A: Datasheet

Algorithm: firstcreditkz_001

Developer: First Credit Bureau Kazakhstan

Submission Date: 2022_11_22

Template size: 288 bytes

Template time (2.5 percentile): 797 msec

Template time (median): 799 msec

Template time (97.5 percentile): 806 msec

Investigation:

Mugshot webcam ranking 33 (out of 343) –– FNIR(1600000, 0, 1) = 0.0082 vs. lowest 0.0055 from sensetime_008

Mugshot profile ranking 49 (out of 312) –– FNIR(1600000, 0, 1) = 0.0942 vs. lowest 0.0521 from sensetime_007

Immigration visa–border ranking 44 (out of 270) –– FNIR(1600000, 0, 1) = 0.0020 vs. lowest 0.0006 from cloudwalk_mt_001

Immigration visa–kiosk ranking 33 (out of 215) –– FNIR(1600000, 0, 1) = 0.0616 vs. lowest 0.0395 from cloudwalk_mt_001

Identification:

Frontal mugshot ranking 22 (out of 381) –– FNIR(1600000, T, L+1) = 0.0030, FPIR=0.001000 vs. lowest 0.0013 from sensetime_008

Mugshot webcam ranking 23 (out of 341) –– FNIR(1600000, T, L+1) = 0.0190, FPIR=0.001000 vs. lowest 0.0090 from sensetime_008

Mugshot profile ranking 18 (out of 311) –– FNIR(1600000, T, L+1) = 0.2910, FPIR=0.001000 vs. lowest 0.0698 from cloudwalk_mt_001

Immigration visa–border ranking 28 (out of 269) –– FNIR(1600000, T, L+1) = 0.0071, FPIR=0.001000 vs. lowest 0.0013 from cloudwalk_mt_001

