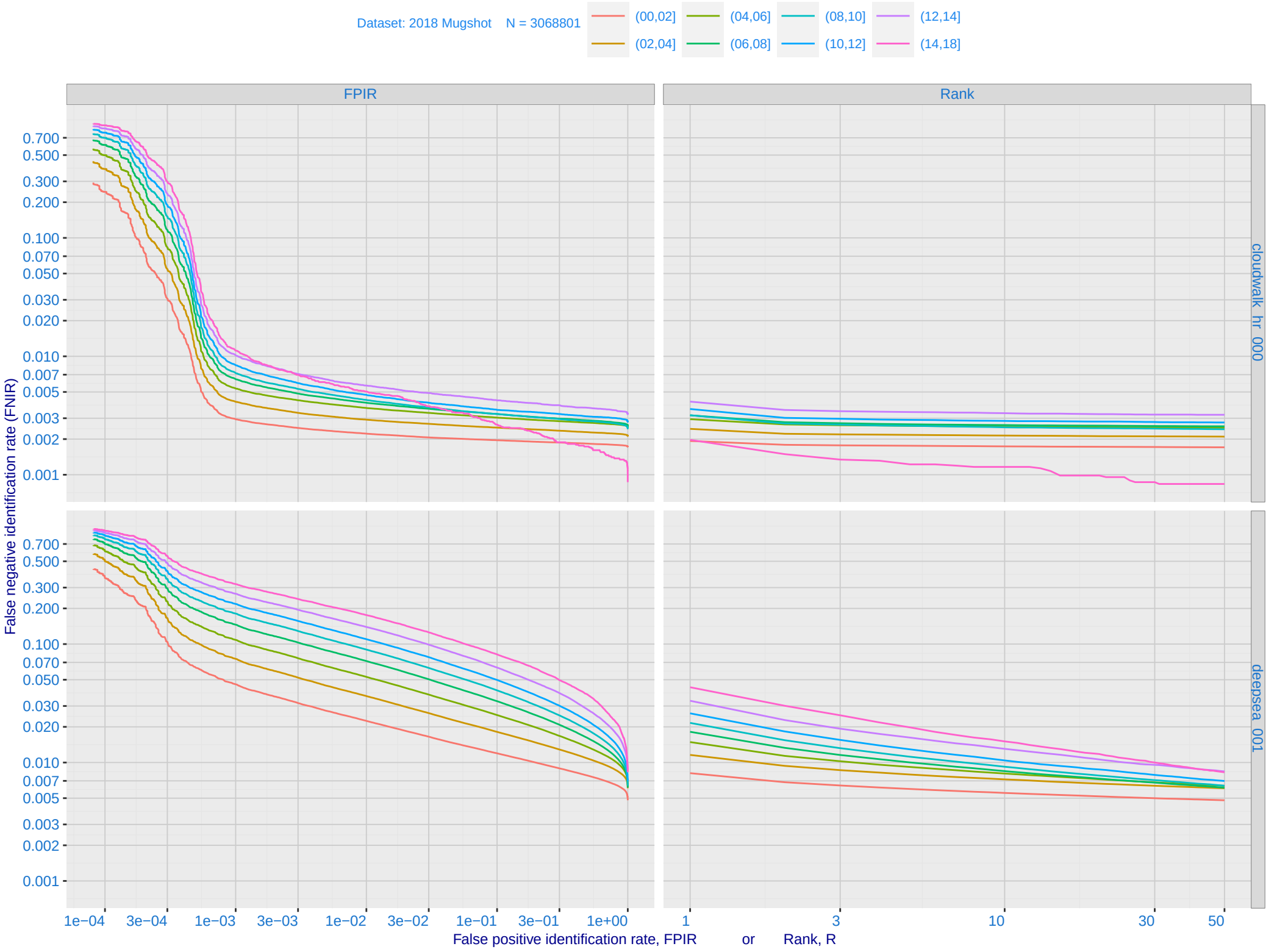

J: DET for Mugshot natural images and various N. Links connect points of equal threshold.
False negative identification rate, FNIR(T)
0.700
0.500
0.300
0.200
0.100
0.070
0.050
0.030
0.020
0.010
0.007
0.005
0.003
0.002
0.001
1e−04
3e−04
1e−03
3e−03
1e−02
3e−02
1e−01
3e−01
1e+00
False positive identification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


K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_006)
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
consolidated
random
recent
FNIR@Rank = 1
deepsea_001
sensetime_006


L: Investigational mode: FNIR(1600000, R, 0) by probe type
deepsea_001
sensetime_006
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
lifetime_consolidated
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
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

# Q: Identification FNIR(N, T, L+1) and Investigational FNIR(N, 0, R) under ageing



R: Decline of genuine scores with ageing, with some eventually dropping below typical thresholds shown by the horizontal lines