A: Datasheet

Algorithm: xforwardai_000

Developer: Xforward AI Technology

Submission Date: 2020_07_24

Template size: 2048 bytes

Template time (2.5 percentile): 752 msec

Template time (median): 753 msec

Template time (97.5 percentile): 813 msec

Investigation:

Frontal mugshot ranking 76 (out of 329) –– FNIR(1600000, 0, 1) = 0.0023 vs. lowest 0.0009 from sensetime_006

Mugshot webcam ranking 76 (out of 291) –– FNIR(1600000, 0, 1) = 0.0136 vs. lowest 0.0057 from sensetime_006

Mugshot profile ranking 22 (out of 260) –– FNIR(1600000, 0, 1) = 0.0888 vs. lowest 0.0550 from sensetime_006

Immigration visa–border ranking 56 (out of 218) –– FNIR(1600000, 0, 1) = 0.0038 vs. lowest 0.0009 from sensetime_006

Immigration visa–kiosk ranking 50 (out of 215) –– FNIR(1600000, 0, 1) = 0.0937 vs. lowest 0.0487 from cubox_000

Identification:

Frontal mugshot ranking 59 (out of 329) –– FNIR(1600000, T, L+1) = 0.0151, FPIR=0.001000 vs. lowest 0.0017 from nec_005

Mugshot webcam ranking 61 (out of 289) –– FNIR(1600000, T, L+1) = 0.0534, FPIR=0.001000 vs. lowest 0.0120 from nec_005

Mugshot profile ranking 15 (out of 259) –– FNIR(1600000, T, L+1) = 0.4402, FPIR=0.001000 vs. lowest 0.1331 from cloudwalk_hr_000

Immigration visa–border ranking 48 (out of 217) –– FNIR(1600000, T, L+1) = 0.0210, FPIR=0.001000 vs. lowest 0.0032 from paravision_009