Immigration visa–kiosk ranking 20 (out of 215) –– FNIR(1600000, T, L+1) = 0.0940, 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)
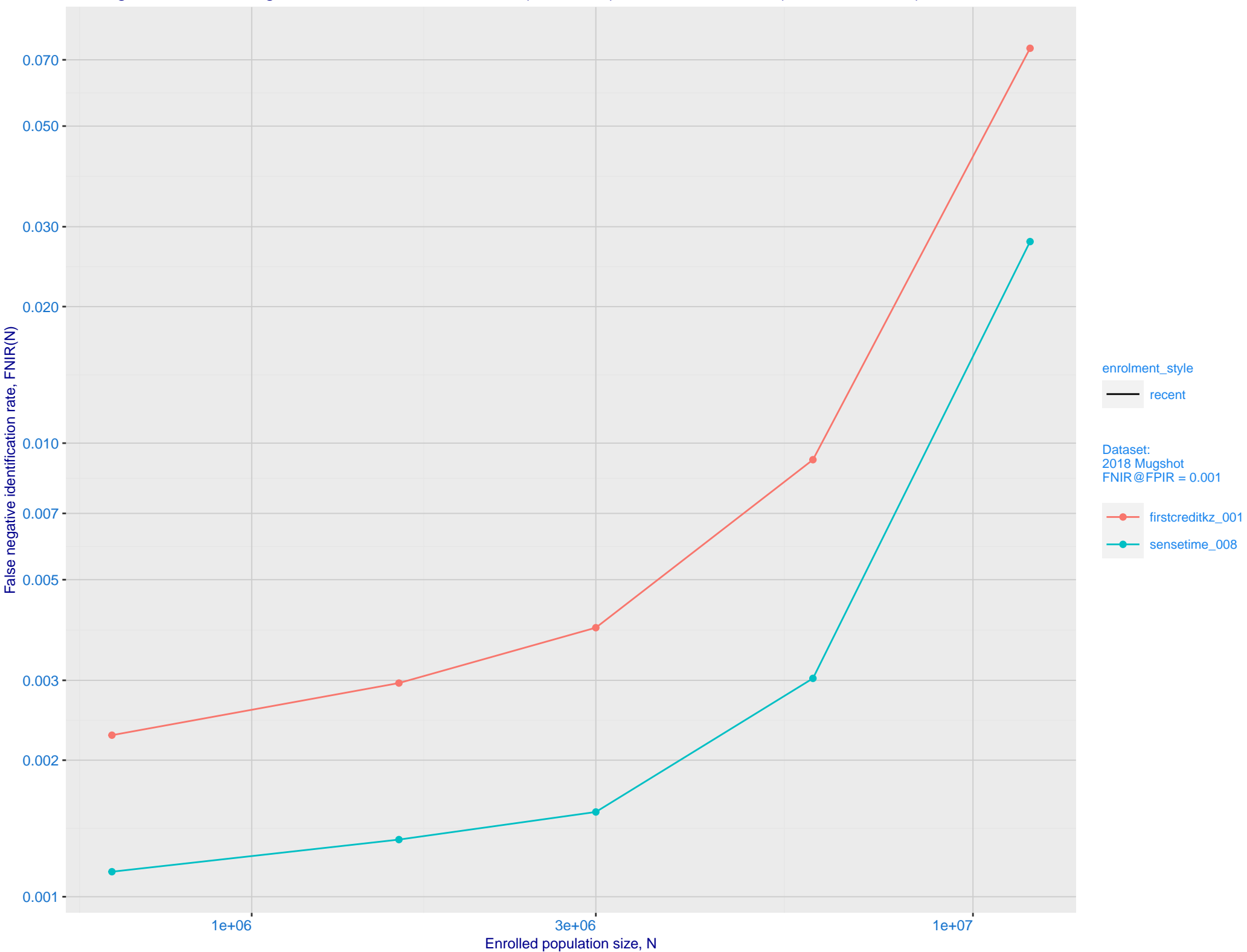
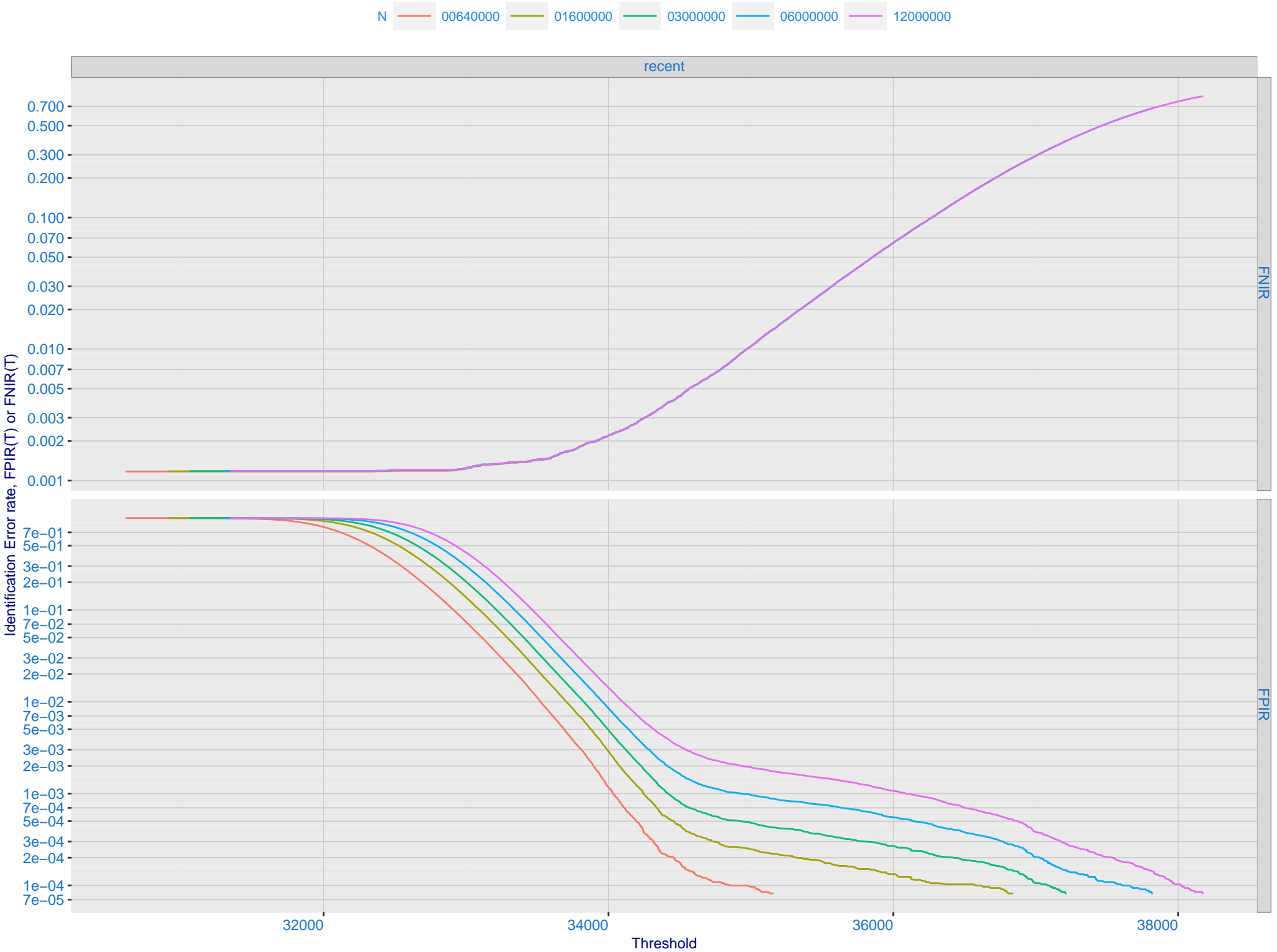C: Evolution of accuracy for FIRSTCREDITKZ algorithms on three datasets 2018 – present
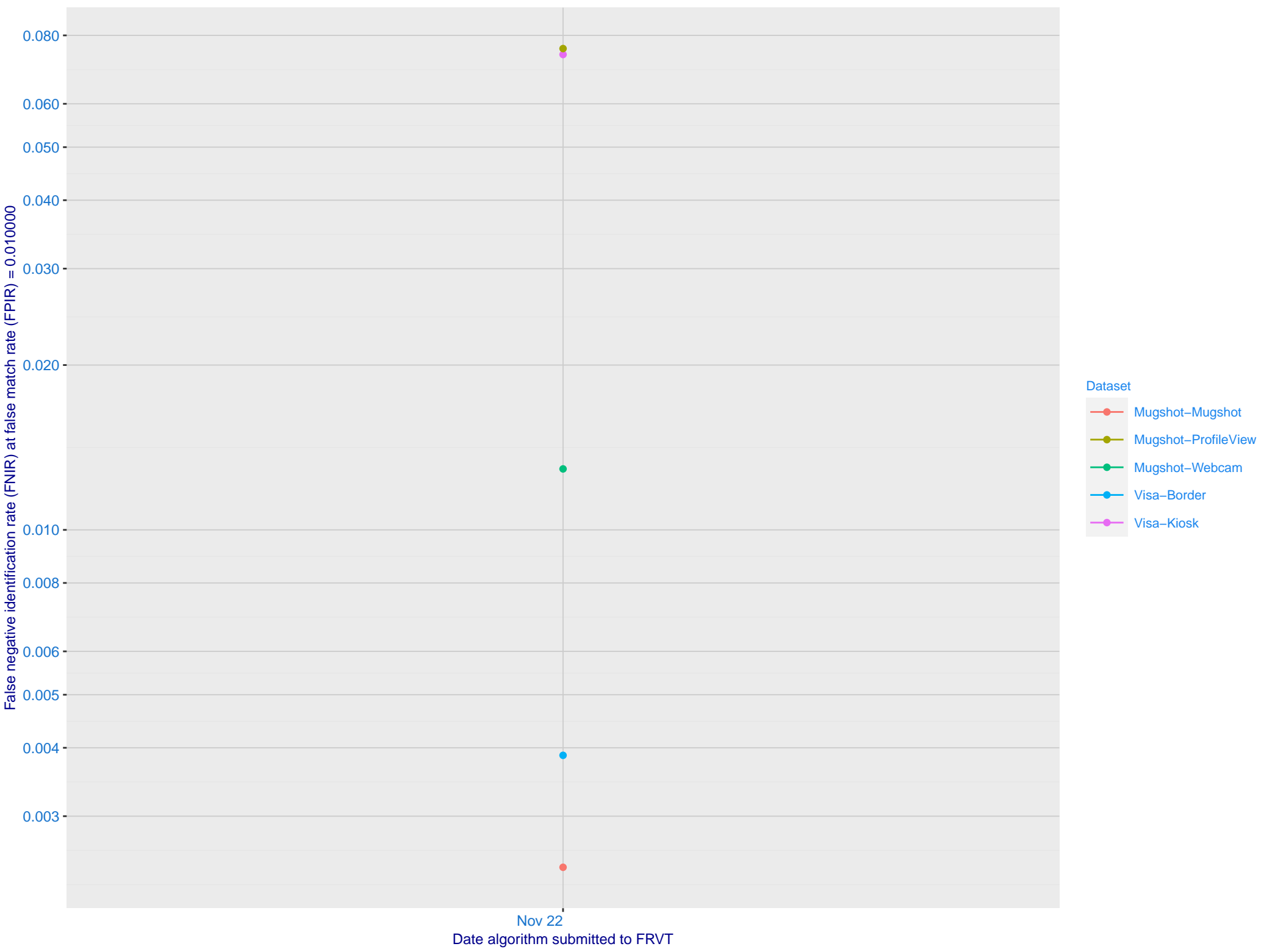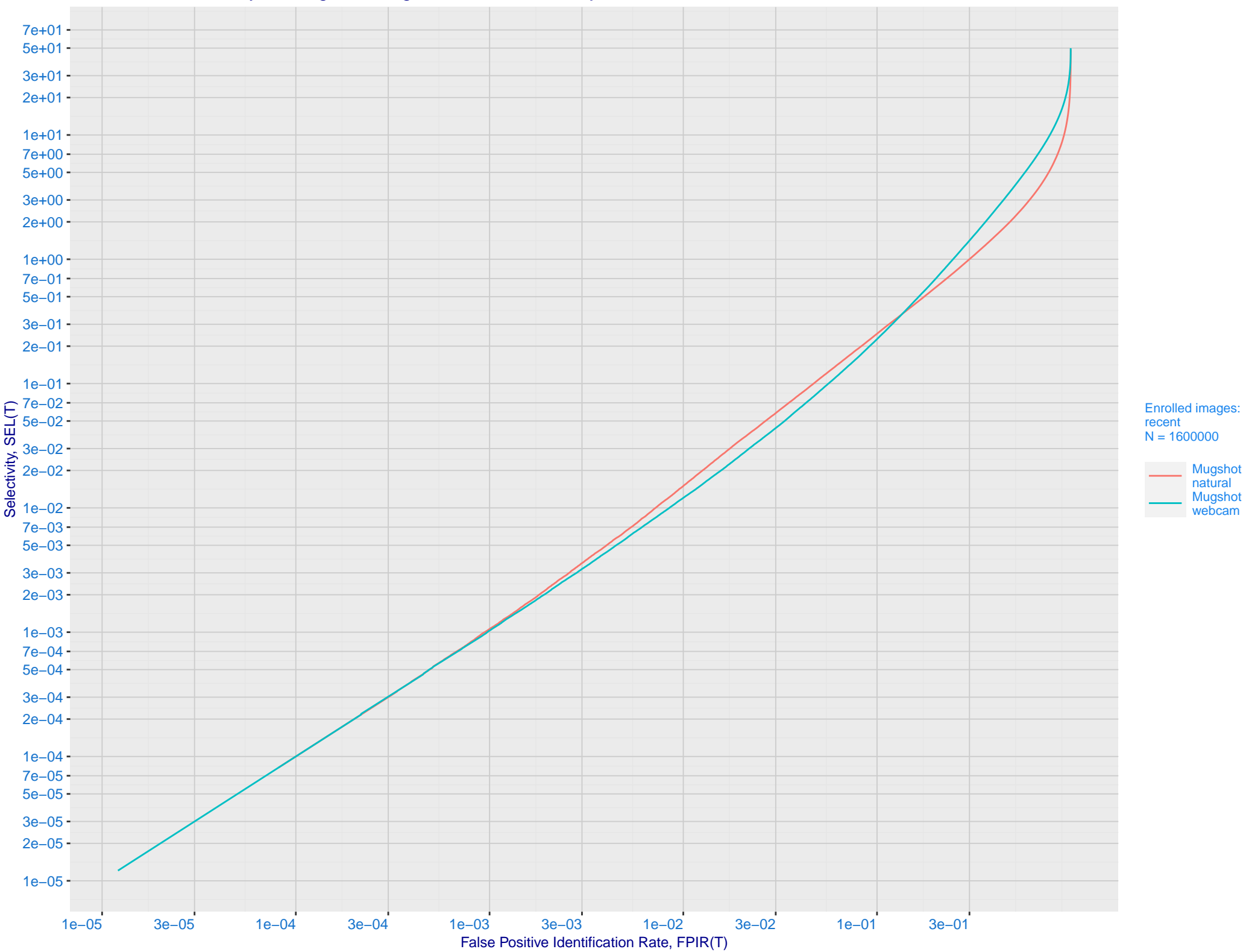
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
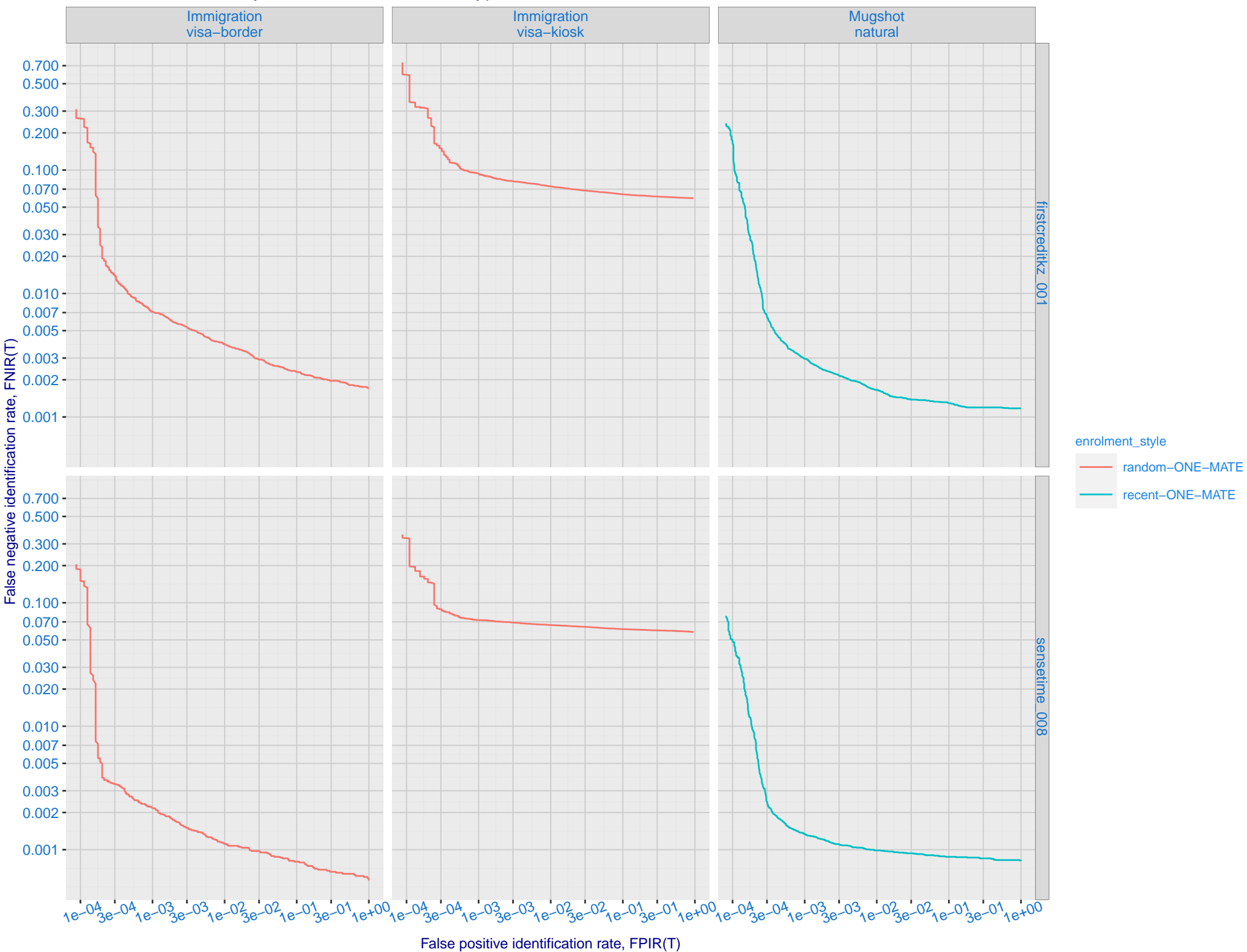
E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images

