A: Datasheet

Algorithm: rankone_013

Developer: Rank One Computing

Submission Date: 2022_07_21

Template size: 261 bytes

Template time (2.5 percentile): 677 msec

Template time (median): 679 msec

Template time (97.5 percentile): 685 msec

Investigation:

Mugshot webcam ranking 10 (out of 337) –– FNIR(1600000, 0, 1) = 0.0068 vs. lowest 0.0055 from sensetime_008

Mugshot profile ranking 34 (out of 306) –– FNIR(1600000, 0, 1) = 0.0755 vs. lowest 0.0521 from sensetime_007

Immigration visa–border ranking 14 (out of 264) –– FNIR(1600000, 0, 1) = 0.0012 vs. lowest 0.0006 from cloudwalk_mt_001

Immigration visa–kiosk ranking 11 (out of 209) –– FNIR(1600000, 0, 1) = 0.0507 vs. lowest 0.0395 from cloudwalk_mt_001

Identification:

Frontal mugshot ranking 33 (out of 375) –– FNIR(1600000, T, L+1) = 0.0045, FPIR=0.001000 vs. lowest 0.0013 from sensetime_008

Mugshot webcam ranking 53 (out of 335) –– FNIR(1600000, T, L+1) = 0.0337, FPIR=0.001000 vs. lowest 0.0090 from sensetime_008

Mugshot profile ranking 179 (out of 305) –– FNIR(1600000, T, L+1) = 0.9960, FPIR=0.001000 vs. lowest 0.0698 from cloudwalk_mt_001

Immigration visa–border ranking 65 (out of 263) –– FNIR(1600000, T, L+1) = 0.0183, FPIR=0.001000 vs. lowest 0.0013 from cloudwalk_mt_001

