A: Datasheet

Algorithm: cyberlink_003

Developer: Cyberlink Corp

Submission Date: 2021_01_05

Template size: 6212 bytes

Template time (2.5 percentile): 690 msec

Template time (median): 692 msec

Template time (97.5 percentile): 715 msec

Investigation:

Frontal mugshot ranking 39 (out of 329) –– FNIR(1600000, 0, 1) = 0.0016 vs. lowest 0.0009 from sensetime_006

Mugshot webcam ranking 24 (out of 291) –– FNIR(1600000, 0, 1) = 0.0090 vs. lowest 0.0057 from sensetime_006

Mugshot profile ranking 89 (out of 260) –– FNIR(1600000, 0, 1) = 0.4745 vs. lowest 0.0550 from sensetime_006

Immigration visa–border ranking 40 (out of 218) –– FNIR(1600000, 0, 1) = 0.0027 vs. lowest 0.0009 from sensetime_006

Immigration visa–kiosk ranking 38 (out of 215) –– FNIR(1600000, 0, 1) = 0.0819 vs. lowest 0.0487 from cubox_000

Identification:

Frontal mugshot ranking 32 (out of 329) –– FNIR(1600000, T, L+1) = 0.0077, FPIR=0.001000 vs. lowest 0.0017 from nec_005
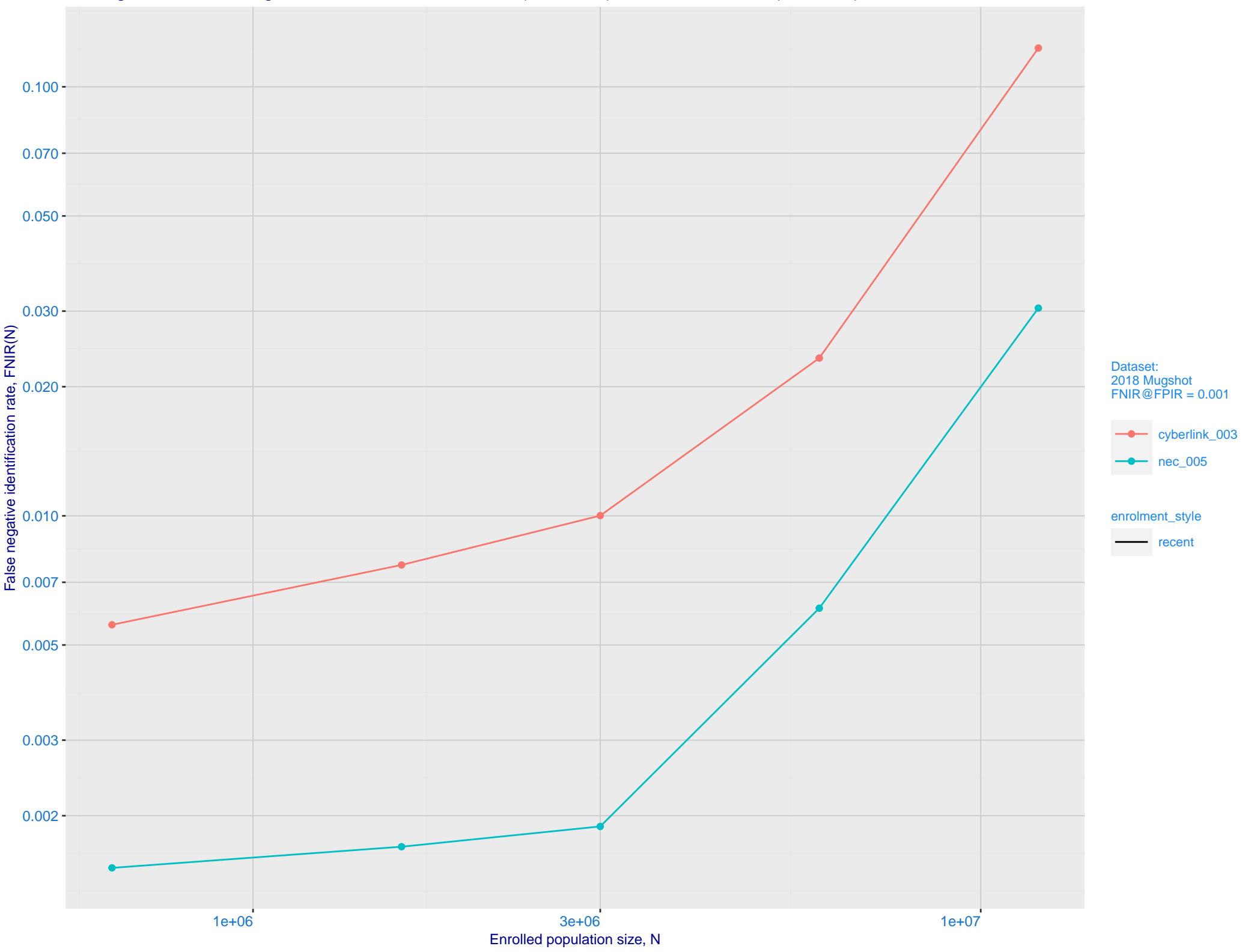
Mugshot webcam ranking 34 (out of 289) –– FNIR(1600000, T, L+1) = 0.0351, FPIR=0.001000 vs. lowest 0.0120 from nec_005