Immigration visa–kiosk ranking 37 (out of 212) –– FNIR(1600000, T, L+1) = 0.1703, FPIR=0.001000 vs. lowest 0.0728 from paravision_009
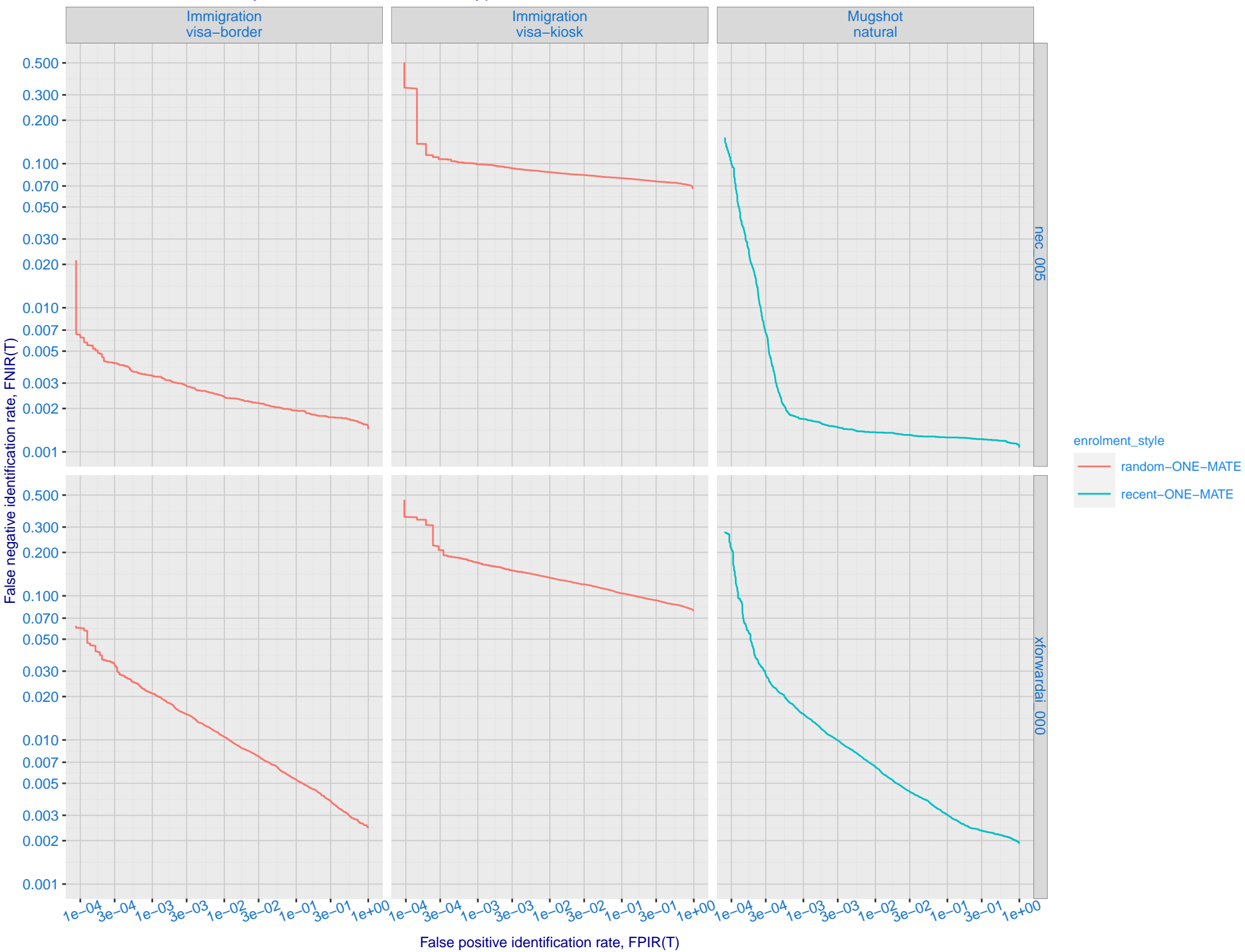