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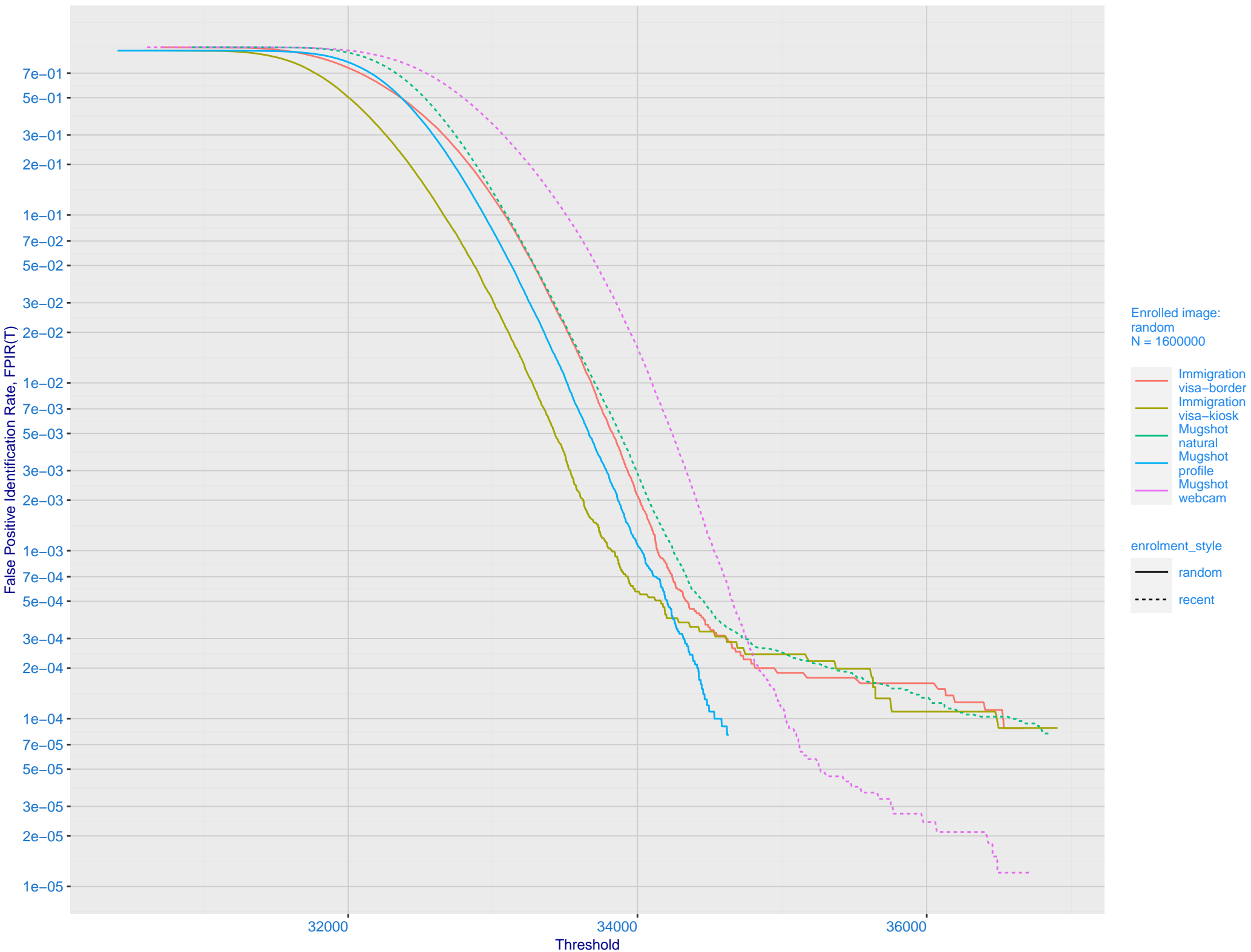
H: Reduced length candidate lists for human review
Dataset is border–border with time–lapse [10,15] YRS with N = 1600000. Probes are 10–15 years later than enrollment image