Mugshot profile ranking 74 (out of 259) –– FNIR(1600000, T, L+1) = 0.9723, FPIR=0.001000 vs. lowest 0.1331 from cloudwalk_hr_000
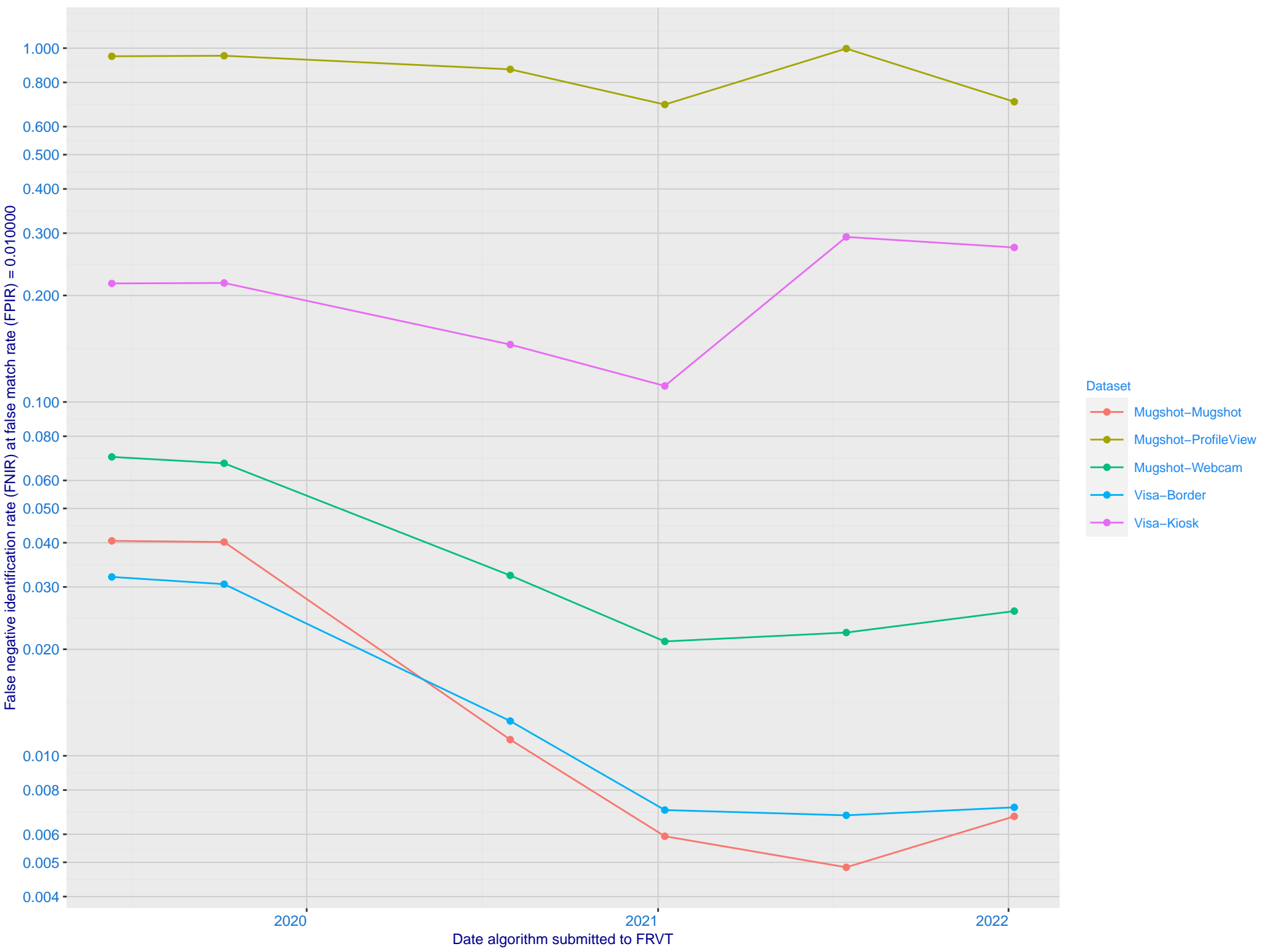
Immigration visa–border ranking 31 (out of 217) –– FNIR(1600000, T, L+1) = 0.0122, FPIR=0.001000 vs. lowest 0.0032 from paravision_009

Immigration visa–kiosk ranking 88 (out of 212) –– FNIR(1600000, T, L+1) = 0.3713, 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)

Enrolled population size, N

Dataset:
2018 Mugshot
FNIR@FPIR = 0.001

cyberlink_003
nec_005

enrolment_style

recent

C: Evolution of accuracy for CYBERLINK algorithms on three datasets 2018 – present

Date algorithm submitted to FRVT

False negative identification rate (FNIR) at false match rate (FPIR) = 0.010000

Dataset
- Mugshot–Mugshot
- Mugshot–ProfileView
- Mugshot–Webcam
- Visa–Border
- Visa–Kiosk

D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
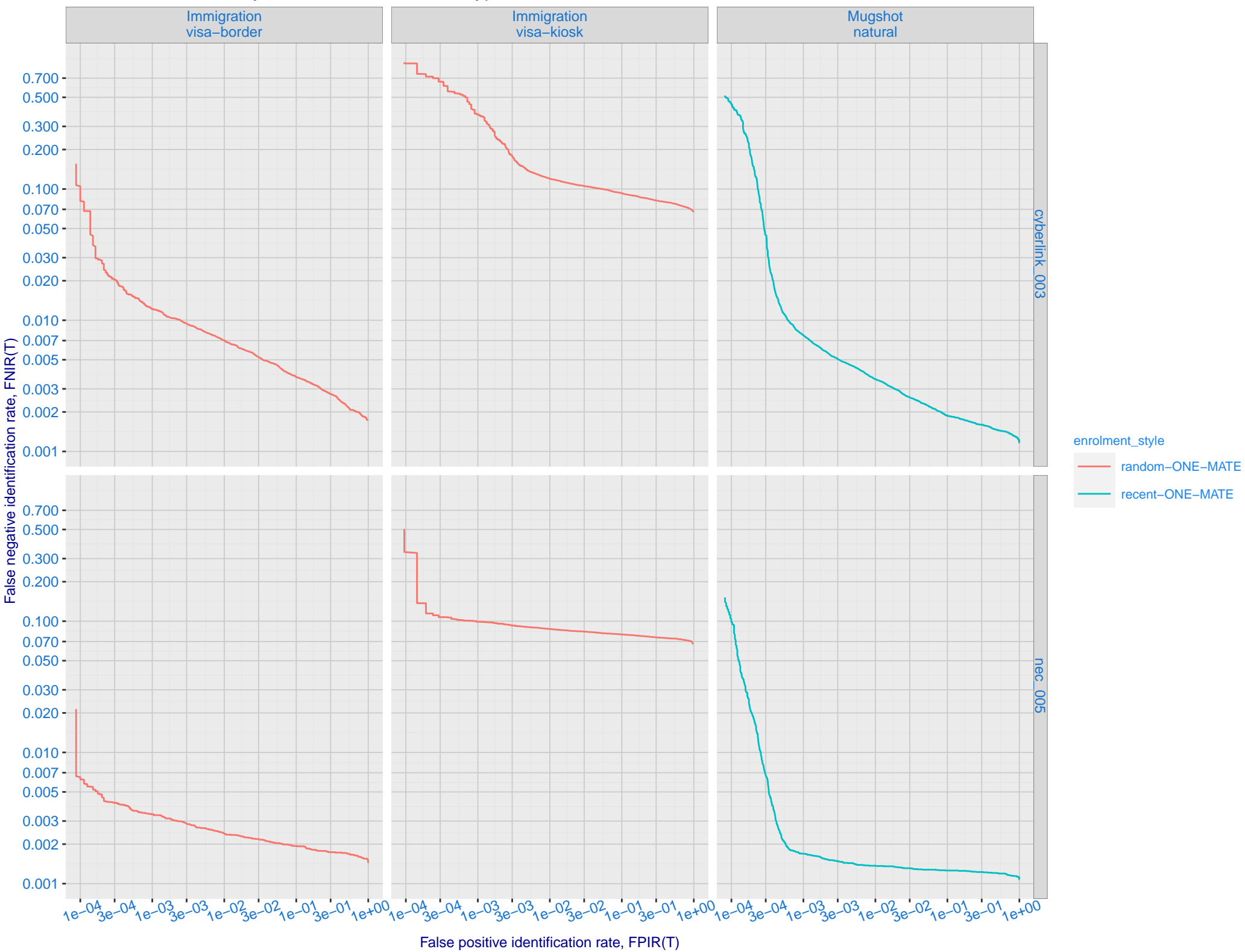
E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images