Immigration visa–kiosk ranking 40 (out of 209) –– FNIR(1600000, T, L+1) = 0.1363, 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)
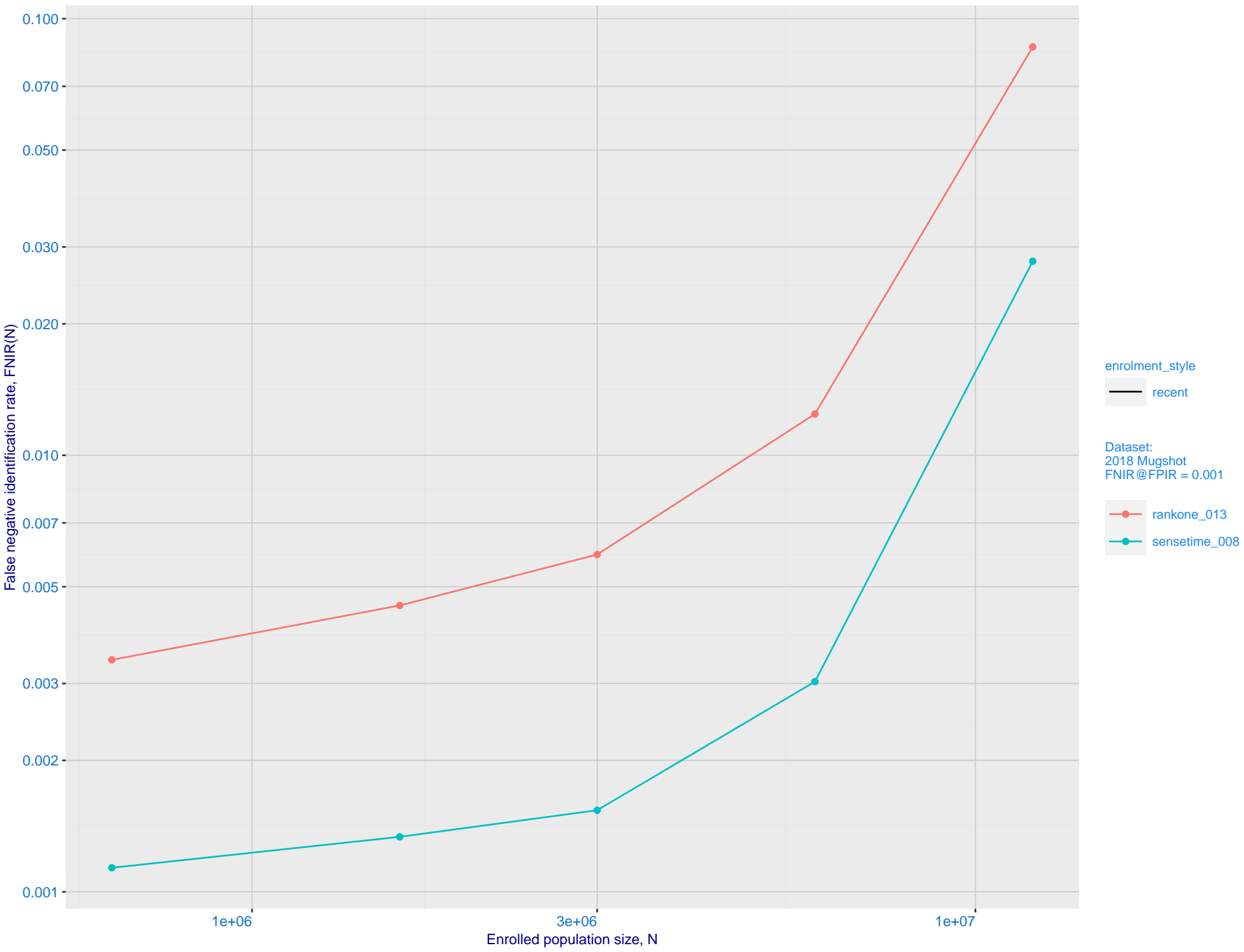
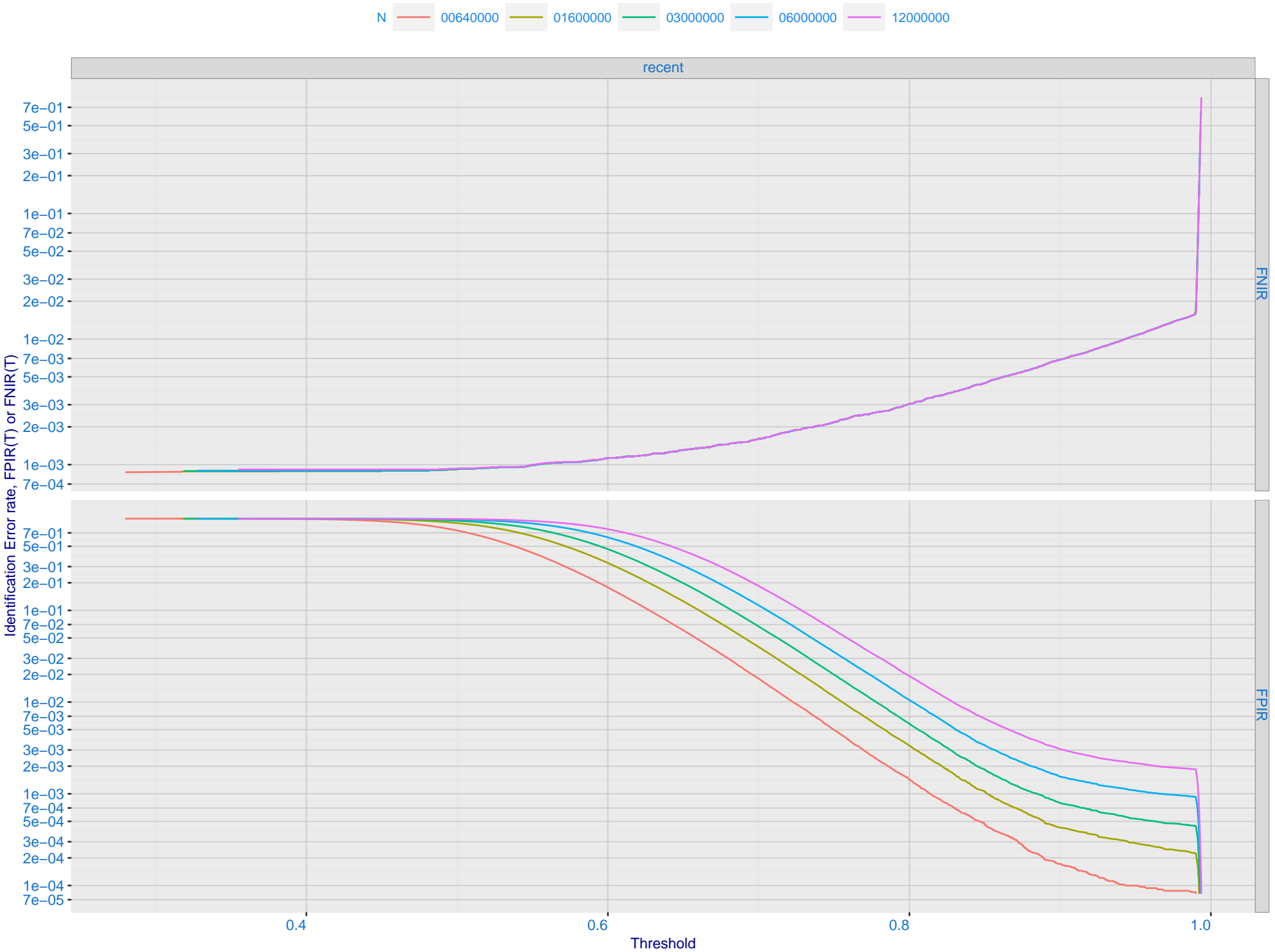**C: Evolution of accuracy for RANKONE algorithms on three datasets 2018 – present**