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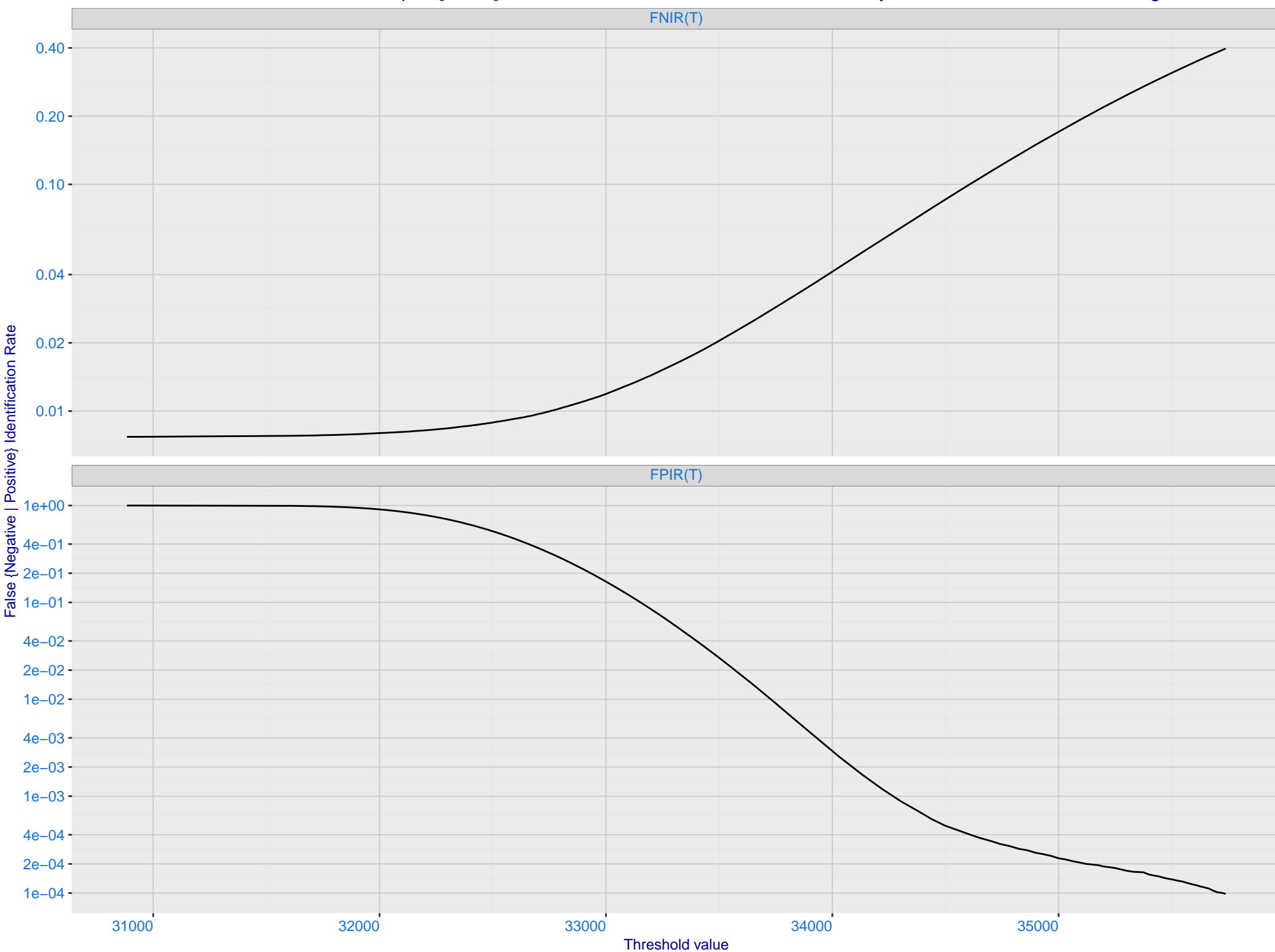
J: DET for Mugshot natural images and various N. Links connect points of equal threshold.