N — 00640000 — 01600000 — 03000000 — 06000000 — 12000000
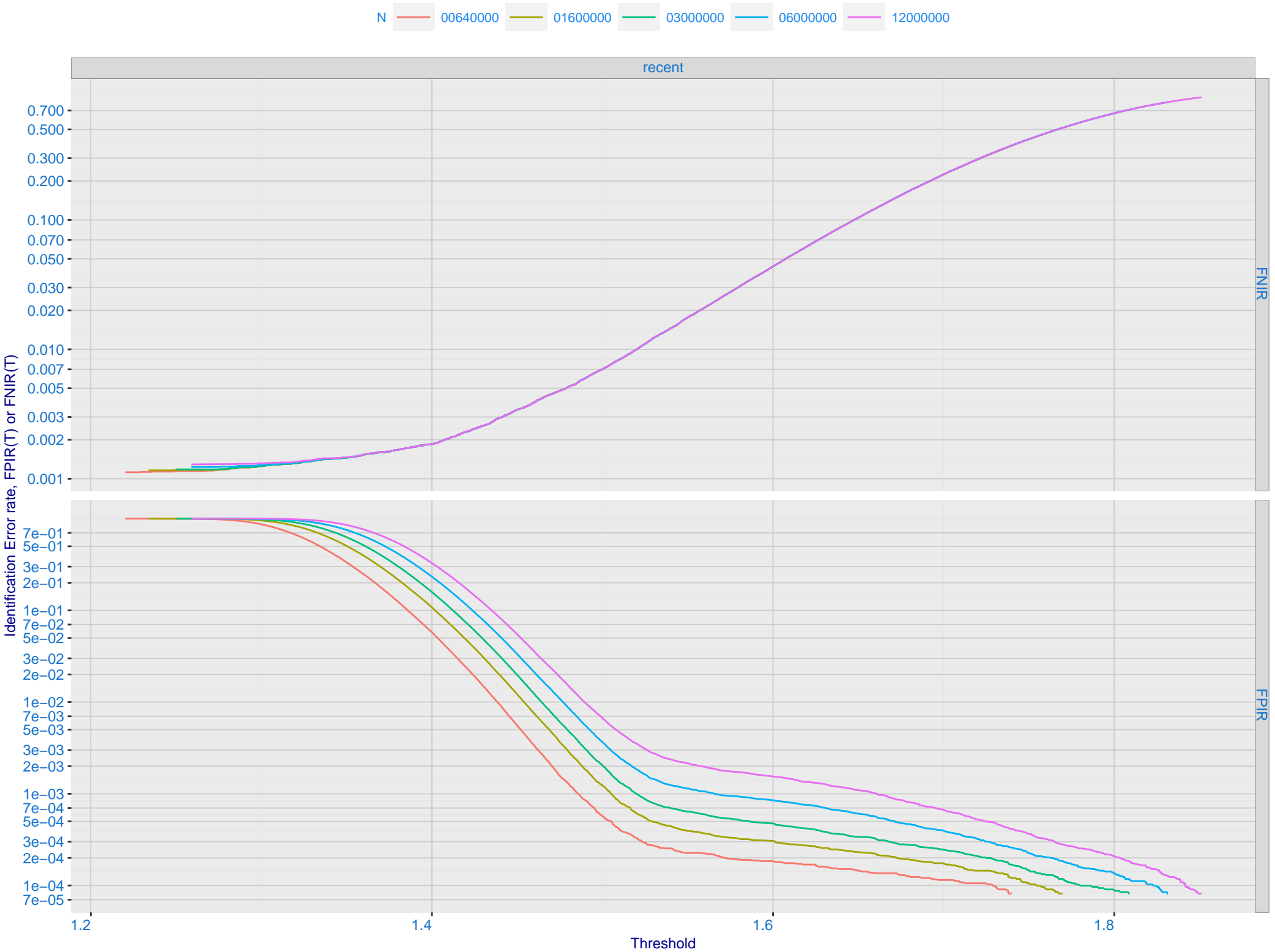
F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate