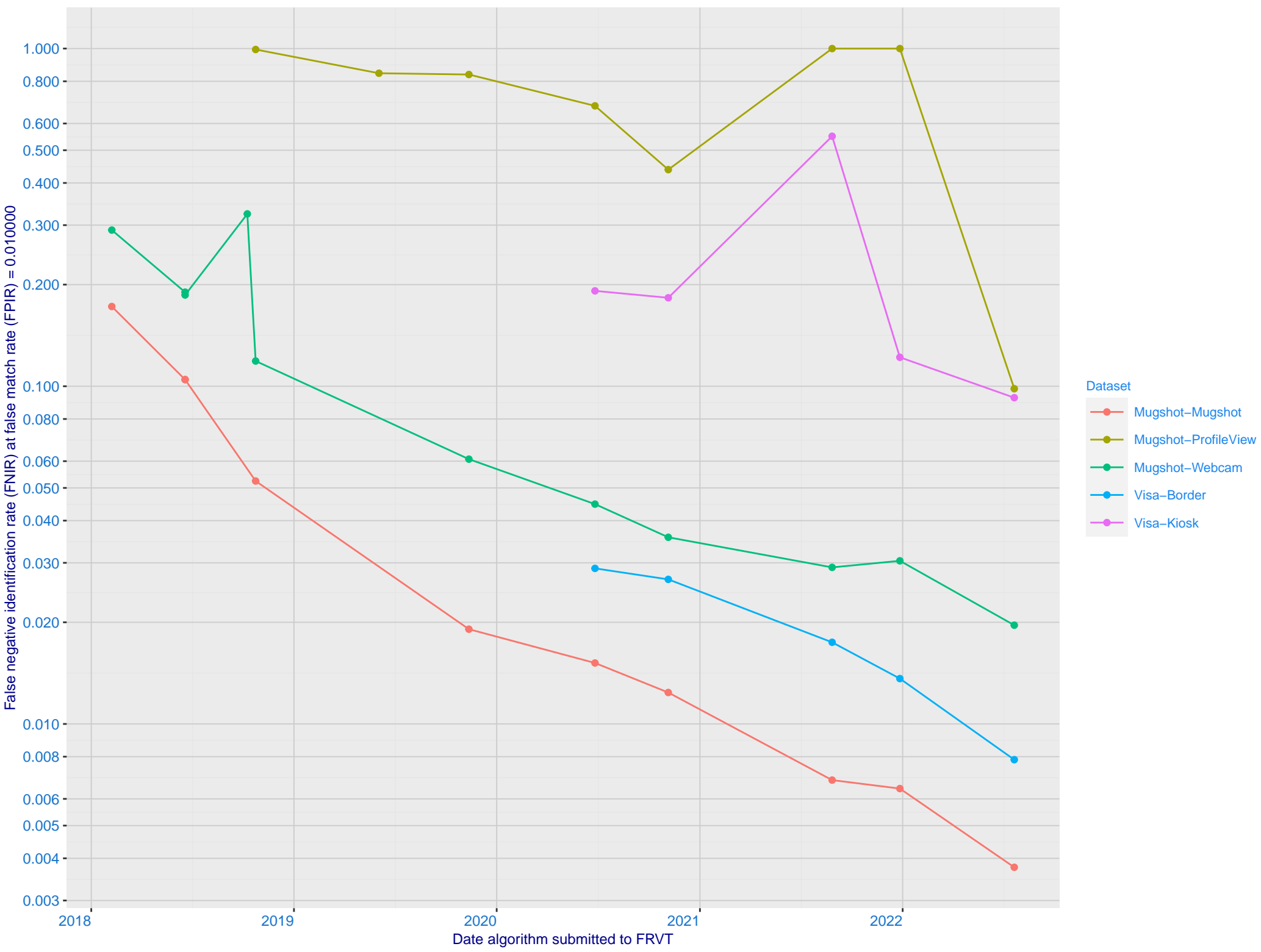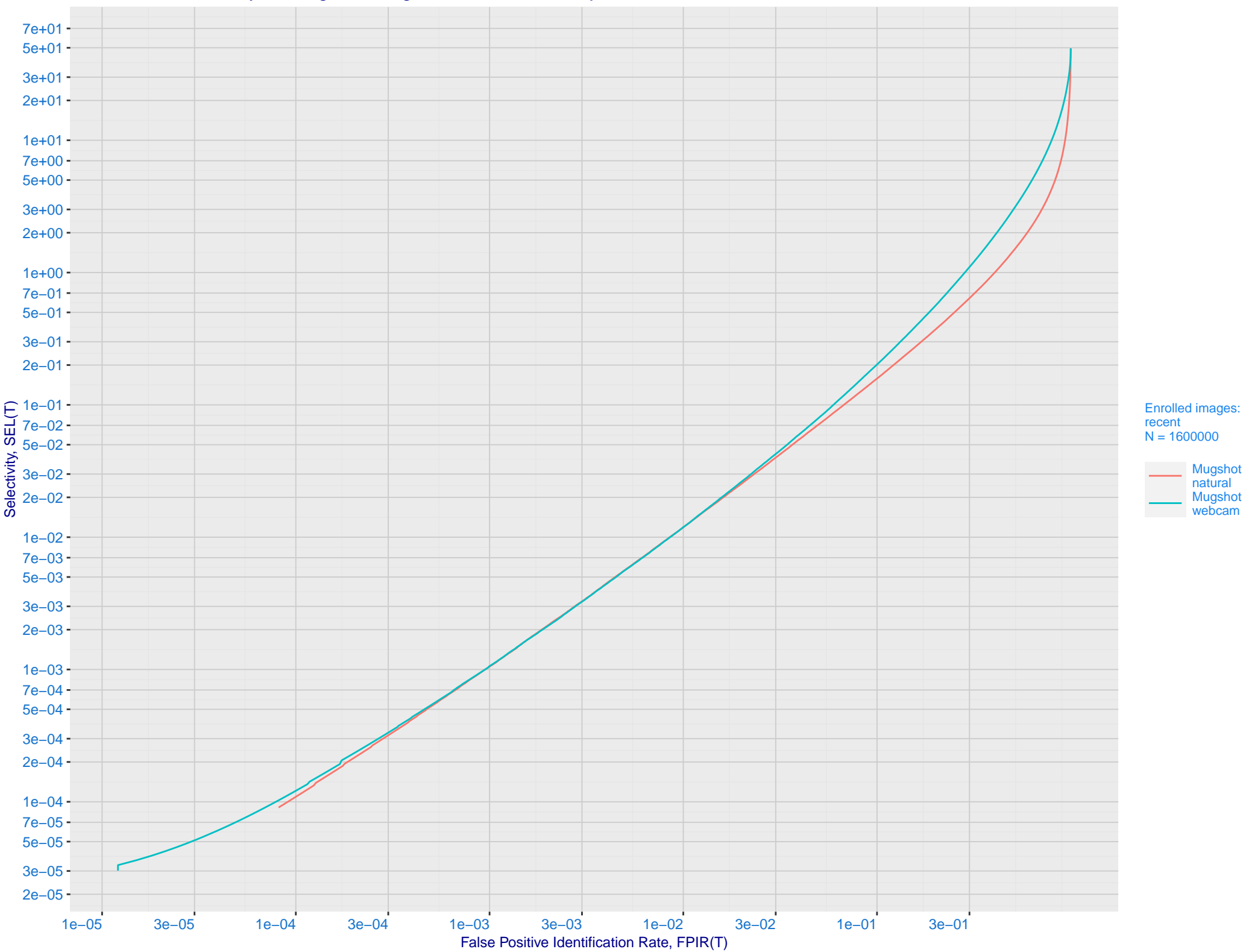
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
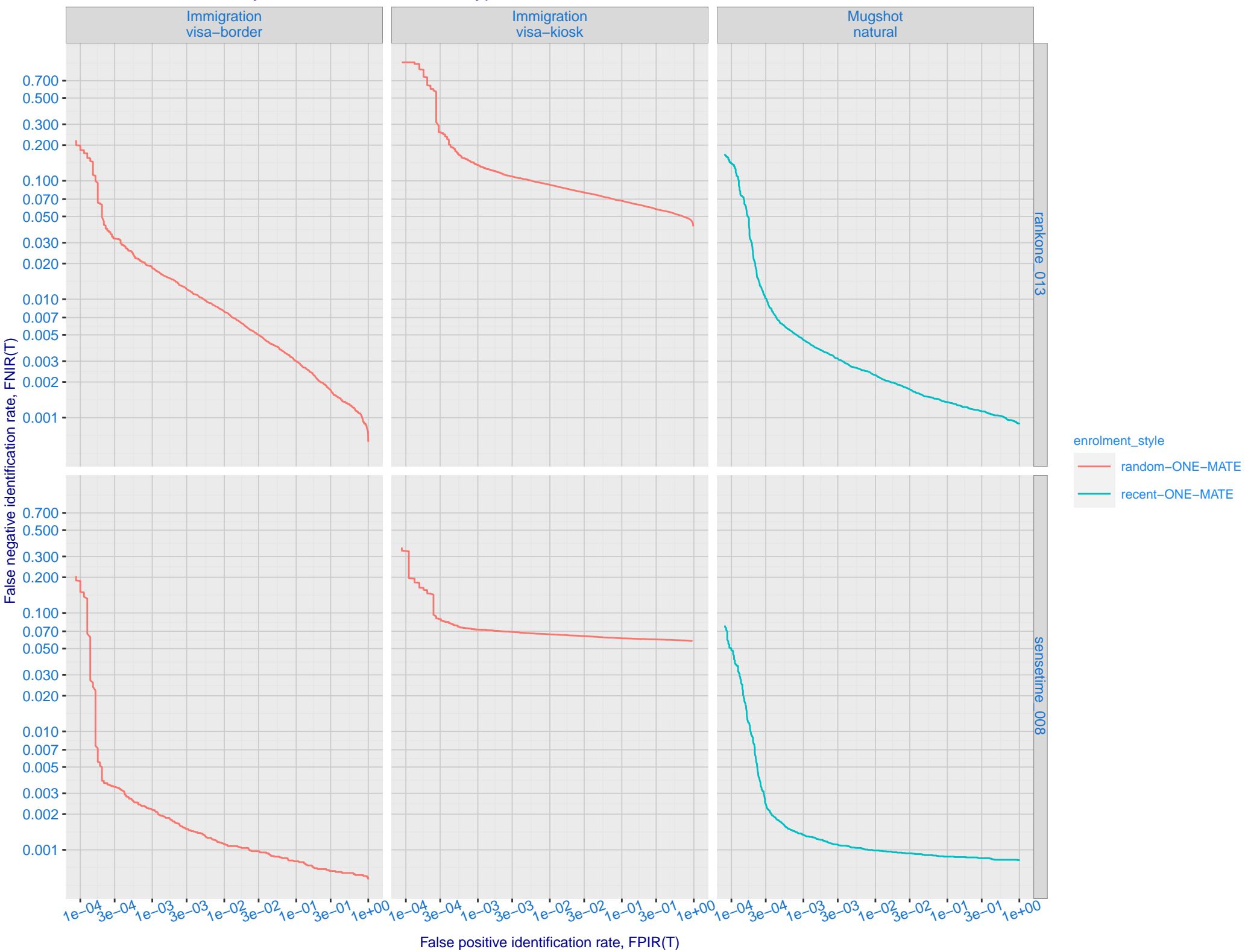
E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images