2018 Mugshot Enrolled image: recent

- 00640000
- 01600000
- 03000000
- 06000000
- 12000000

False negative identification rate, FNIR(T)

False positive identification rate, FPIR(T)
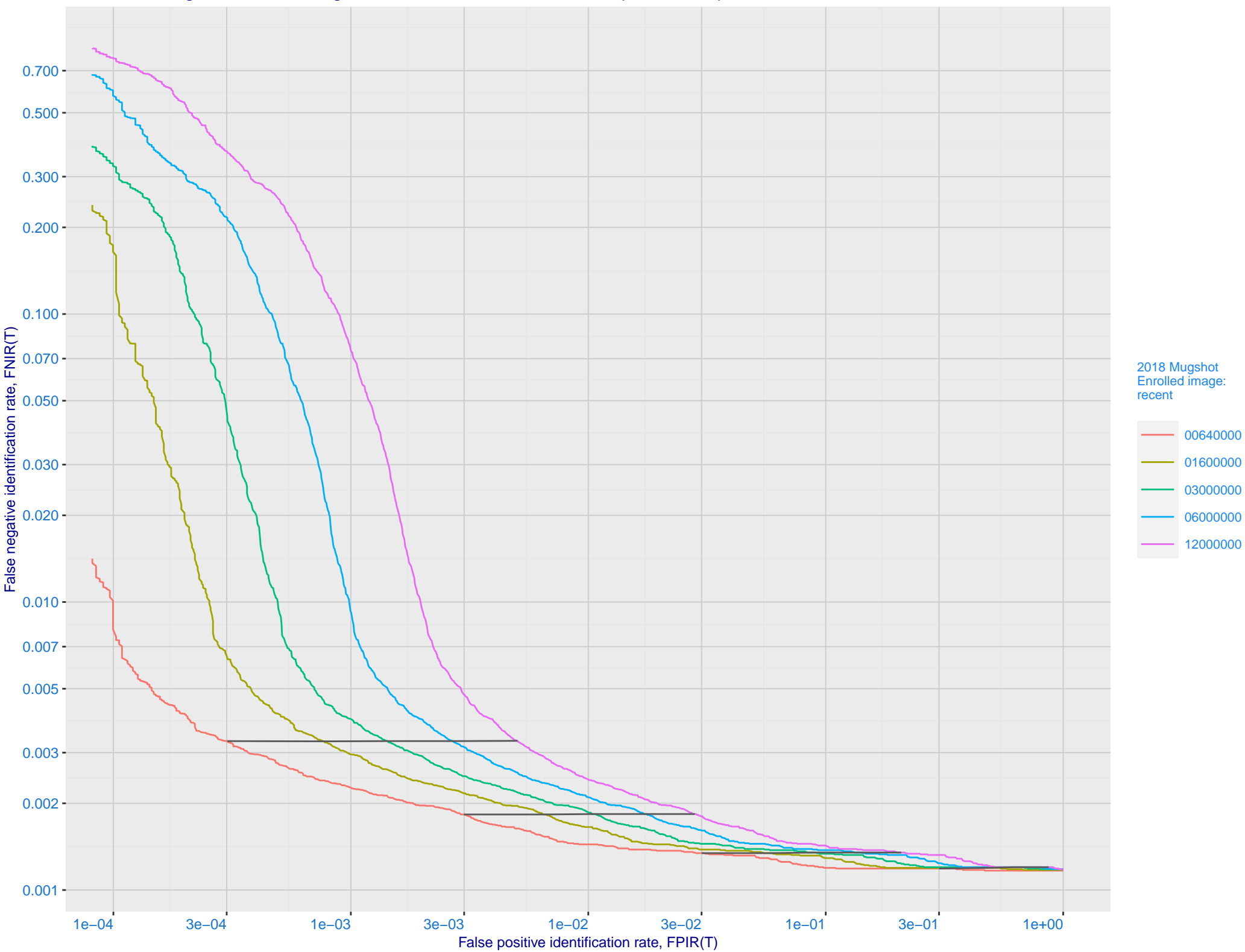
K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_007)
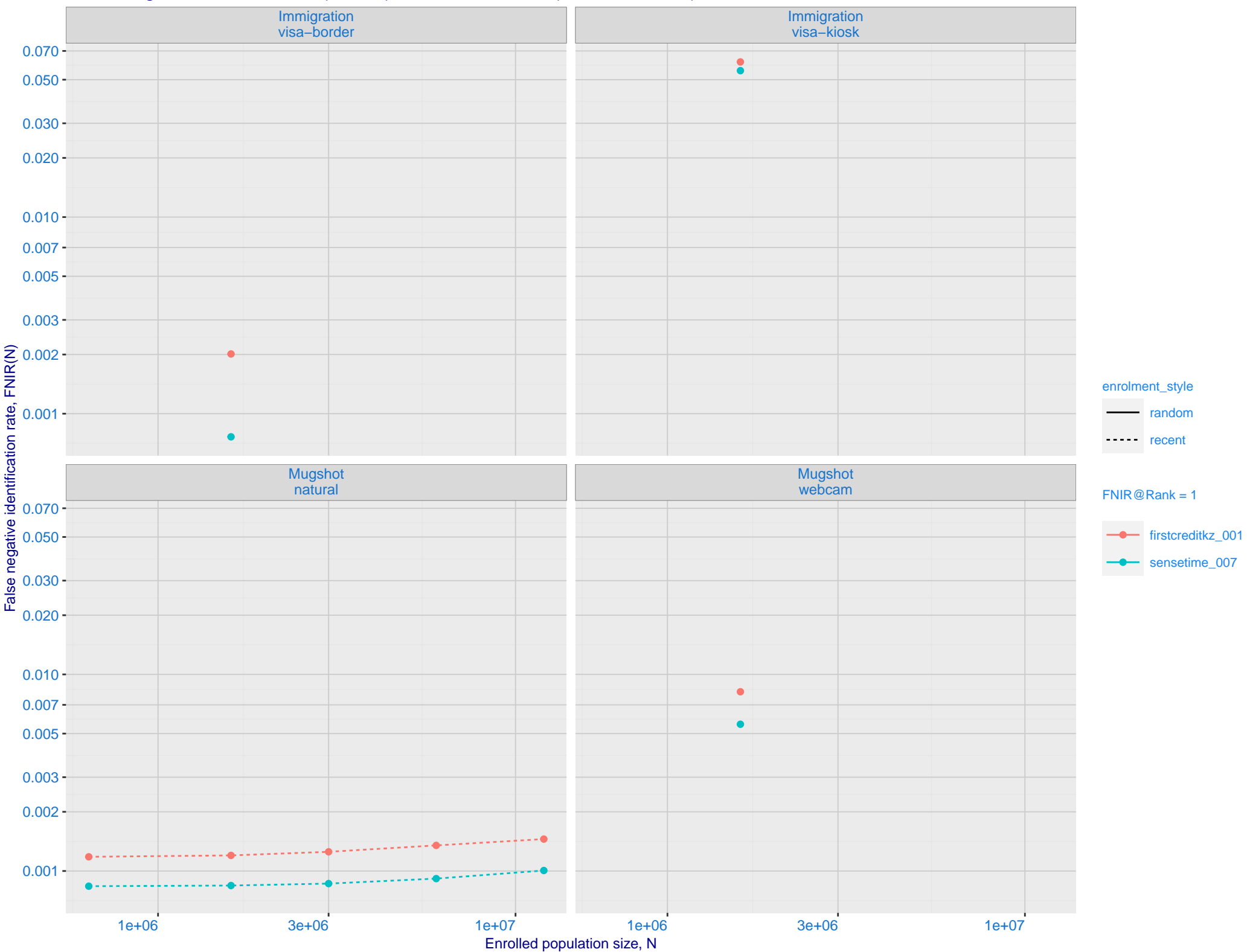
L: Investigational mode: FNIR(1600000, R, 0) by probe type