G: FPIR dependence on T by probe type for N = 1600000 subjects
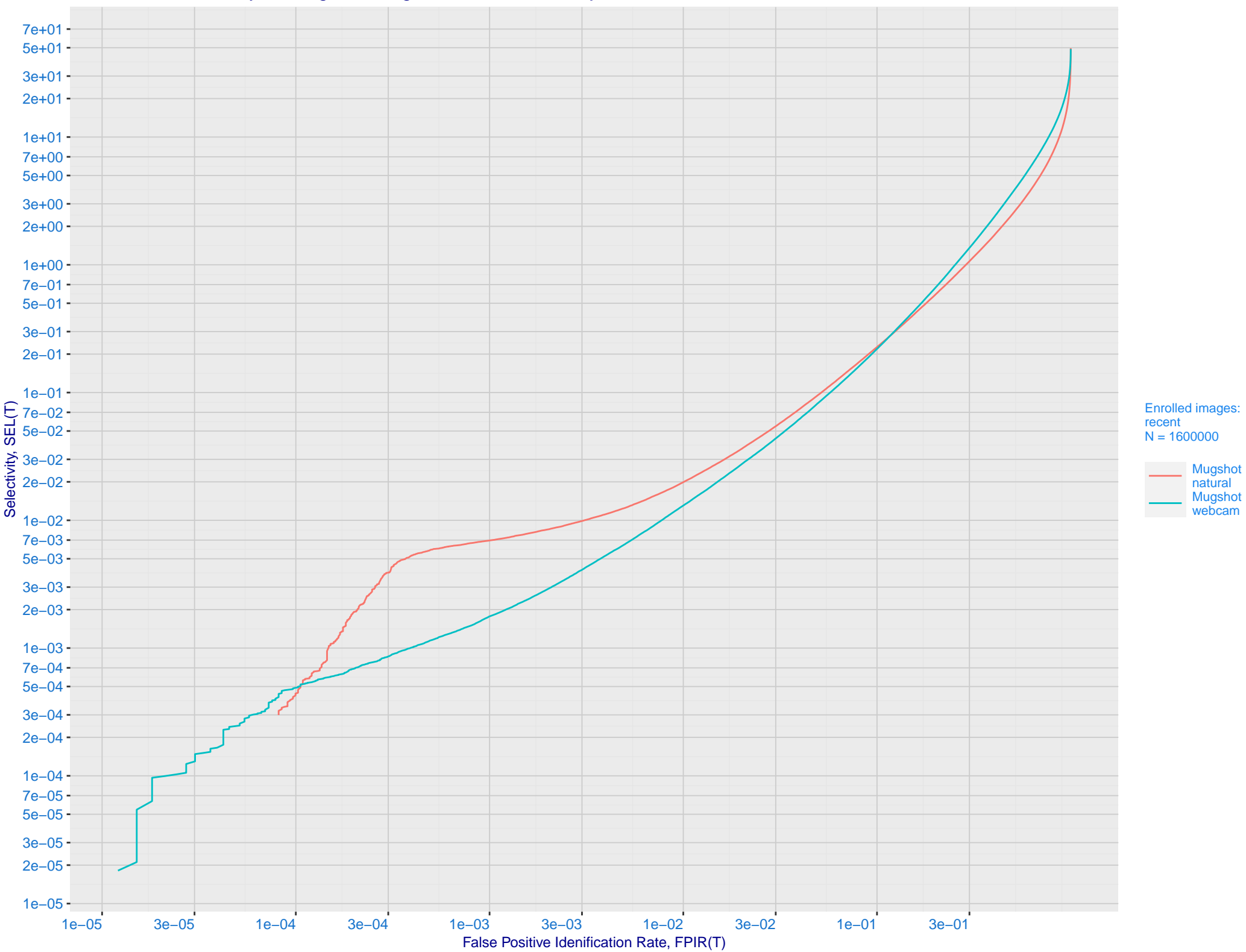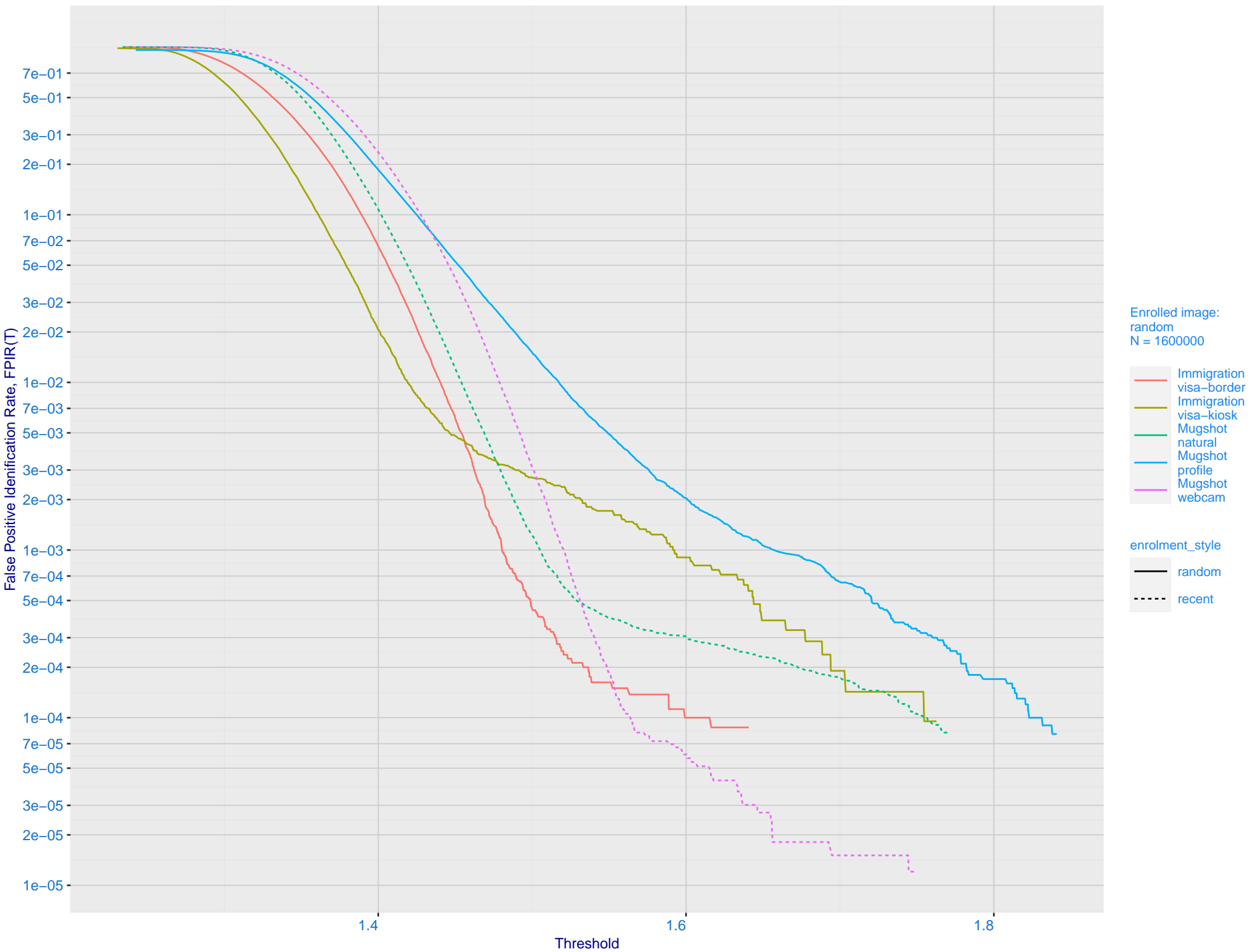
H: Reduced length candidate lists for human review
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image