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
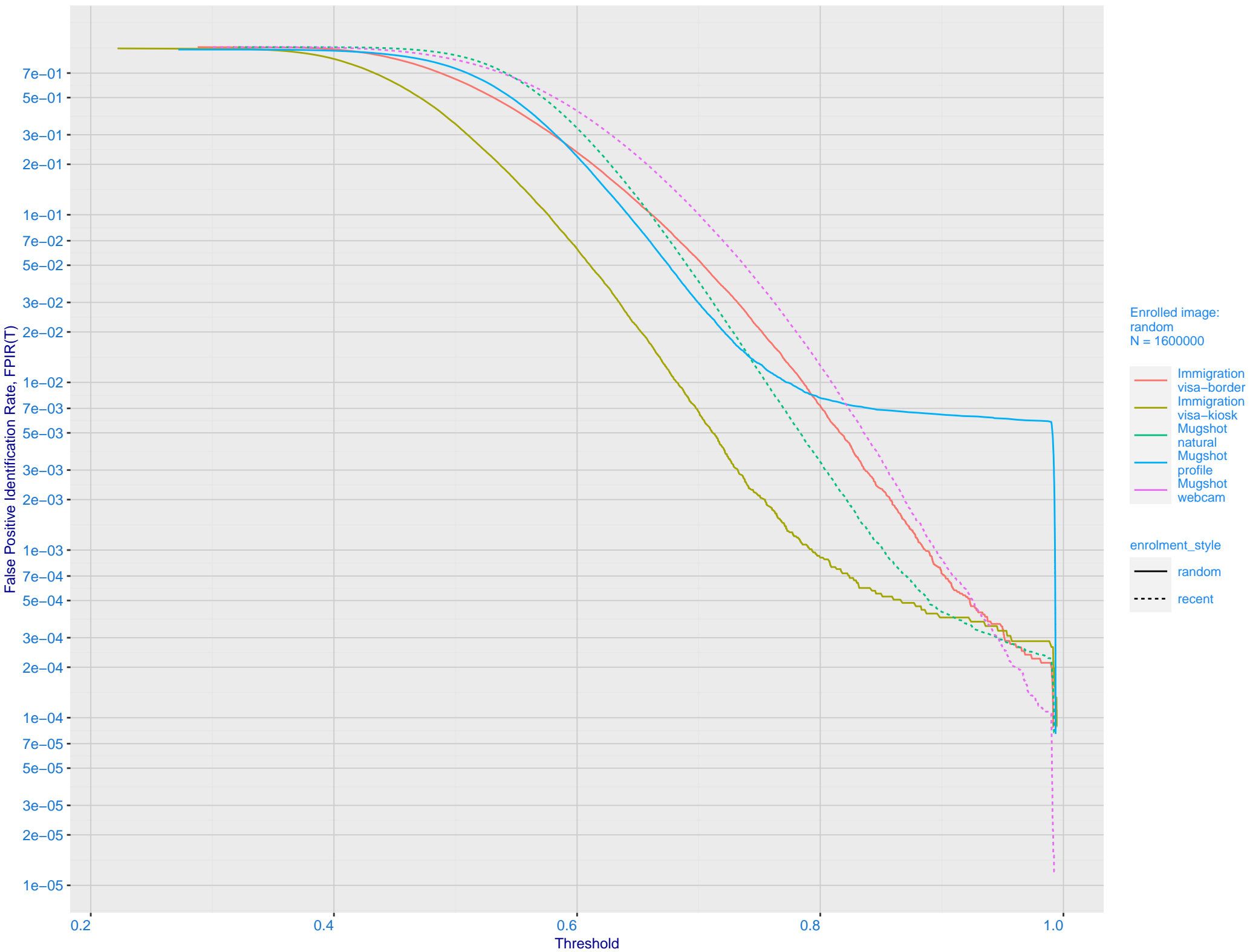
H: Reduced length candidate lists for human review
Dataset is border–border with time–lapse [10,15] YRS with N = 1600000. Probes are 10–15 years later than enrollment image