B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (nec_005)
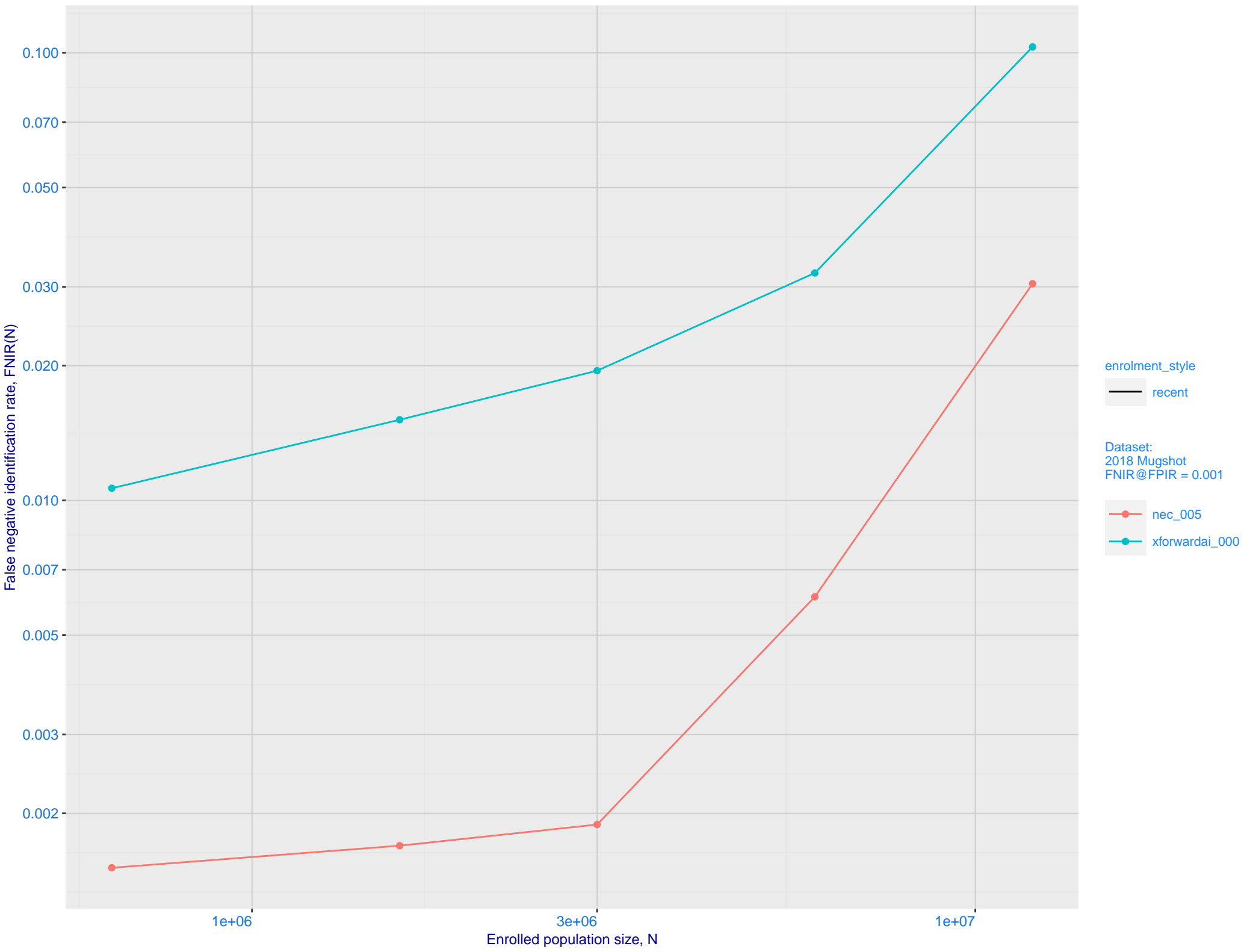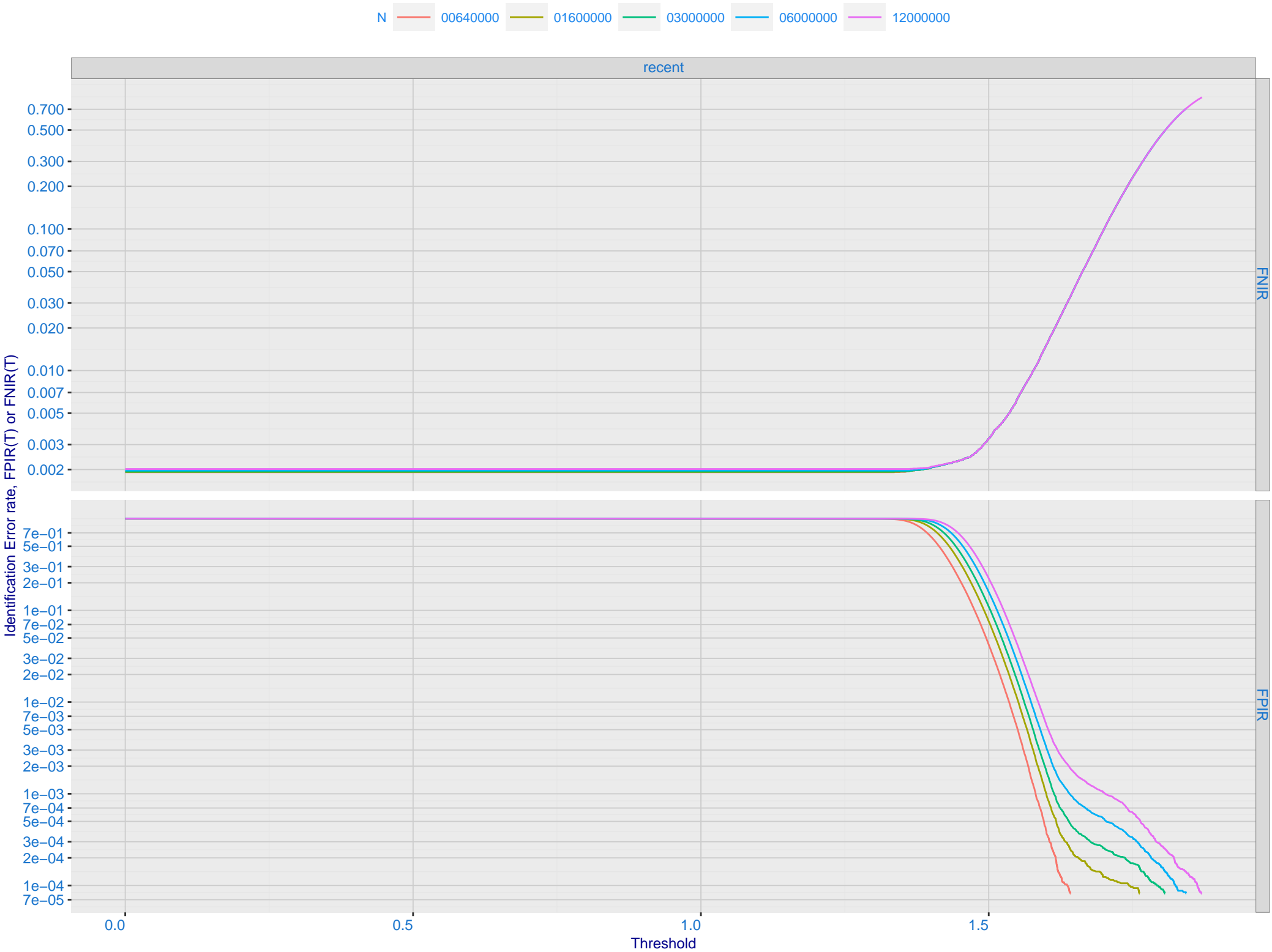
C: Evolution of accuracy for XFORWARDAI algorithms on three datasets 2018 – present
