A: Datasheet

Algorithm: imperial_000

Developer: Imperial College London

Submission Date: 2019_08_28

Template size: 2048 bytes

Template time (2.5 percentile): 568 msec

Template time (median): 577 msec

Template time (97.5 percentile): 790 msec

Investigation:

Frontal mugshot ranking 86 (out of 329) -- FNIR(1600000, 0, 1) = 0.0024 vs. lowest 0.0009 from sensetime_006

Mugshot webcam ranking 90 (out of 291) -- FNIR(1600000, 0, 1) = 0.0148 vs. lowest 0.0057 from sensetime_006

Mugshot profile ranking 58 (out of 260) -- FNIR(1600000, 0, 1) = 0.2803 vs. lowest 0.0550 from sensetime_006

Immigration visa-border ranking 68 (out of 218) -- FNIR(1600000, 0, 1) = 0.0044 vs. lowest 0.0009 from sensetime_006

Immigration visa-kiosk ranking 53 (out of 215) -- FNIR(1600000, 0, 1) = 0.0967 vs. lowest 0.0487 from cubox_000

Identification:

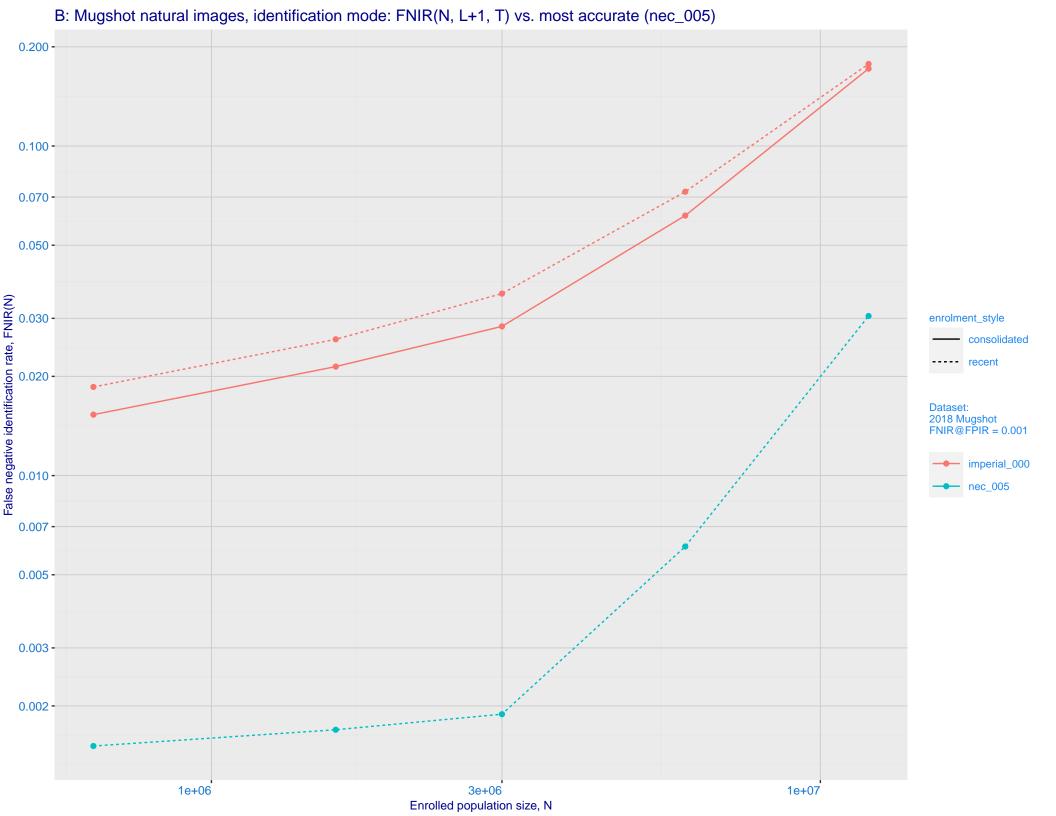
Frontal mugshot ranking 89 (out of 329) -- FNIR(1600000, T, L+1) = 0.0259, FPIR=0.001000 vs. lowest 0.0017 from nec_005

Mugshot webcam ranking 78 (out of 289) -- FNIR(1600000, T, L+1) = 0.0677, FPIR=0.001000 vs. lowest 0.0120 from nec_005