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
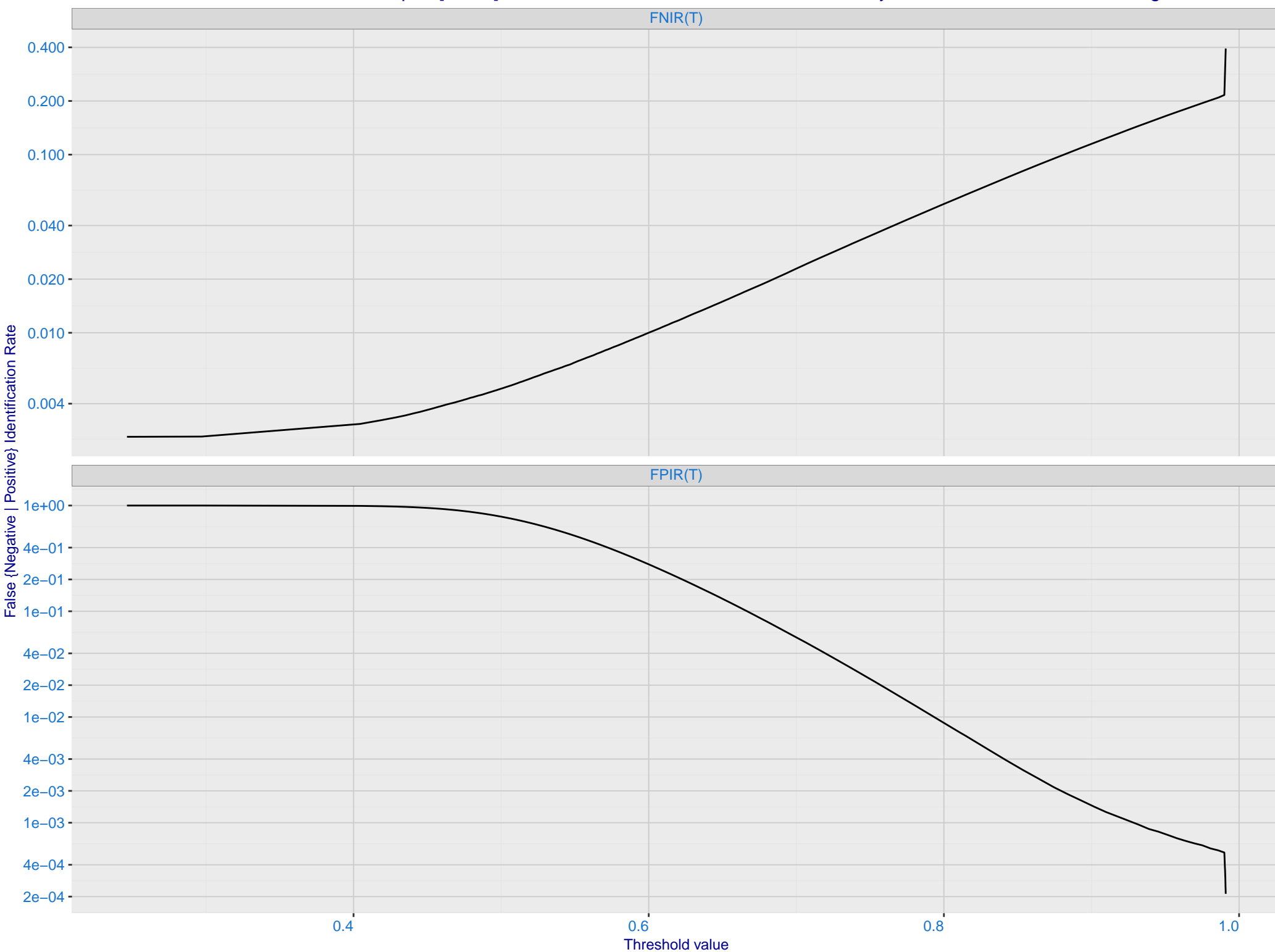
J: DET for Mugshot natural images and various N. Links connect points of equal threshold.
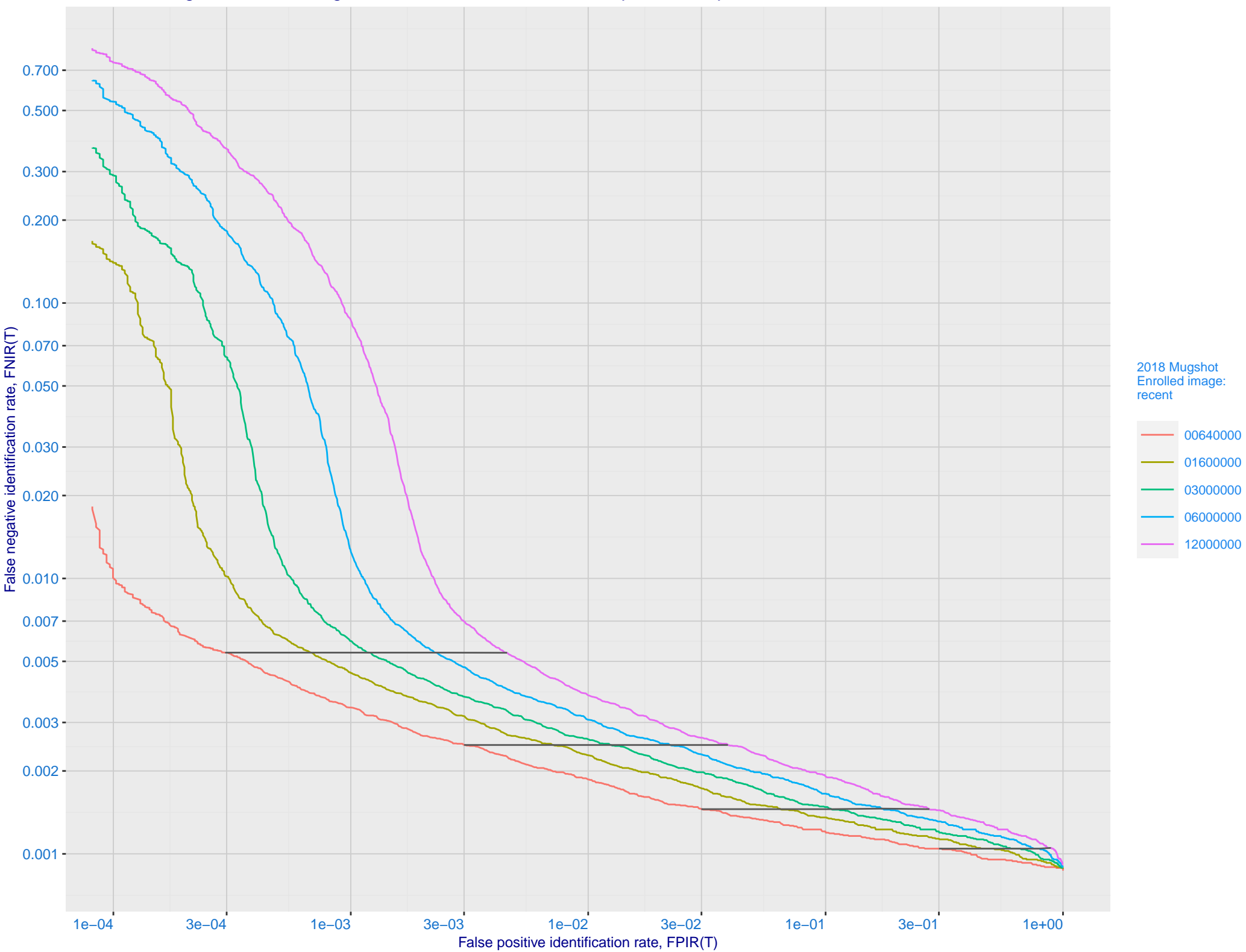
K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_007)
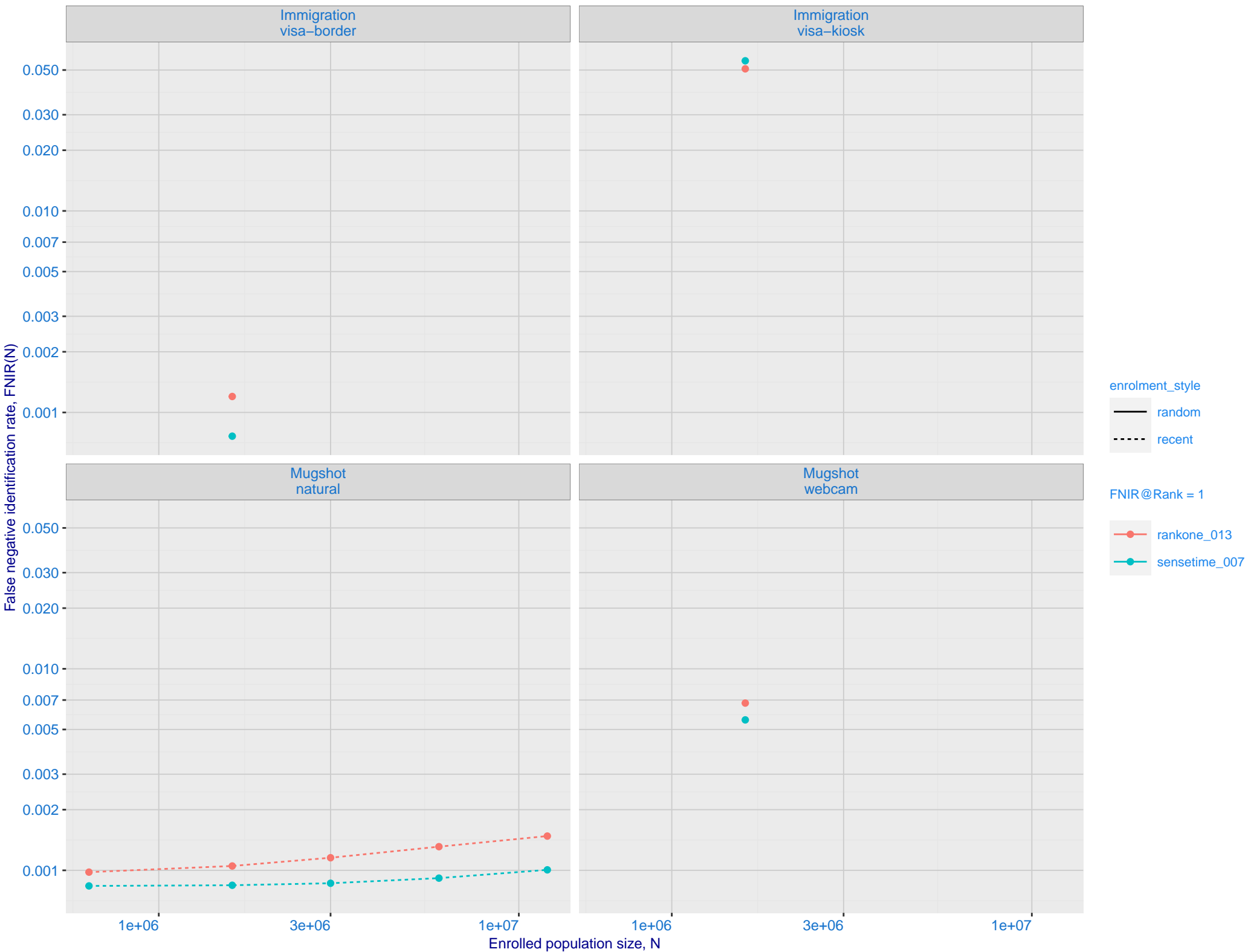
L: Investigational mode: FNIR(1600000, R, 0) by probe type
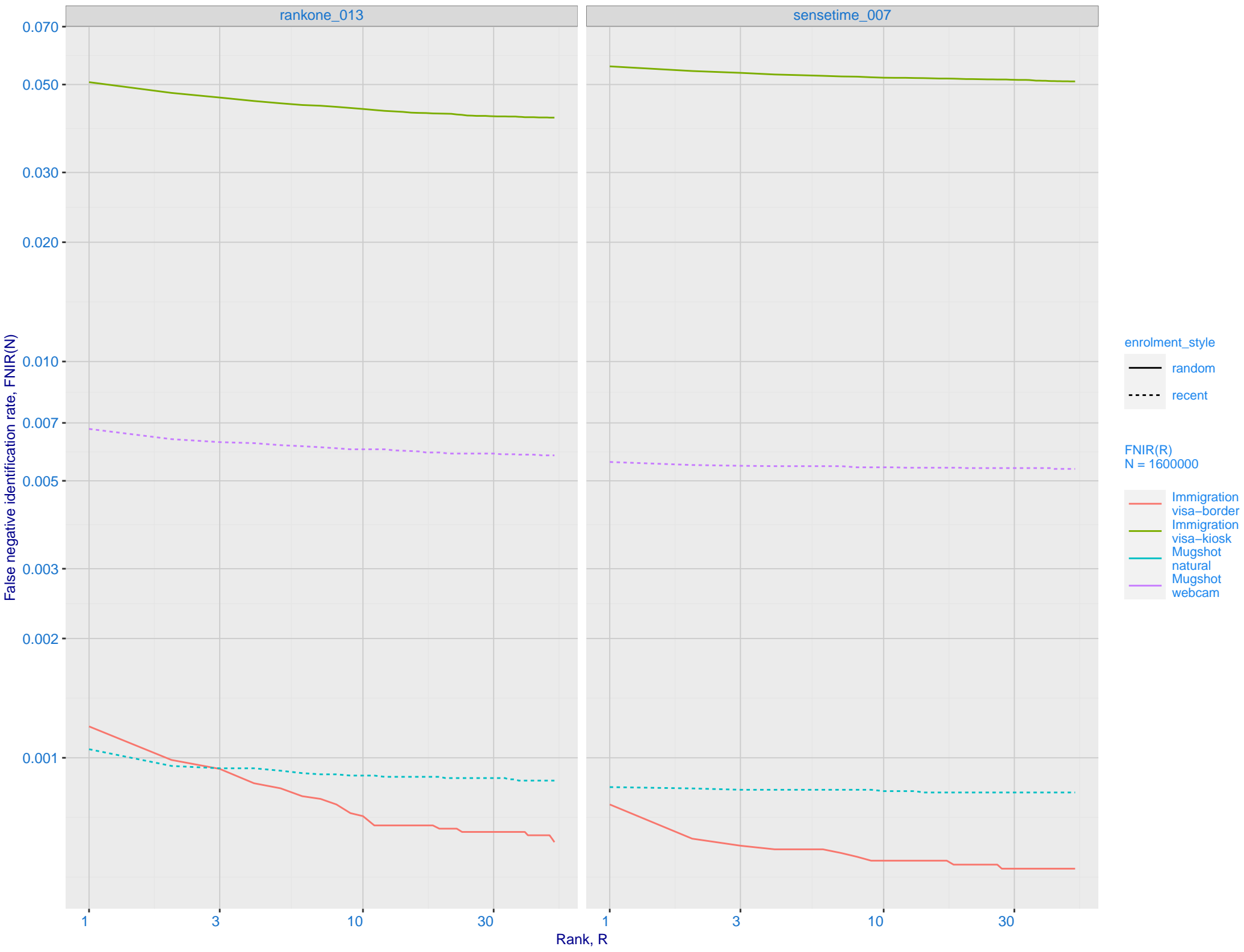