firstcreditkz_001

sensetime_007

False negative identification rate, FNIR(N)

Rank, R

enrolment_style

— random

···· recent

FNIR(R)
N = 1600000

Immigration
visa−border

Immigration
visa−kiosk

Mugshot
natural

Mugshot
webcam
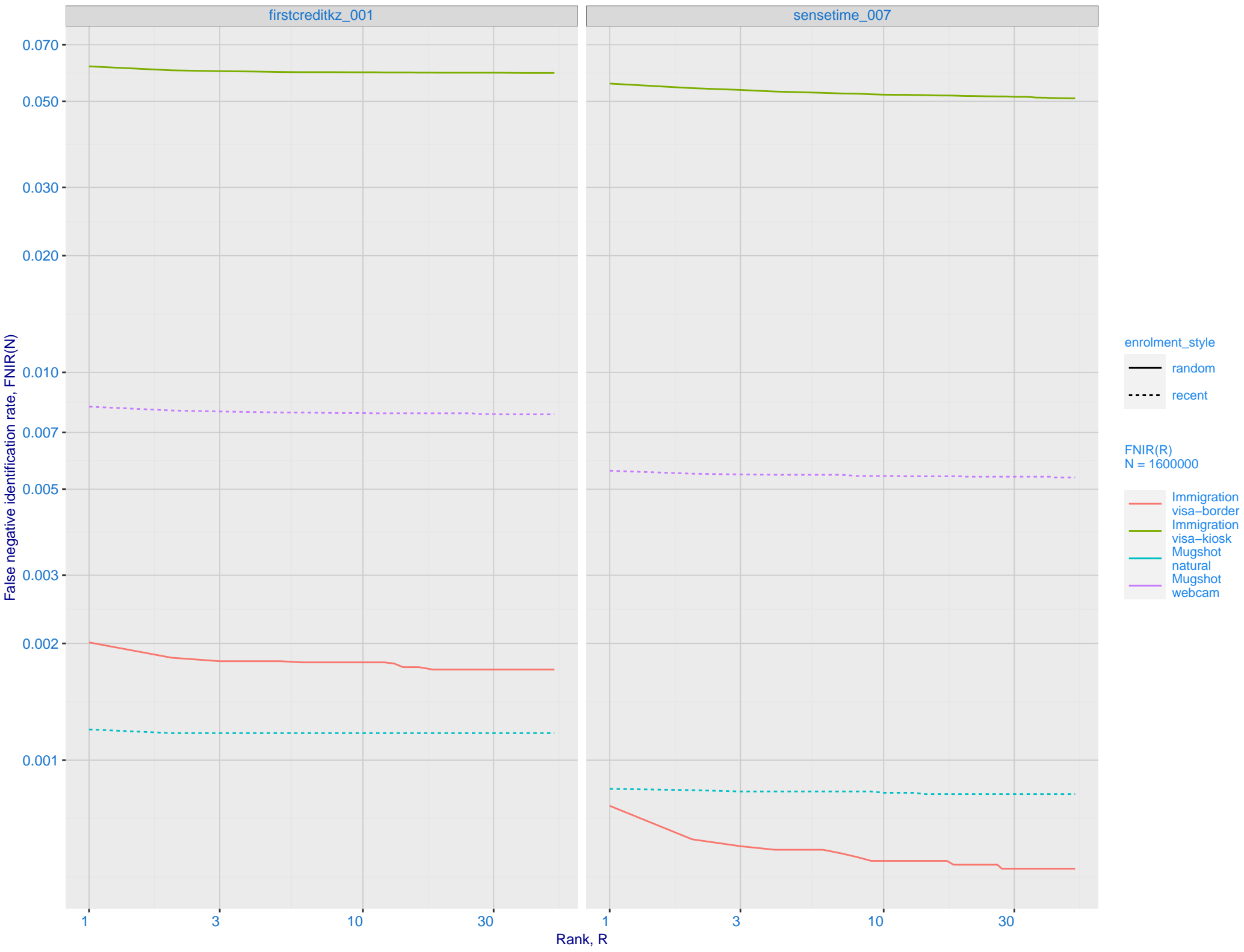
M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements. The template generation time is independent of N. The log and power−law models are fit to the first two (N,T) observations
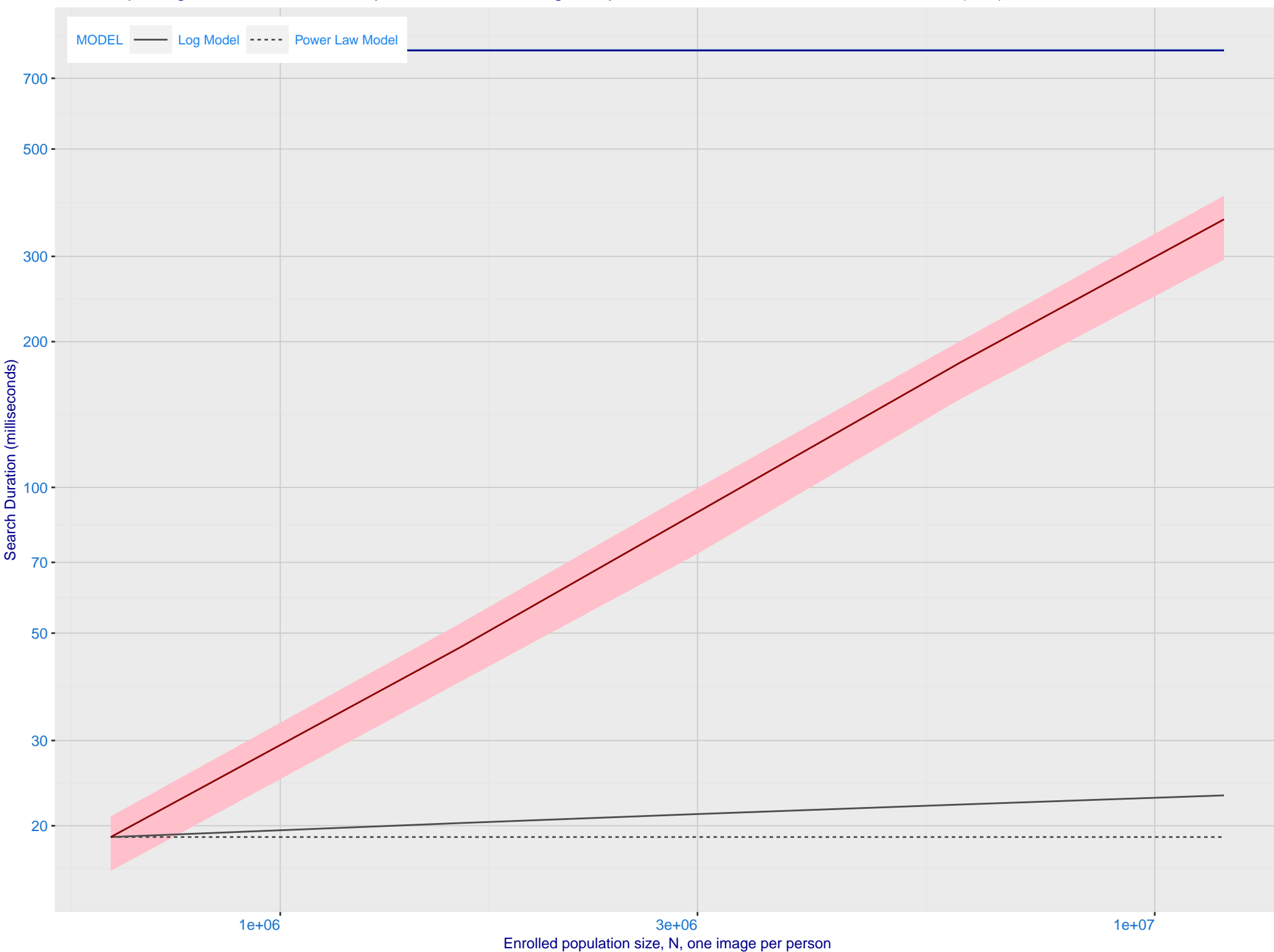
O: FNIR(T, N = 1.6 million) by sex, age and time−lapse. The top row gives investigational rank−1 miss rates.
The bottom panels give high threshold for more lights−out identification with low FPIR.