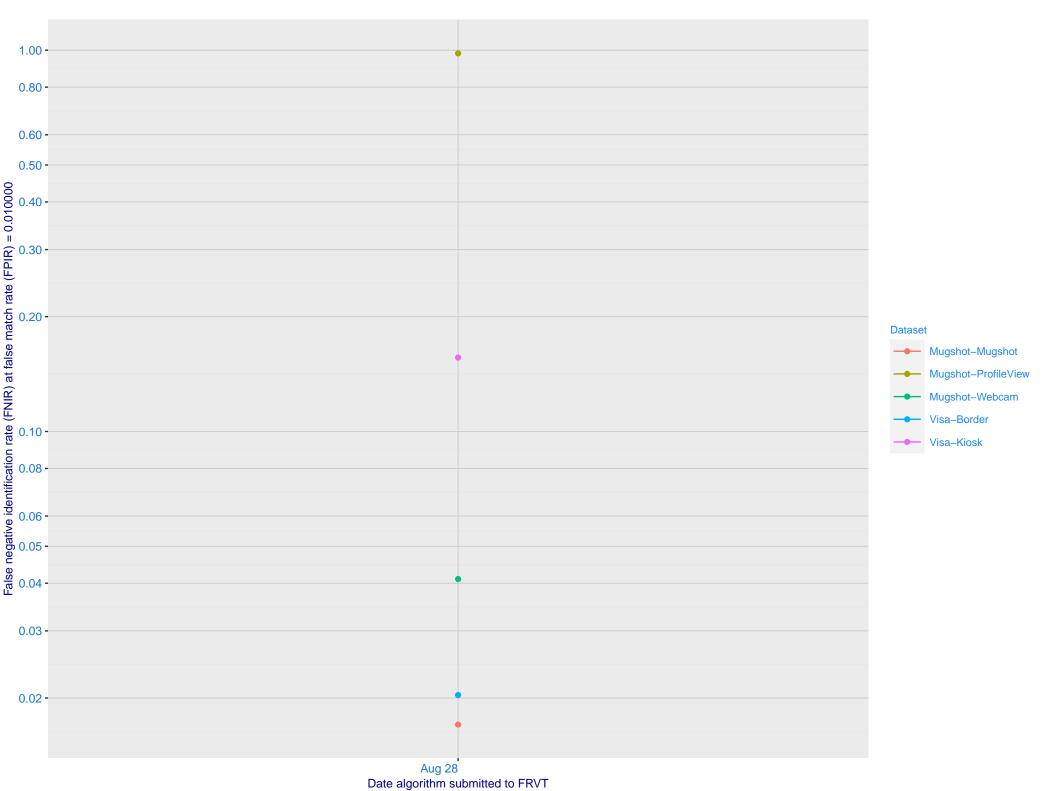
Mugshot profile ranking 168 (out of 259) -- FNIR(1600000, T, L+1) = 0.9987, FPIR=0.001000 vs. lowest 0.1331 from cloudwalk_hr_000

Immigration visa-border ranking 84 (out of 217) -- FNIR(1600000, T, L+1) = 0.0418, FPIR=0.001000 vs. lowest 0.0032 from paravision_009

Immigration visa-kiosk ranking 59 (out of 212) -- FNIR(1600000, T, L+1) = 0.2456, FPIR=0.001000 vs. lowest 0.0728 from paravision_009



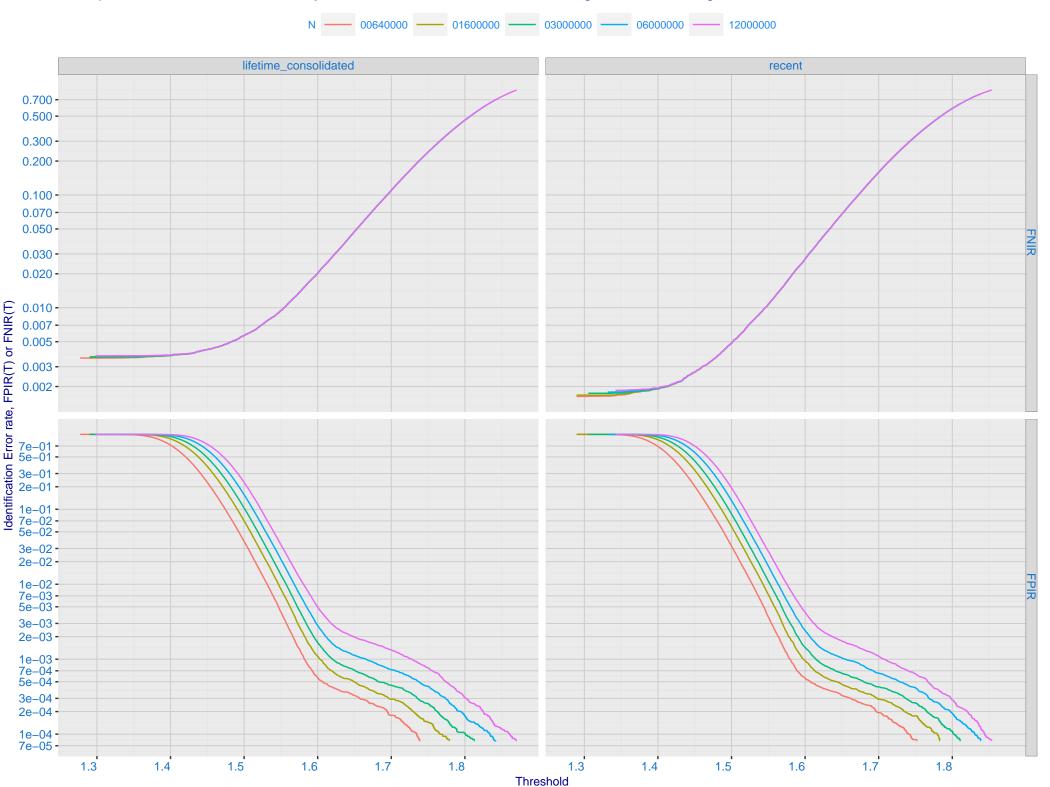
C: Evolution of accuracy for IMPERIAL algorithms on three datasets 2018 – present