M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements. The template generation time is independent of N. The log and power−law models are fit to the first two (N,T) observations
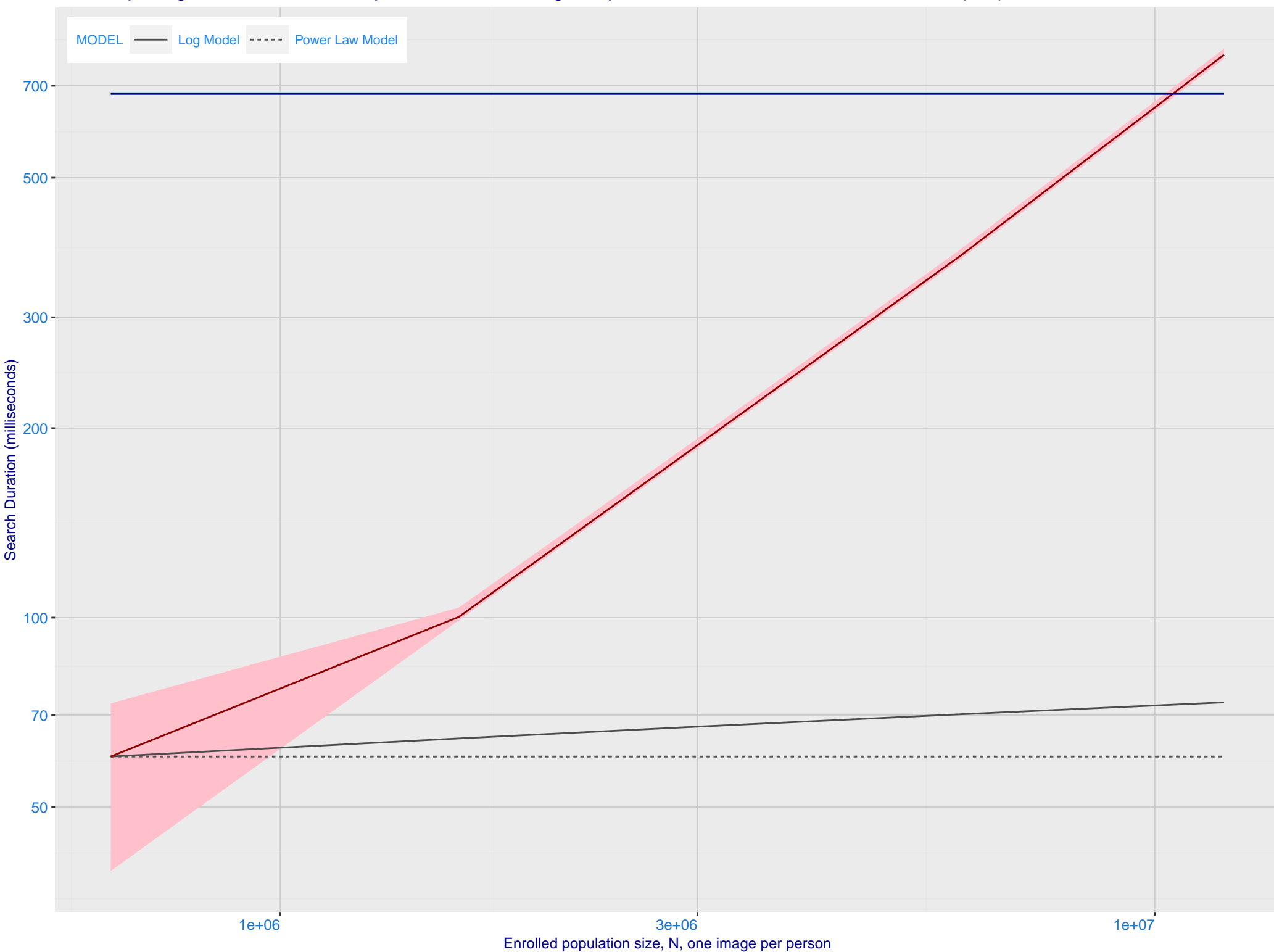
O: FNIR(T, N = 1.6 million) by sex, age and time−lapse. The top row gives investigational rank−1 miss rates. The bottom panels give high threshold for more lights−out identification with low FPIR.