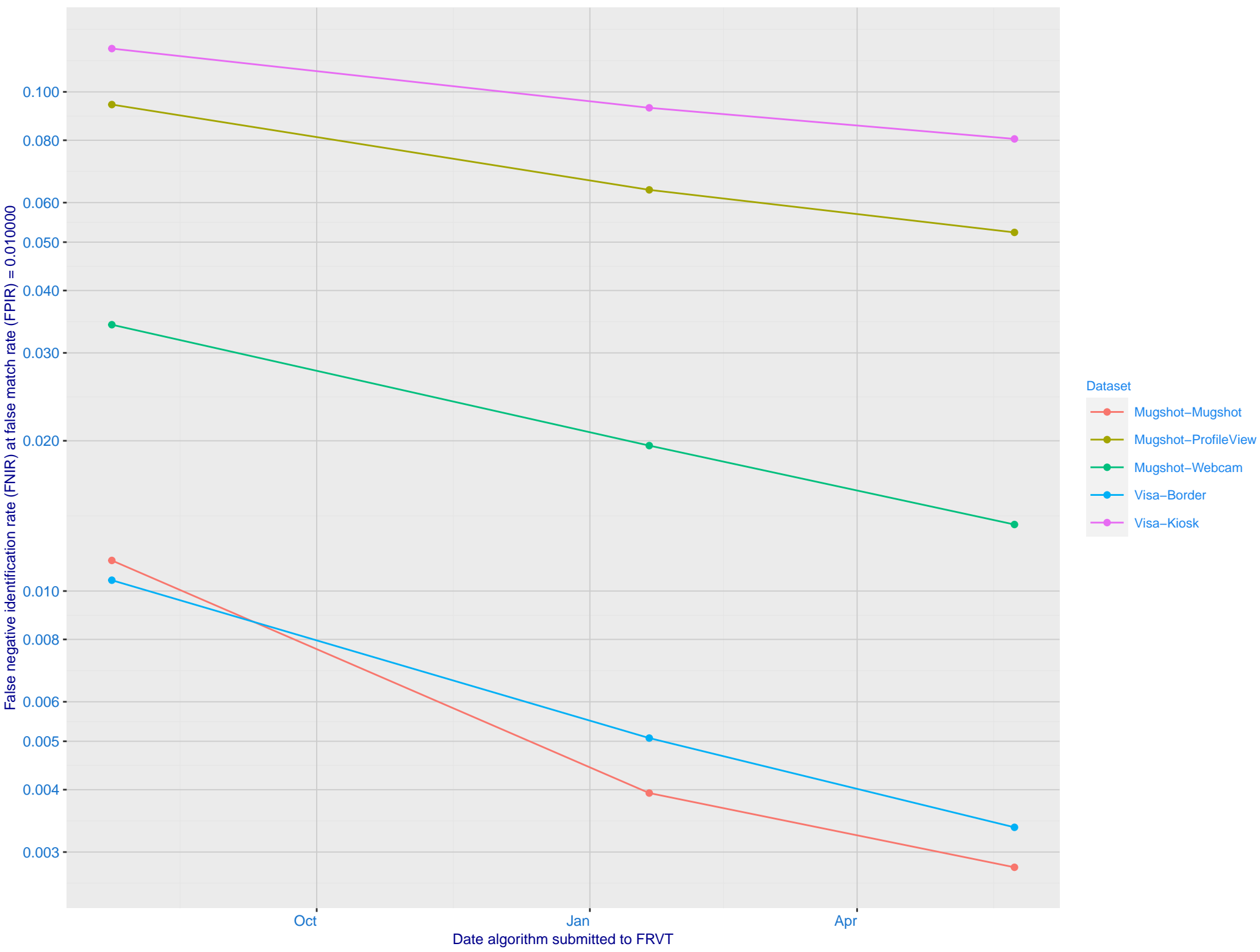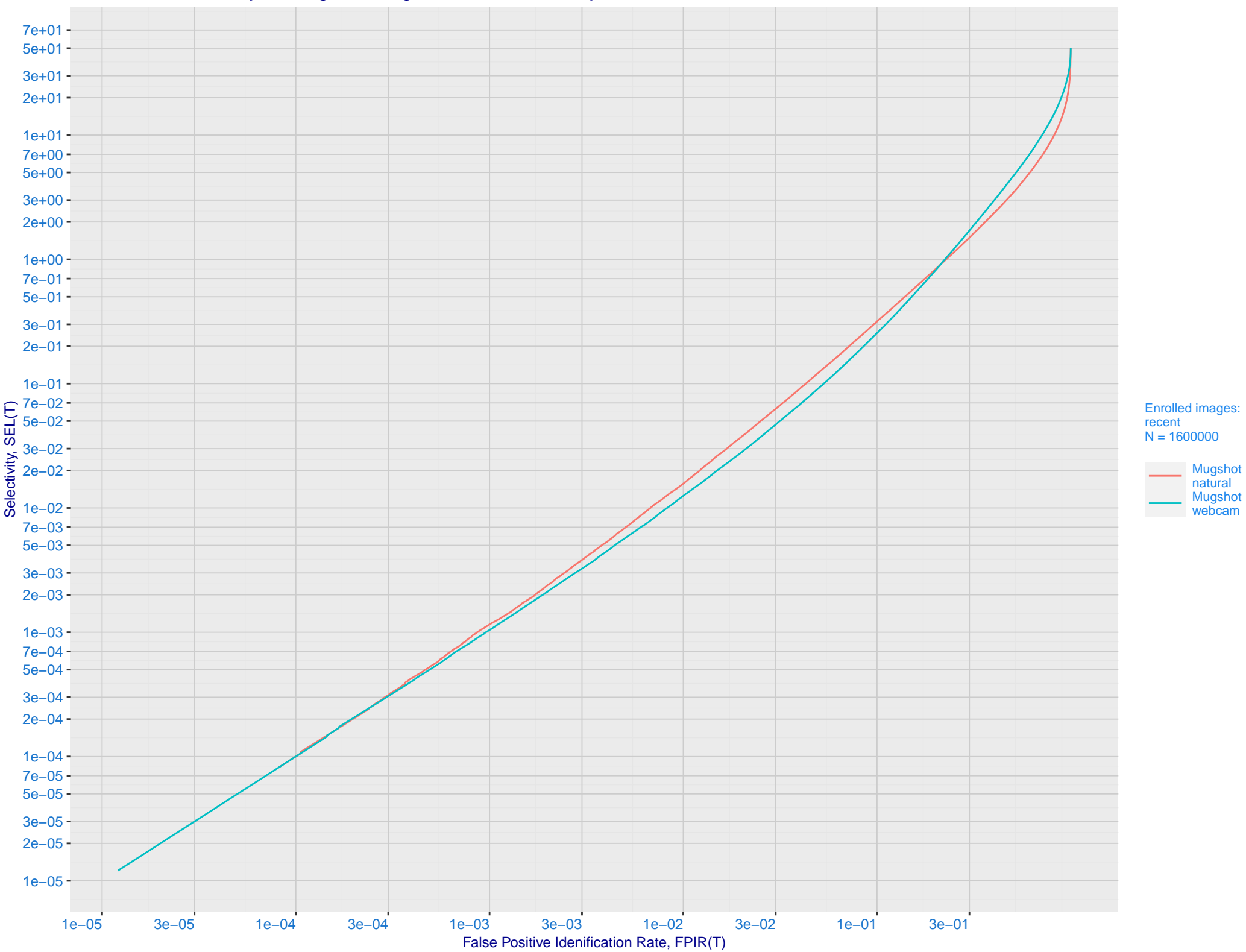
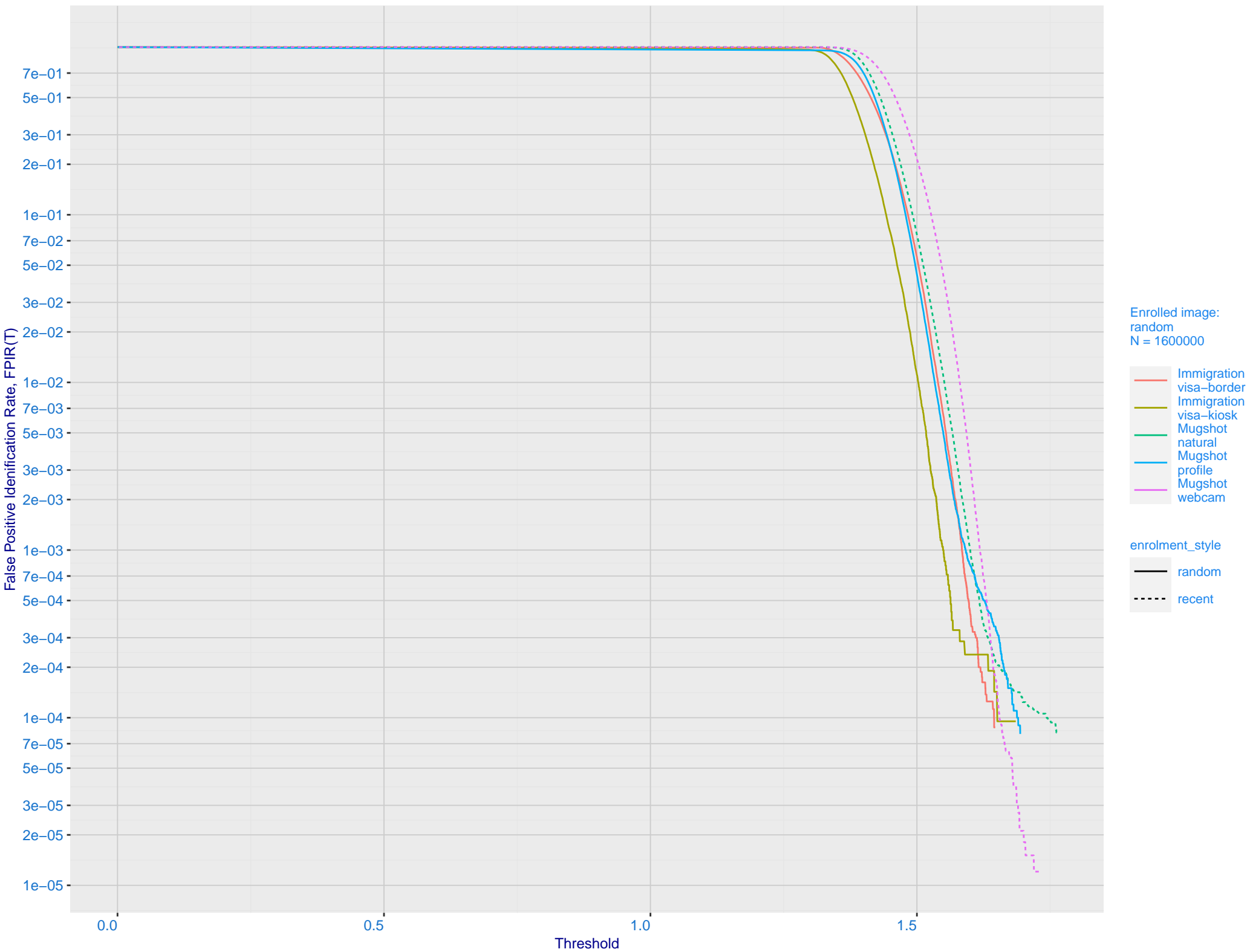D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals

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

Enrolled image:
random
N = 1600000

Immigration
visa–border
Immigration
visa–kiosk
Mugshot
natural
Mugshot
profile
Mugshot
webcam

enrolment_style

—— random

----- recent

False Positive Idenification Rate, FPIR(T)

Threshold

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
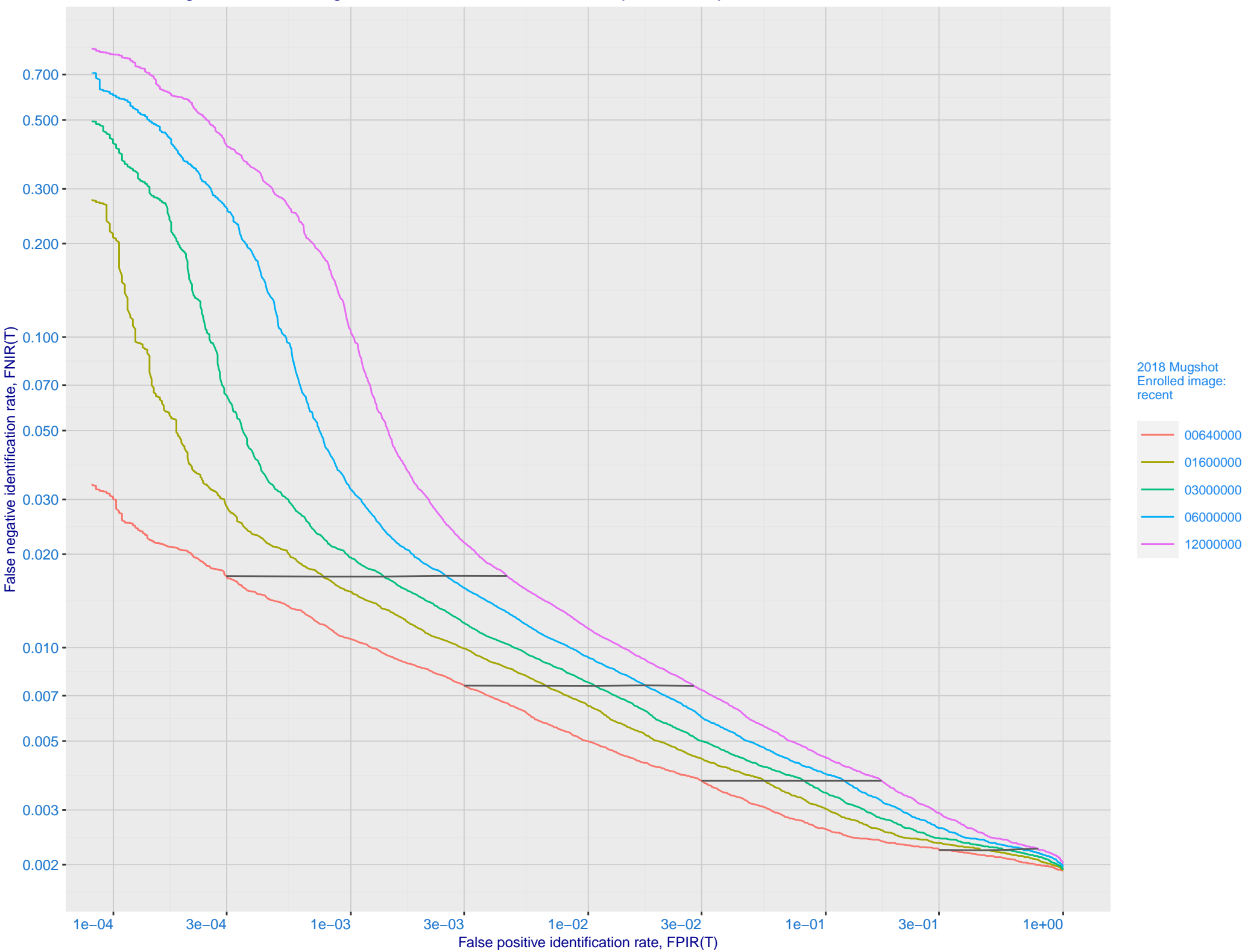
Mean candidate list length