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

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
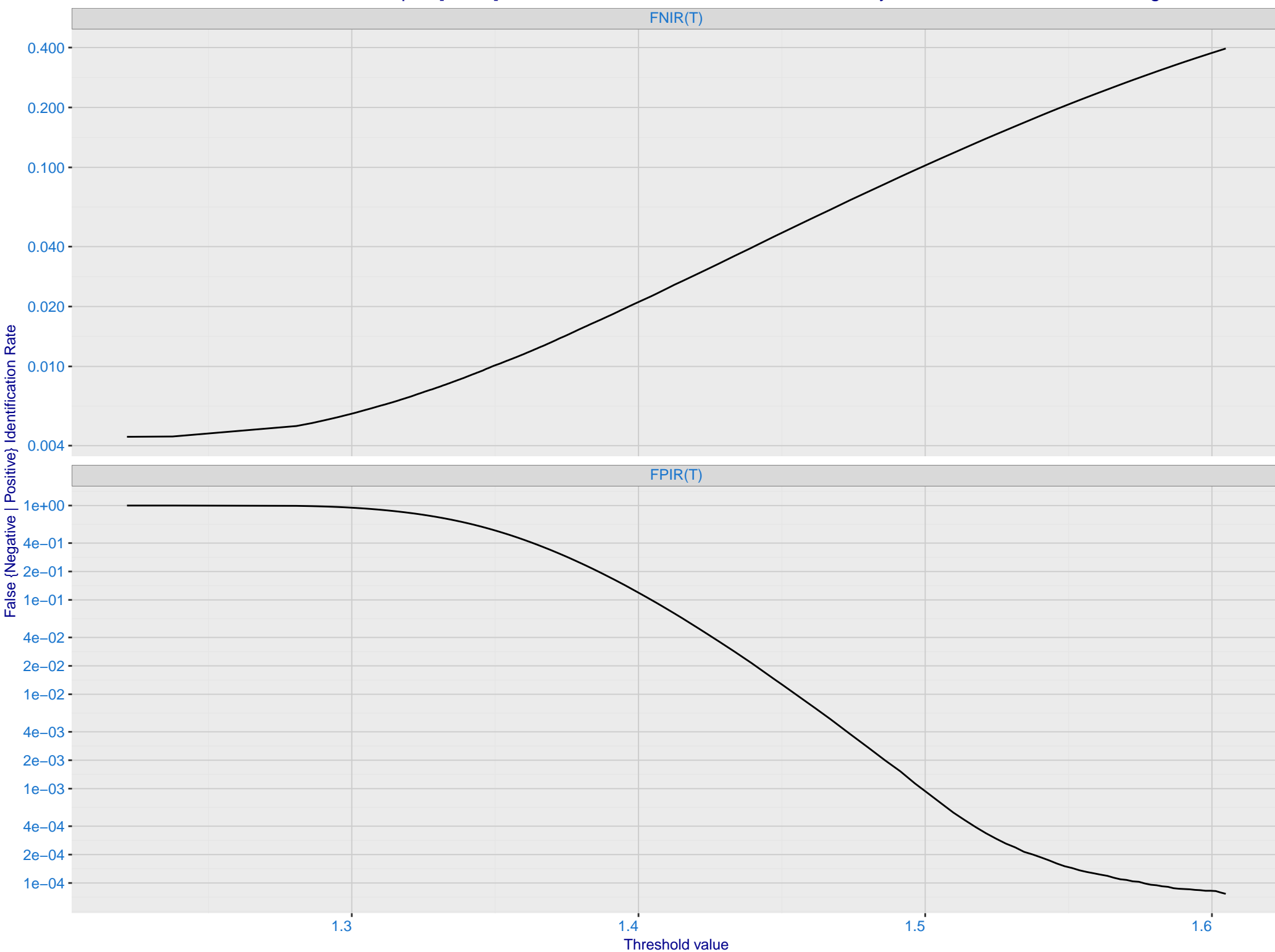
J: DET for Mugshot natural images and various N. Links connect points of equal threshold.
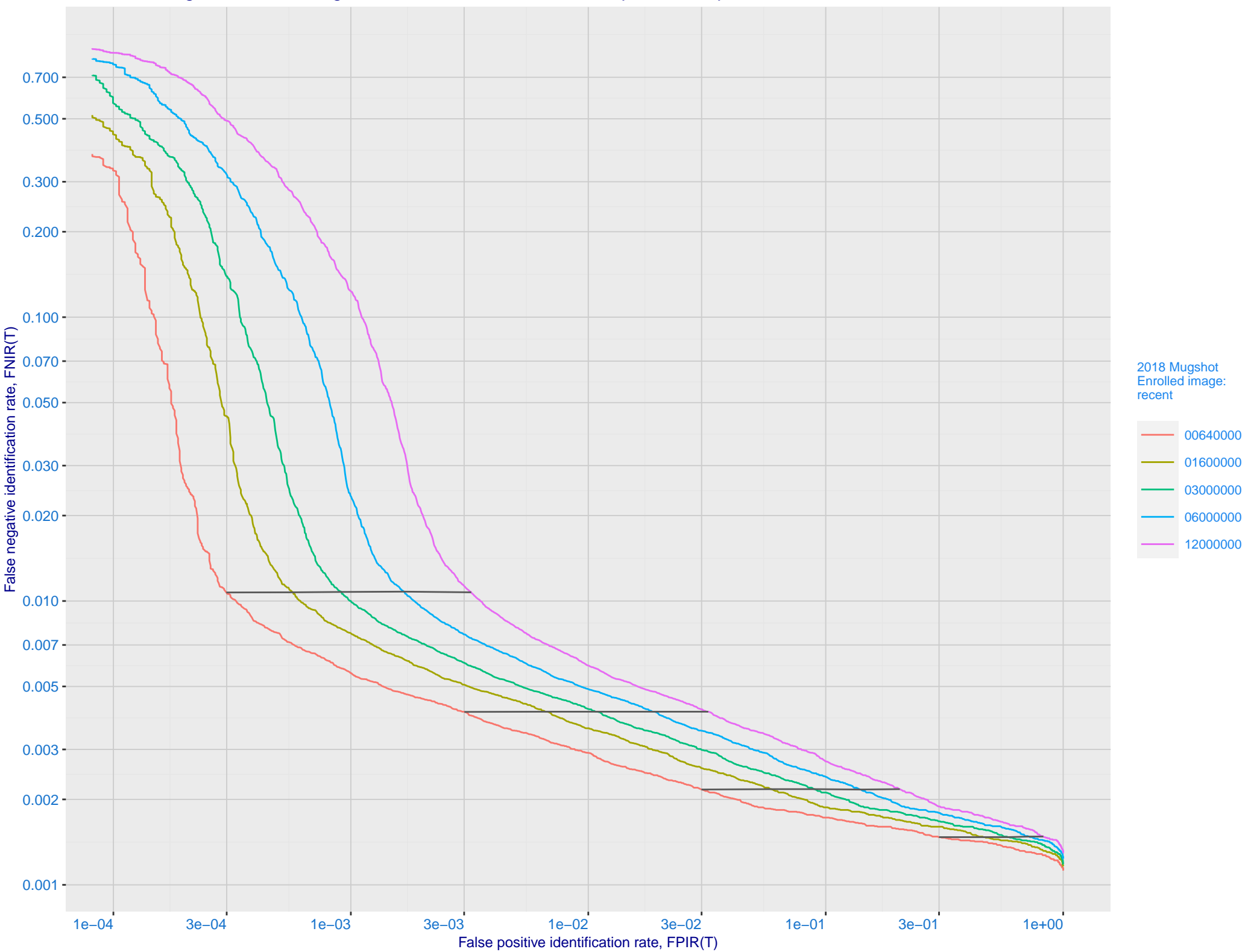
K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_006)