Algorithm: rankone_013, Dataset: Border−Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)

Female

Age group	10	11	12	13	14	15
(60:99]	0.010	0.012	0.014	0.013	0.016	0.011
(45:60]	0.008	0.008	0.010	0.011	0.012	0.012
(30:45]	0.007	0.007	0.009	0.011	0.011	0.014
(21:30]	0.010	0.008	0.010	0.012	0.013	0.010
(18:21]	0.018	0.016	0.018	0.020	0.019	0.021
(15:18]	0.027	0.021	0.027	0.029	0.028	0.029
(12:15]	0.041	0.026	0.038	0.044	0.047	0.014

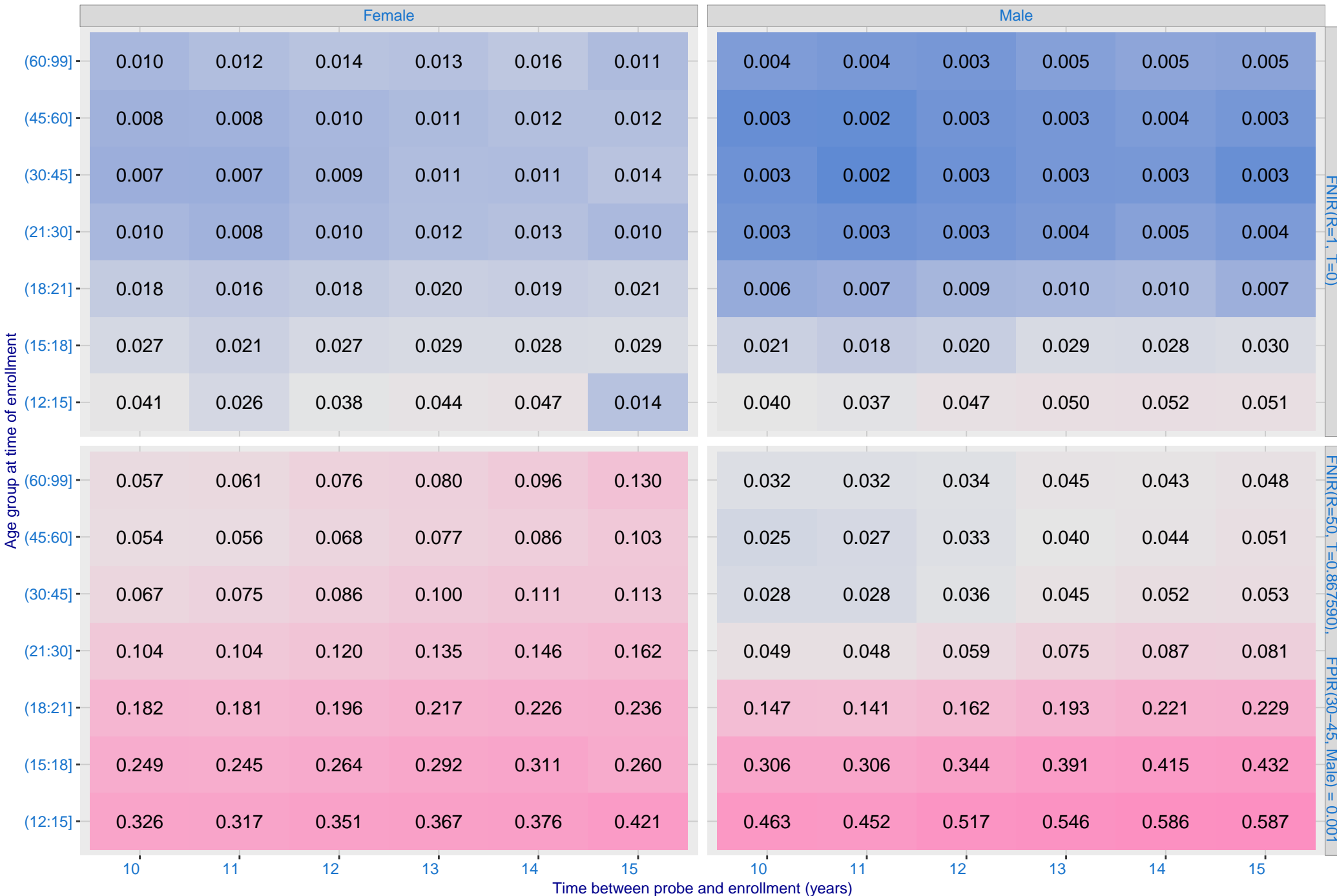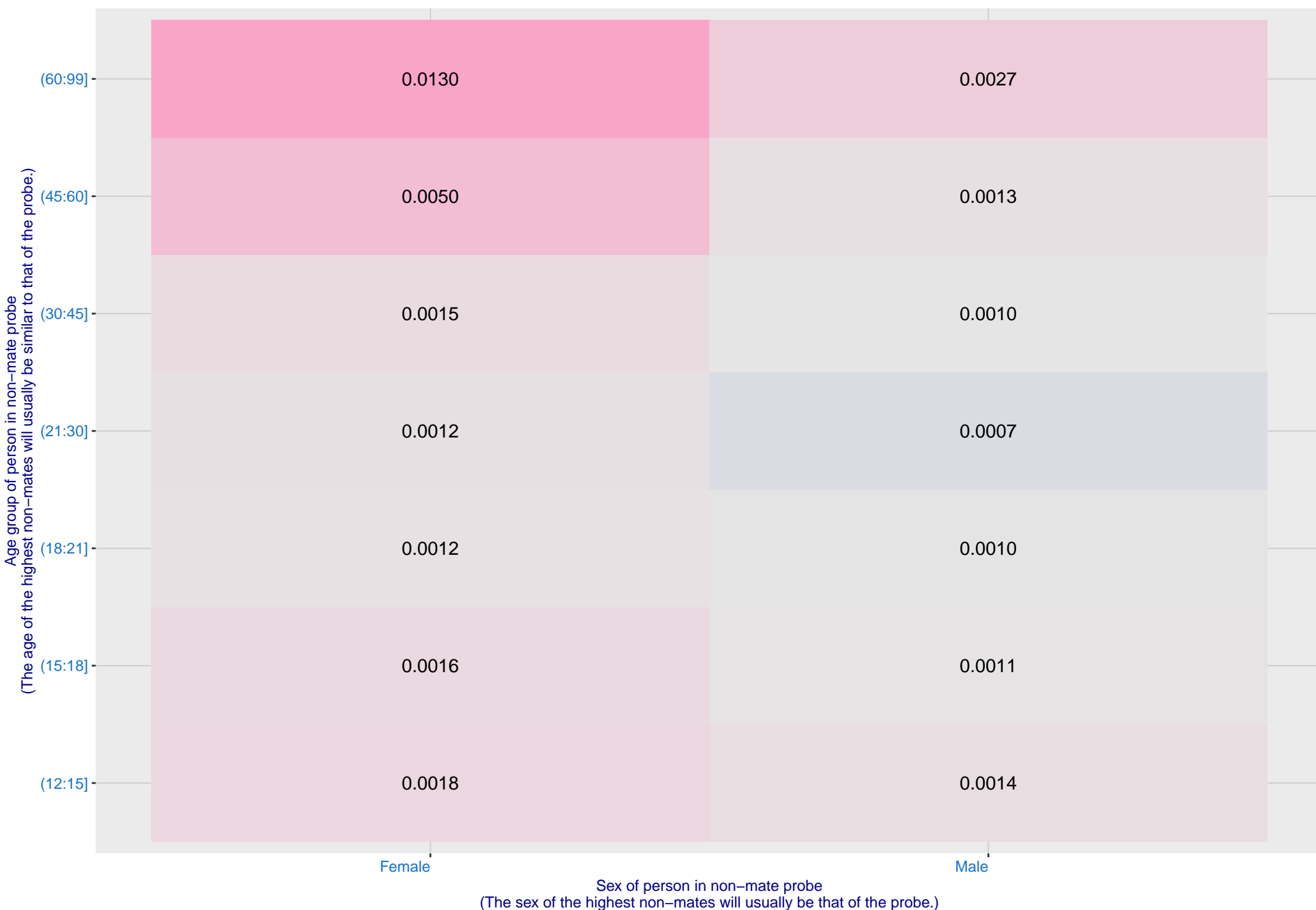**Male** — FNIR(R=1, T=0)