Threshold value
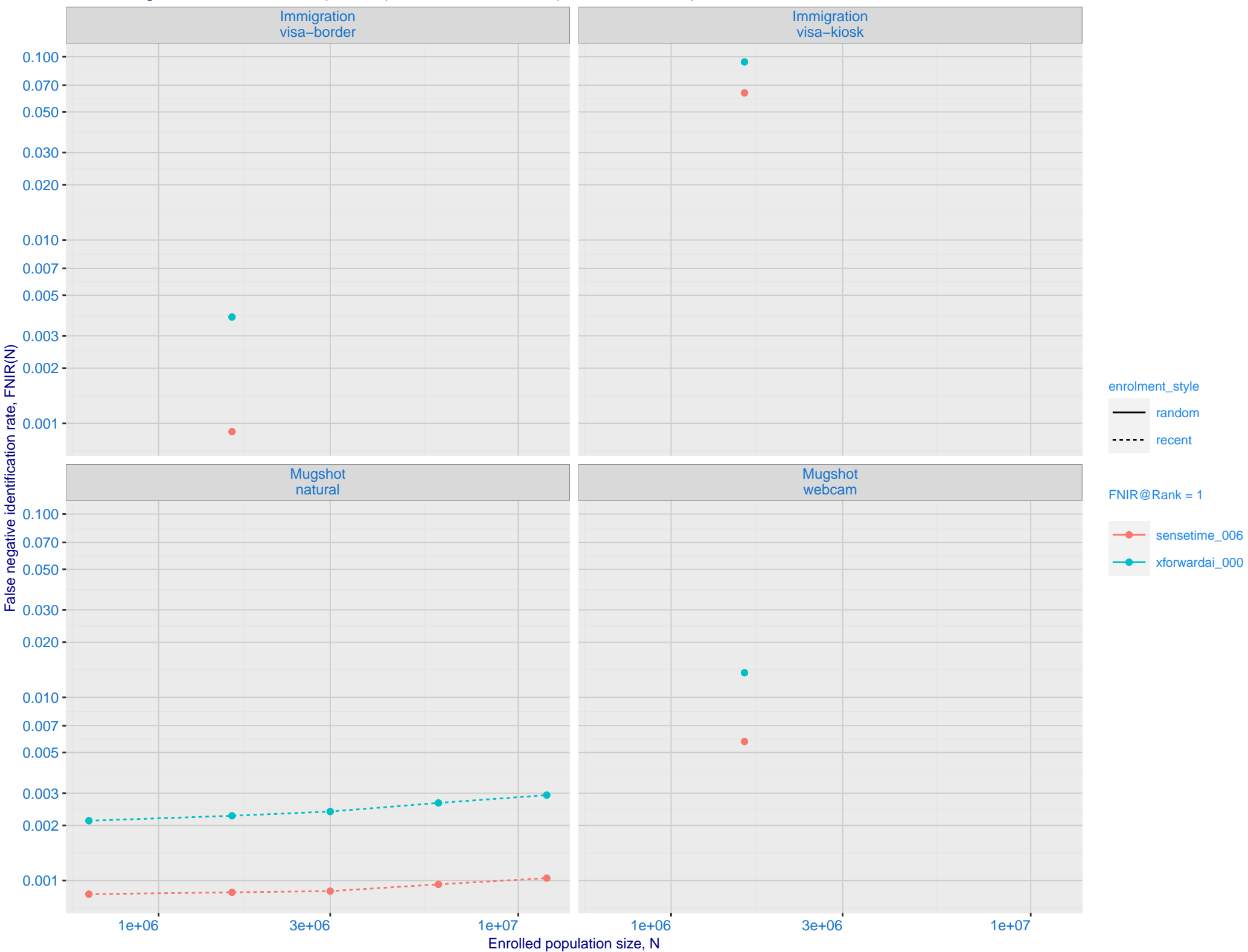
I: FNIR and FPIR dependence on threshold
Dataset is border–border with time–lapse [10,15] YRS with N = 1600000. Probes are 10–15 years later than enrollment image
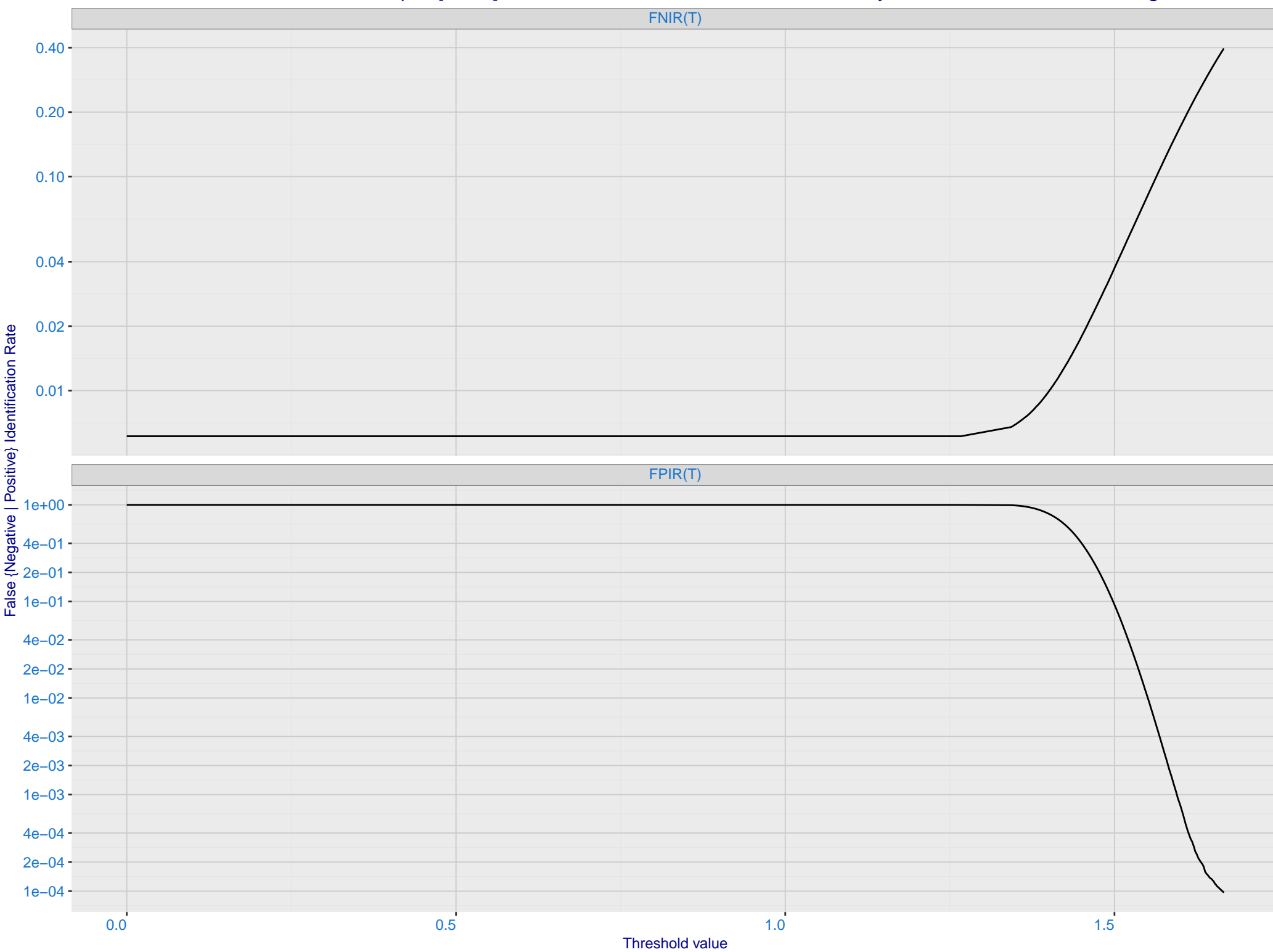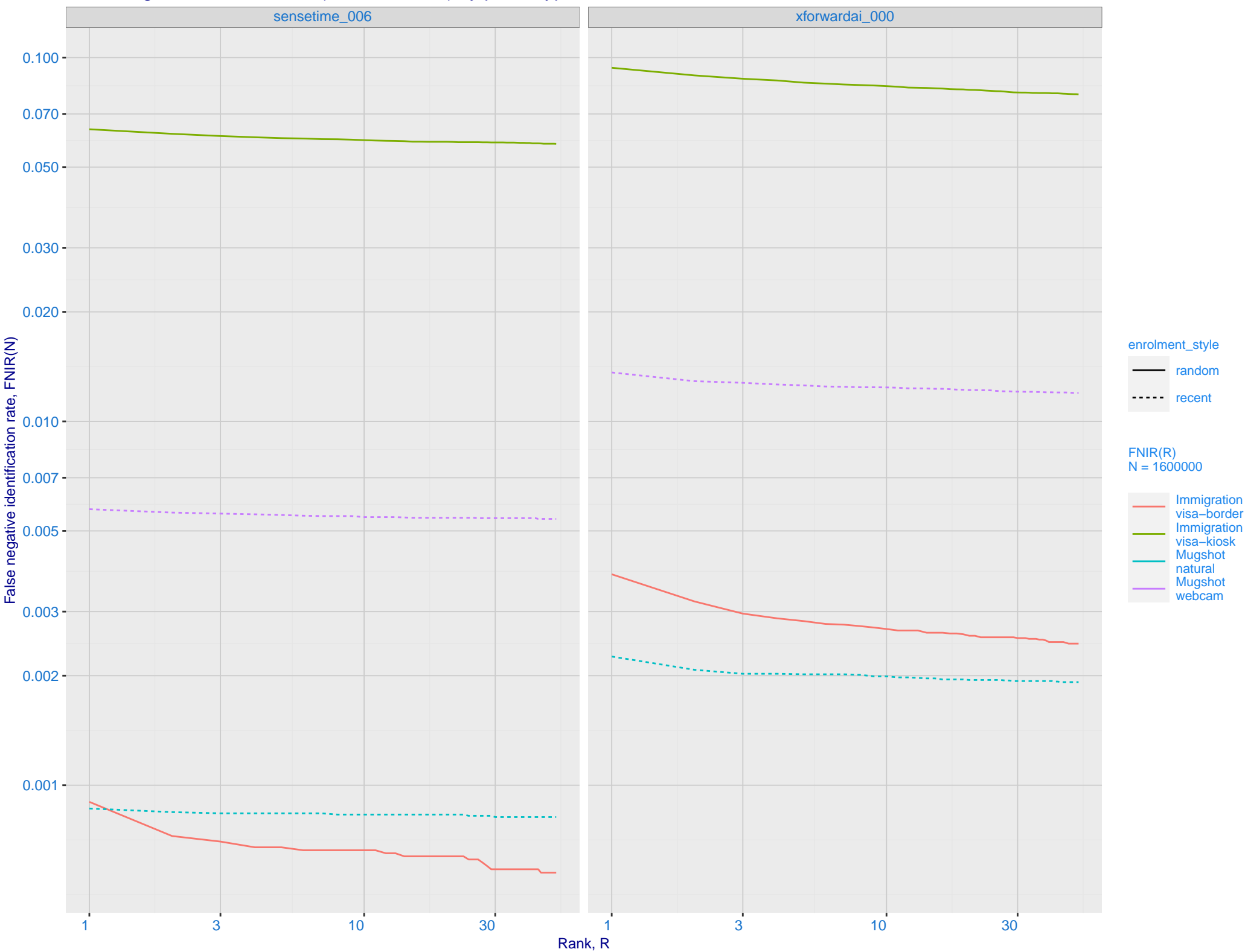
J: DET for Mugshot natural images and various N. Links connect points of equal threshold.