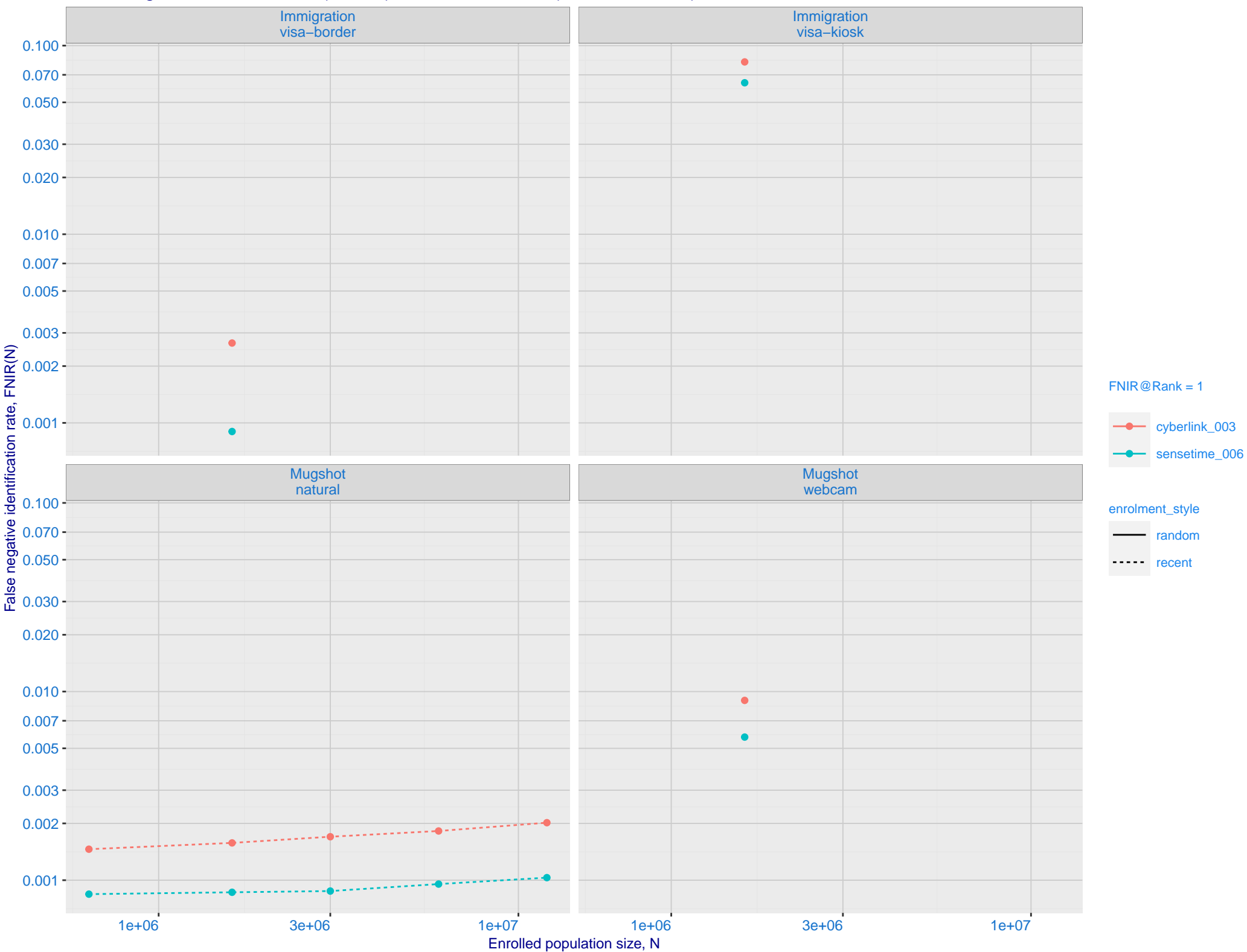
L: Investigational mode: FNIR(1600000, R, 0) by probe type
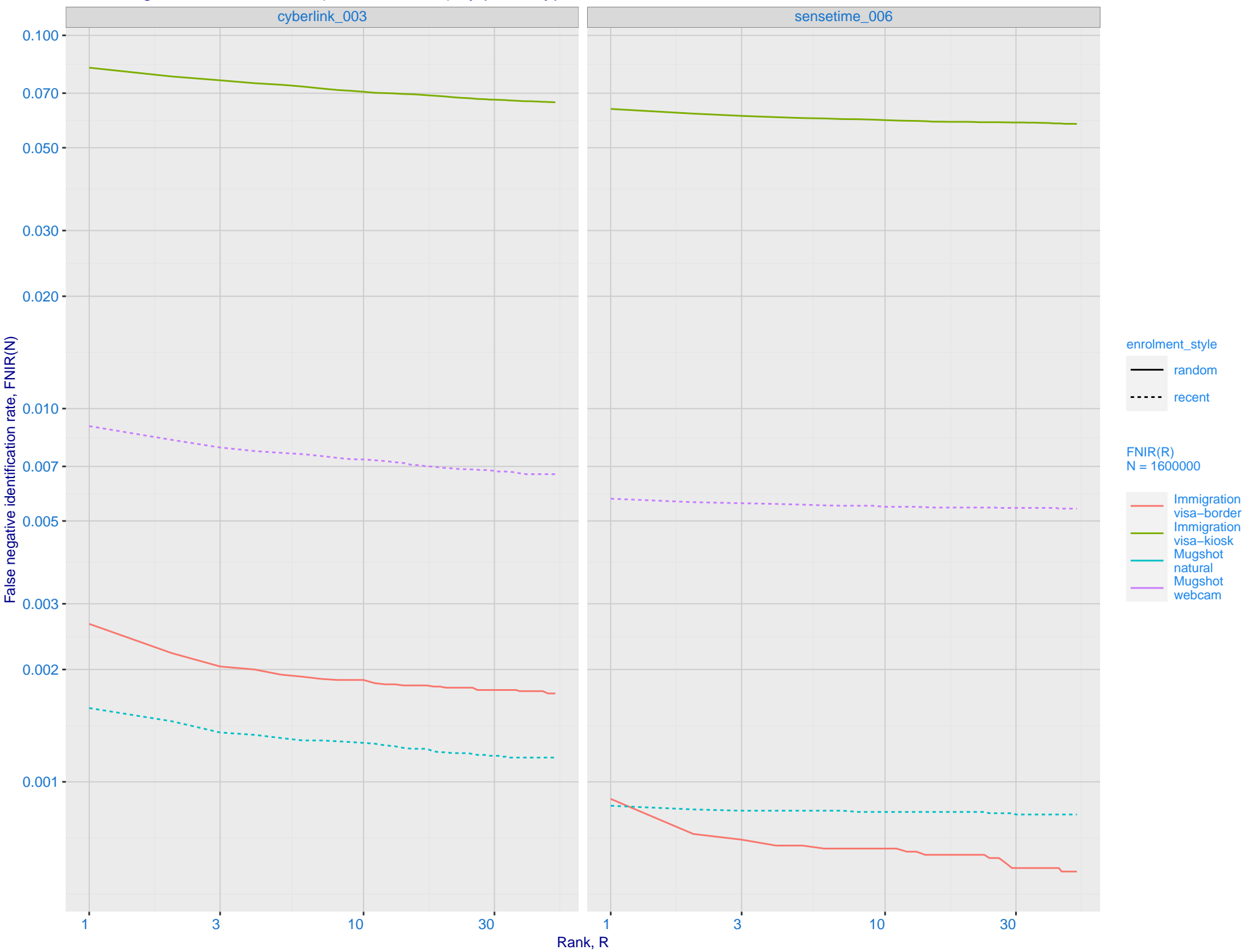
M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements. The template generation time is independent of N. The log and power–law models are fit to the first two (N,T) observations