Age group	10	11	12	13	14	15
(60:99]	0.004	0.004	0.003	0.005	0.005	0.005
(45:60]	0.003	0.002	0.003	0.003	0.004	0.003
(30:45]	0.003	0.002	0.003	0.003	0.003	0.003
(21:30]	0.003	0.003	0.003	0.004	0.005	0.004
(18:21]	0.006	0.007	0.009	0.010	0.010	0.007
(15:18]	0.021	0.018	0.020	0.029	0.028	0.030
(12:15]	0.040	0.037	0.047	0.050	0.052	0.051

Female

Age group	10	11	12	13	14	15
(60:99]	0.057	0.061	0.076	0.080	0.096	0.130
(45:60]	0.054	0.056	0.068	0.077	0.086	0.103
(30:45]	0.067	0.075	0.086	0.100	0.111	0.113
(21:30]	0.104	0.104	0.120	0.135	0.146	0.162
(18:21]	0.182	0.181	0.196	0.217	0.226	0.236
(15:18]	0.249	0.245	0.264	0.292	0.311	0.260
(12:15]	0.326	0.317	0.351	0.367	0.376	0.421

Male — FNIR(R=50, T=0.867590), FPIR(30−45, Male) = 0.001

Age group	10	11	12	13	14	15
(60:99]	0.032	0.032	0.034	0.045	0.043	0.048
(45:60]	0.025	0.027	0.033	0.040	0.044	0.051
(30:45]	0.028	0.028	0.036	0.045	0.052	0.053
(21:30]	0.049	0.048	0.059	0.075	0.087	0.081
(18:21]	0.147	0.141	0.162	0.193	0.221	0.229
(15:18]	0.306	0.306	0.344	0.391	0.415	0.432
(12:15]	0.463	0.452	0.517	0.546	0.586	0.587

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.
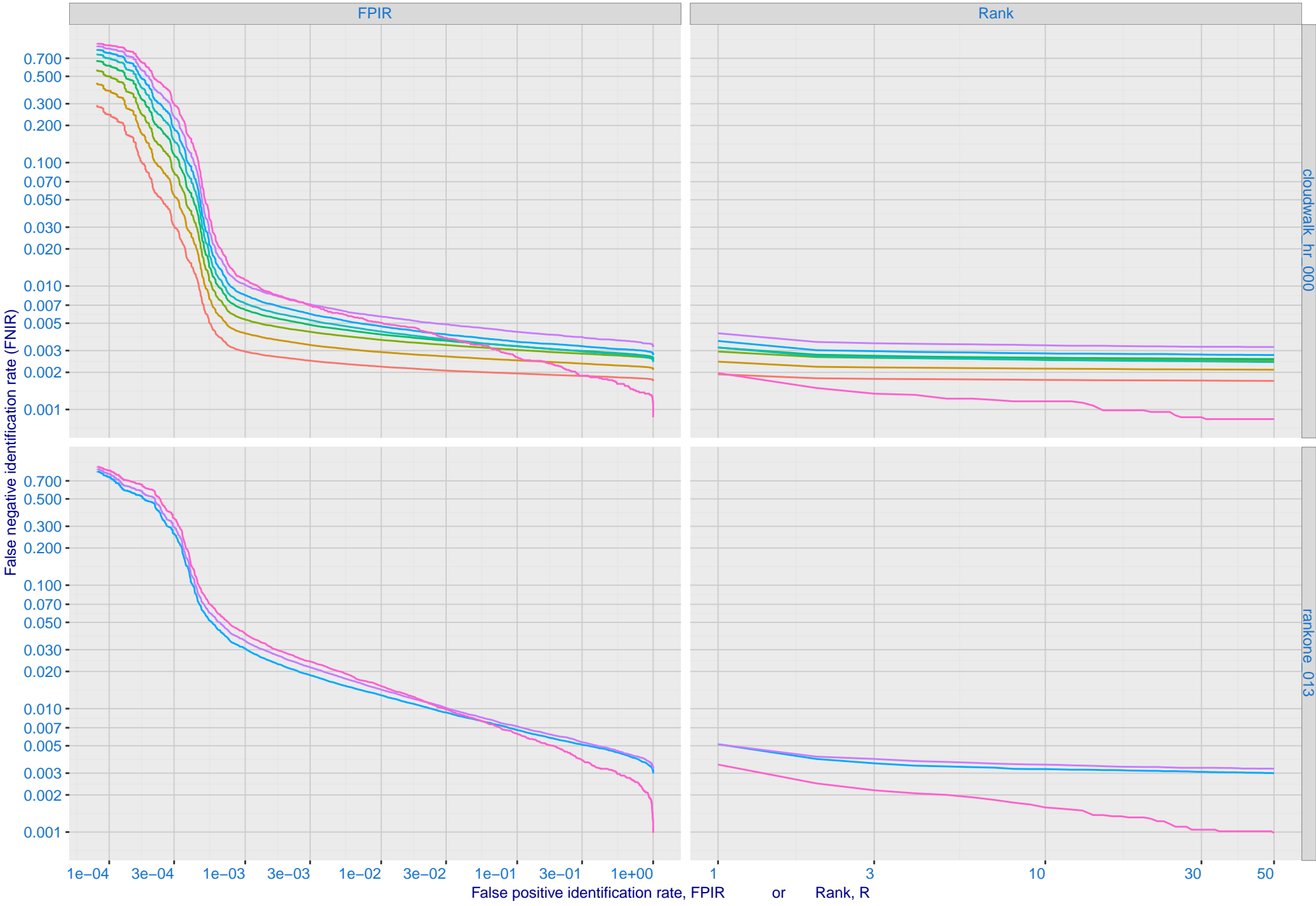
Algorithm: rankone_013, Dataset: Border–Crossing Ageing
Threshold: 0.867590 set to achive FPIR(30–45, Male) = 0.001

Color encodes log(FPIR)

	Female	Male
(60:99]	0.0130	0.0027
(45:60]	0.0050	0.0013
(30:45]	0.0015	0.0010
(21:30]	0.0012	0.0007
(18:21]	0.0012	0.0010
(15:18]	0.0016	0.0011
(12:15]	0.0018	0.0014

Age group of person in non–mate probe
(The age of the highest non–mates will usually be similar to that of the probe.)

Sex of person in non–mate probe
(The sex of the highest non–mates will usually be that of the probe.)

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