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
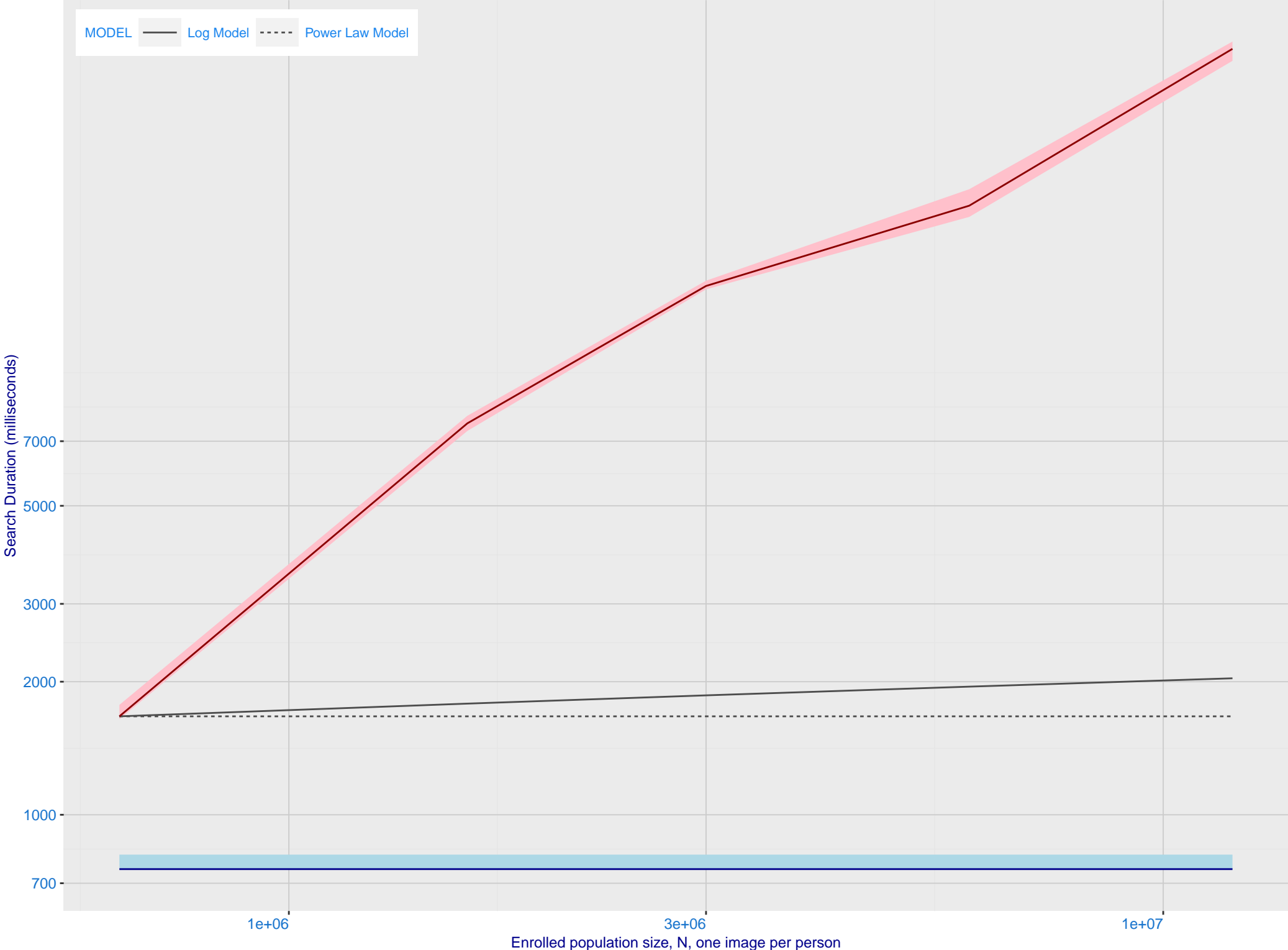
O: FNIR(T, N = 1.6 million) by sex, age and time−lapse. The top row gives investigational rank−1 miss rates. The bottom panels give high threshold for more lights−out identification with low FPIR.