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: cyberlink_003, Dataset: Border-Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)

Female / Male — FNIR(R=1, T=0)

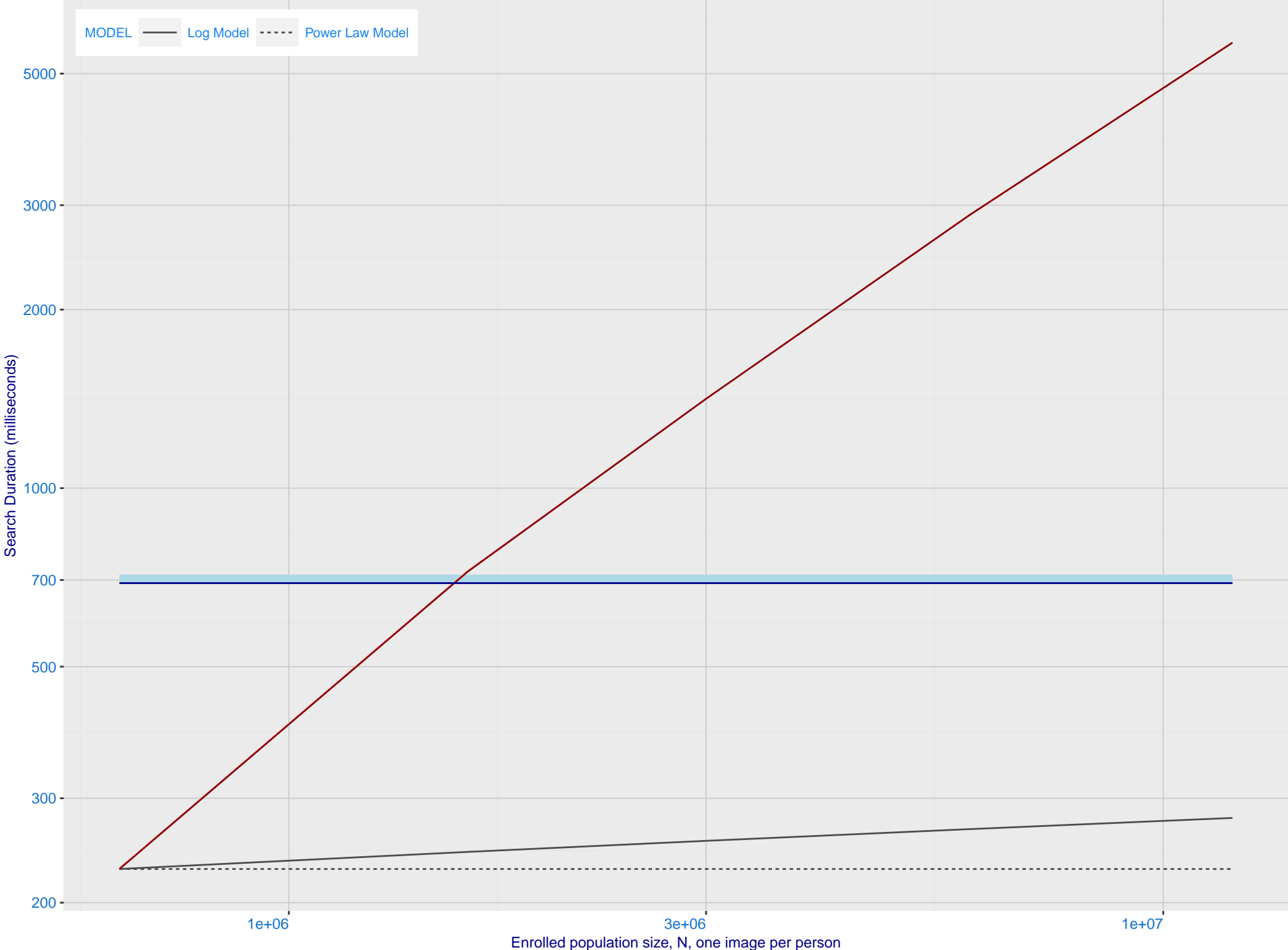| Age group	10	11	12	13	14	15
Female						
(60:99]	0.013	0.014	0.016	0.016	0.019	0.018
(45:60]	0.010	0.010	0.011	0.013	0.014	0.013
(30:45]	0.011	0.011	0.013	0.014	0.014	0.015
(21:30]	0.014	0.014	0.015	0.017	0.019	0.019
(18:21]	0.026	0.024	0.025	0.029	0.028	0.025
(15:18]	0.041	0.037	0.038	0.038	0.041	0.047
(12:15]	0.057	0.040	0.052	0.061	0.069	0.050