Algorithm: firstcreditkz_001, Dataset: Border−Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)

| | −3.0 | −2.5 | −2.0 | −1.5 | −1.0 |

Female

Age group at time of enrollment	10	11	12	13	14	15
(60:99]	0.013	0.015	0.017	0.017	0.021	0.022
(45:60]	0.008	0.008	0.009	0.010	0.013	0.012
(30:45]	0.007	0.007	0.008	0.010	0.011	0.013
(21:30]	0.010	0.009	0.011	0.012	0.014	0.014
(18:21]	0.020	0.018	0.019	0.020	0.022	0.020
(15:18]	0.029	0.026	0.026	0.028	0.033	0.038
(12:15]	0.043	0.037	0.040	0.048	0.058	0.023

Male — FNIR(R=1, T=0)

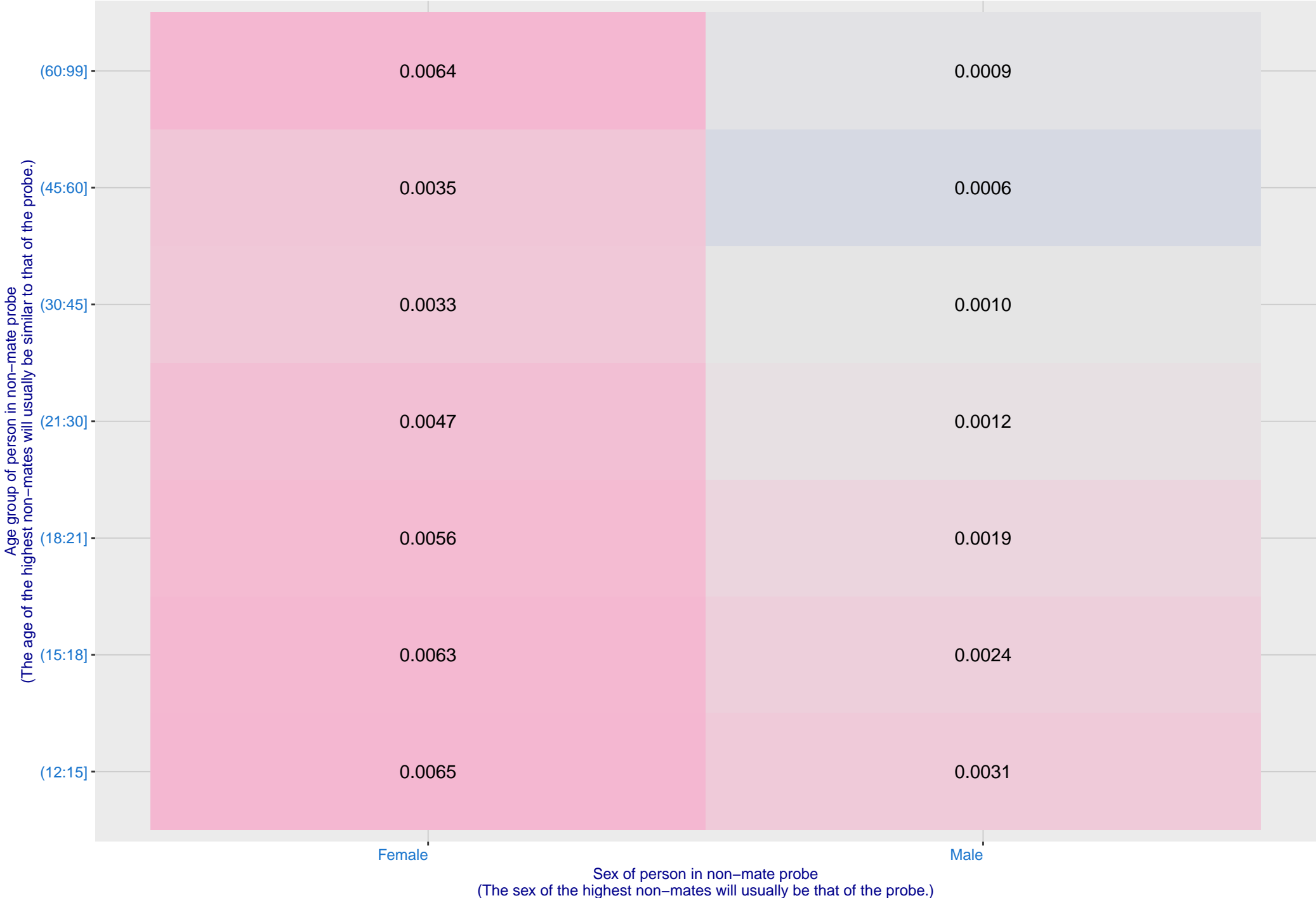|	10	11	12	13	14	15
(60:99]	0.007	0.007	0.007	0.007	0.010	0.008
(45:60]	0.004	0.003	0.004	0.005	0.005	0.006
(30:45]	0.004	0.003	0.004	0.004	0.005	0.004
(21:30]	0.005	0.004	0.005	0.005	0.007	0.005
(18:21]	0.011	0.010	0.011	0.015	0.014	0.007
(15:18]	0.028	0.027	0.029	0.042	0.038	0.060
(12:15]	0.054	0.050	0.060	0.070	0.066	0.043