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.
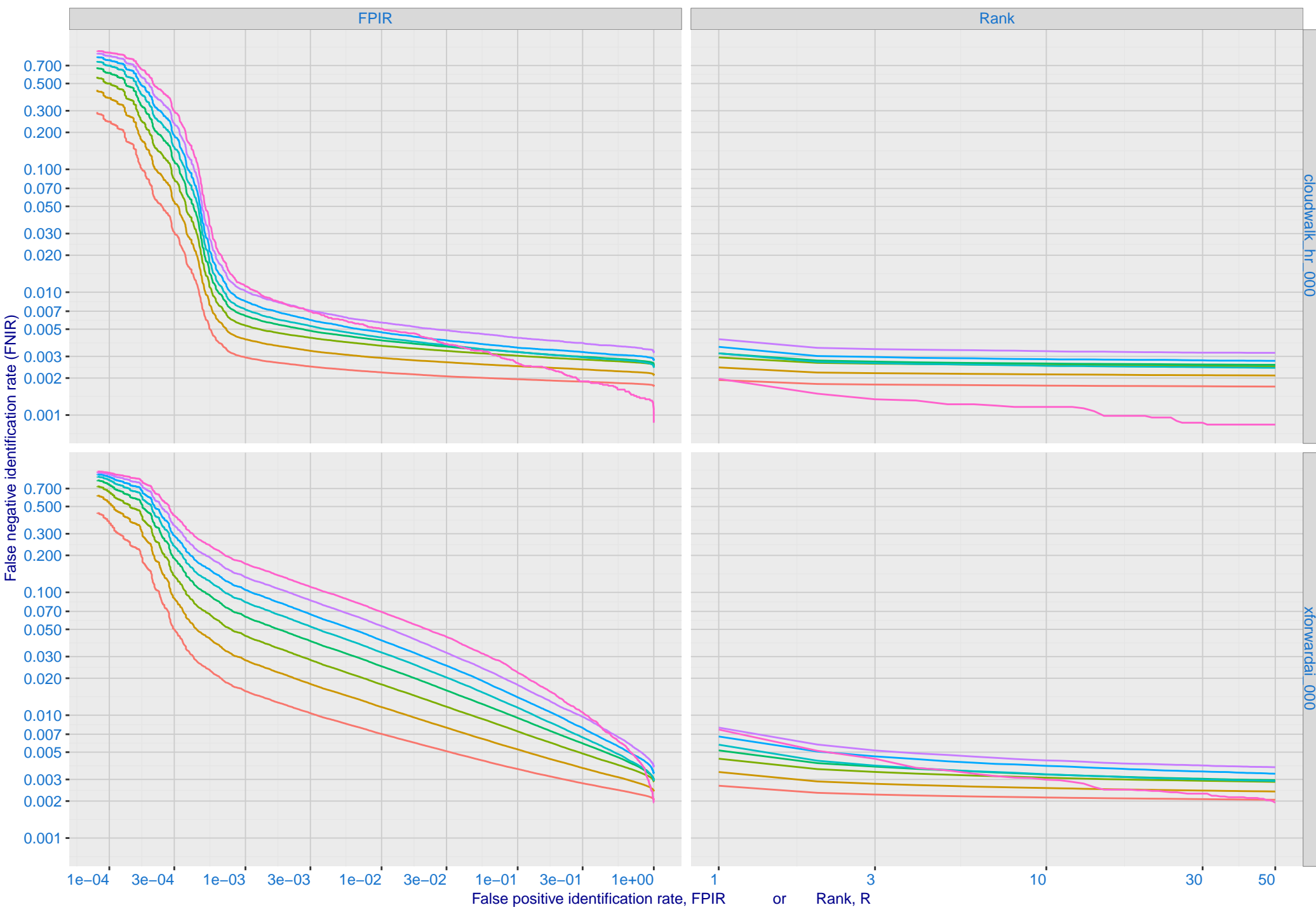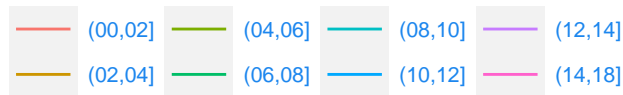
Algorithm: xforwardai_000, Dataset: Border−Crossing Ageing
Threshold: 1.549240 set to achive FPIR(30−45, Male) = 0.001

Color encodes log(FPIR)

−4   −3   −2   −1

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

	Female	Male
(60:99]	0.0168	0.0007
(45:60]	0.0100	0.0006
(30:45]	0.0090	0.0010
(21:30]	0.0170	0.0027
(18:21]	0.0229	0.0052
(15:18]	0.0249	0.0067
(12:15]	0.0235	0.0088

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