Male — FNIR(R=1, T=0)

Age group	10	11	12	13	14	15
(60:99]	0.005	0.005	0.006	0.005	0.005	0.018
(45:60]	0.004	0.004	0.004	0.005	0.005	0.003
(30:45]	0.004	0.004	0.004	0.005	0.005	0.004
(21:30]	0.005	0.005	0.006	0.006	0.007	0.005
(18:21]	0.010	0.009	0.012	0.013	0.012	0.010
(15:18]	0.029	0.023	0.025	0.036	0.035	0.037
(12:15]	0.050	0.043	0.060	0.060	0.069	0.043

Female — FNIR(R=50, T=1.454470), FPIR(30-45, Male) = 0.001

Age group	10	11	12	13	14	15
(60:99]	0.038	0.040	0.051	0.053	0.064	0.065
(45:60]	0.033	0.033	0.039	0.047	0.053	0.058
(30:45]	0.038	0.040	0.048	0.055	0.061	0.062
(21:30]	0.054	0.053	0.061	0.071	0.076	0.082
(18:21]	0.092	0.090	0.099	0.110	0.117	0.119
(15:18]	0.135	0.127	0.140	0.160	0.165	0.139
(12:15]	0.188	0.159	0.177	0.210	0.223	0.208

Male — FNIR(R=50, T=1.454470), FPIR(30-45, Male) = 0.001

Age group	10	11	12	13	14	15
(60:99]	0.024	0.022	0.023	0.031	0.029	0.040
(45:60]	0.016	0.017	0.021	0.025	0.028	0.032
(30:45]	0.017	0.016	0.020	0.025	0.030	0.029
(21:30]	0.027	0.027	0.032	0.039	0.045	0.042
(18:21]	0.078	0.072	0.082	0.098	0.112	0.102
(15:18]	0.175	0.172	0.193	0.230	0.241	0.243
(12:15]	0.313	0.287	0.337	0.365	0.383	0.370

Age group at time of enrollment

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.

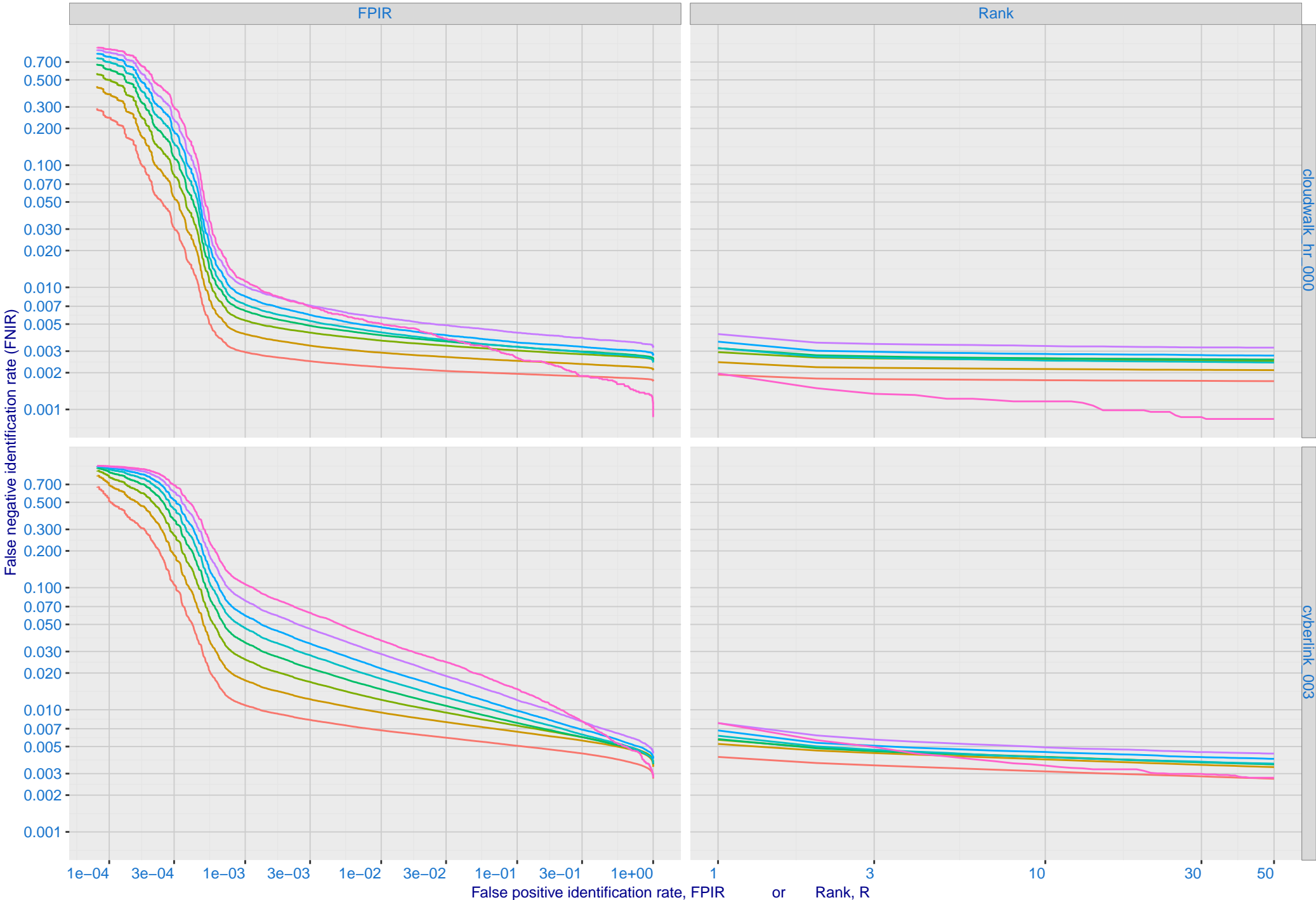Q: Identification FNIR(N, T, L+1) and Investigational FNIR(N, 0, R) under ageing

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