Female — NIR(R=50, T=33967.100000), FPIR(30−45, Male) = 0.001

Age group at time of enrollment	10	11	12	13	14	15
(60:99]	0.033	0.035	0.044	0.046	0.055	0.065
(45:60]	0.027	0.026	0.033	0.039	0.045	0.048
(30:45]	0.031	0.033	0.039	0.046	0.049	0.048
(21:30]	0.042	0.042	0.048	0.055	0.060	0.063
(18:21]	0.080	0.078	0.084	0.096	0.094	0.093
(15:18]	0.120	0.113	0.120	0.138	0.135	0.116
(12:15]	0.169	0.143	0.157	0.188	0.207	0.167

Male

	10	11	12	13	14	15
(60:99]	0.016	0.016	0.017	0.021	0.020	0.020
(45:60]	0.010	0.010	0.012	0.015	0.017	0.019
(30:45]	0.011	0.010	0.013	0.016	0.019	0.017
(21:30]	0.018	0.016	0.021	0.026	0.030	0.024
(18:21]	0.057	0.050	0.059	0.070	0.078	0.065
(15:18]	0.143	0.140	0.157	0.184	0.197	0.200
(12:15]	0.246	0.229	0.276	0.305	0.300	0.304

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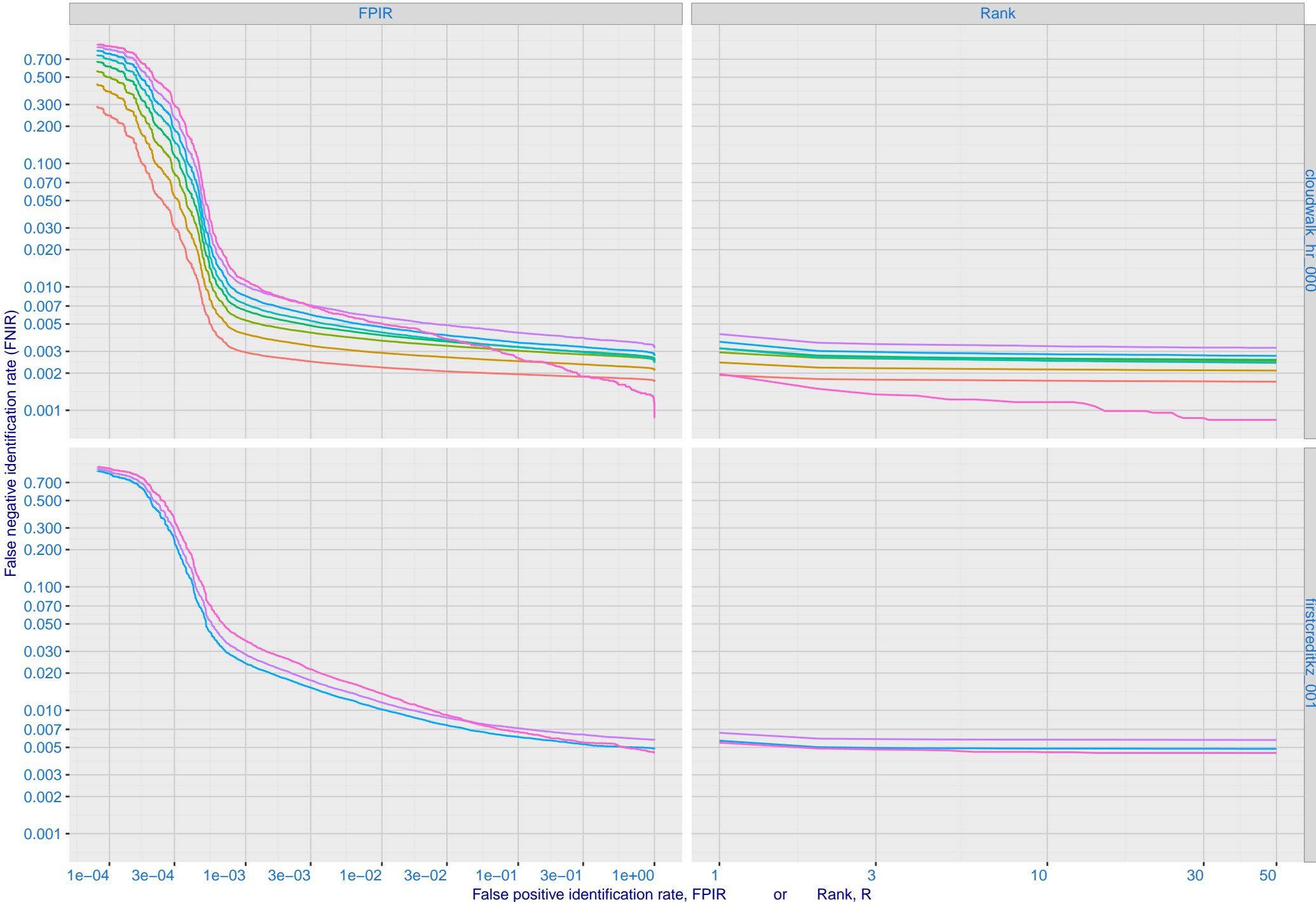
R: Decline of genuine scores with ageing, with some eventually dropping below typical thresholds shown by the horizontal lines

Score

40000

37500

35000

32500

(10,12]   (12,14]   (14,18]
Time lapse between search and initial encounter enrollment (years)

Dataset:
2018 Mugshot
N= 3.1M
Color encodes
FNIR (Rank = 1)

0.20

0.15

0.10

0.05

0.00

TVAL

FPIR = 0.001

FPIR = 0.003

FPIR = 0.010

FPIR = 0.030