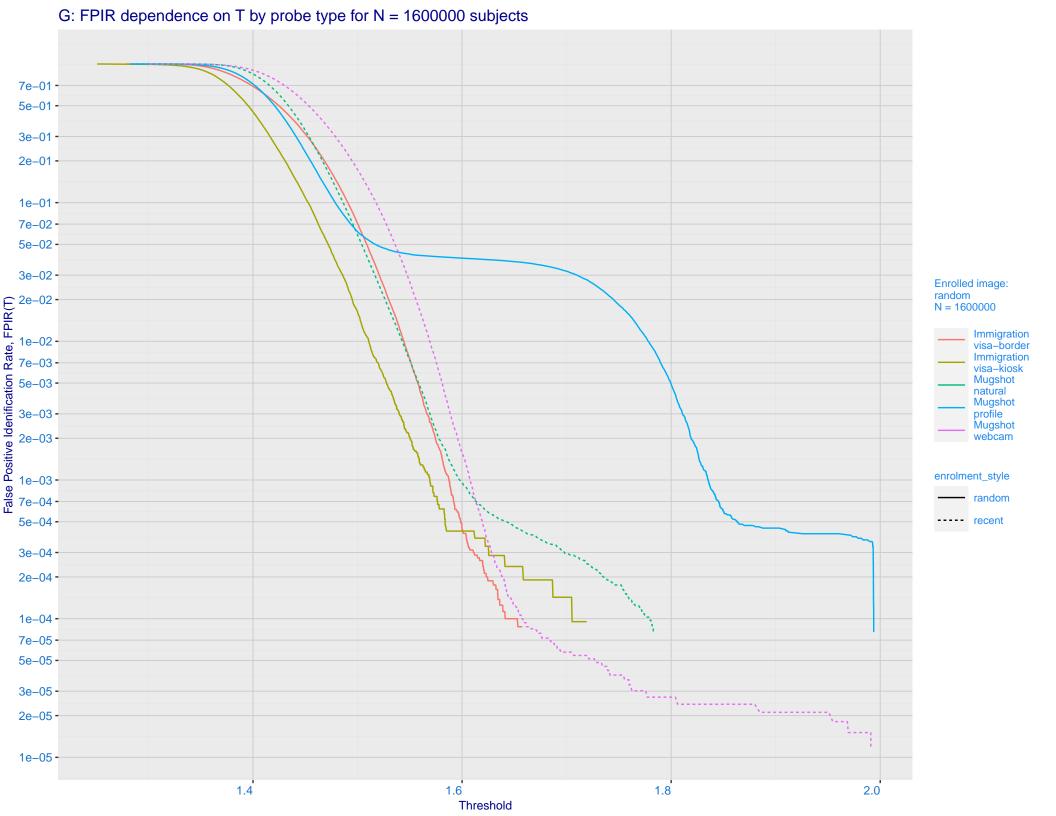
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals Immigration **Immigration** Mugshot visa-border visa-kiosk natural 0.700 -0.500 -0.300 -0.200 -0.100 -0.070 -0.050 imperial 000 0.030 -0.020 -0.010 -Construction (0.007 - 0.007 - 0.003 - 0.002 - 0.001 - 0.500 - 0.500 - 0.200 enrolment_style consolidated-ONE-MATE random-ONE-MATE recent-ONE-MATE unconsolidated-ALL-MATES unconsolidated-ANY-MATE 0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 -0.005 -0.003 -0.002 -0.001 -1e-03e-04e-03e-03e-03e-02e-02e-01e+001e-03e-04e-03e-02e-02e-02e-01e+001e-03e-04e-03e-04e-03e-01e+00

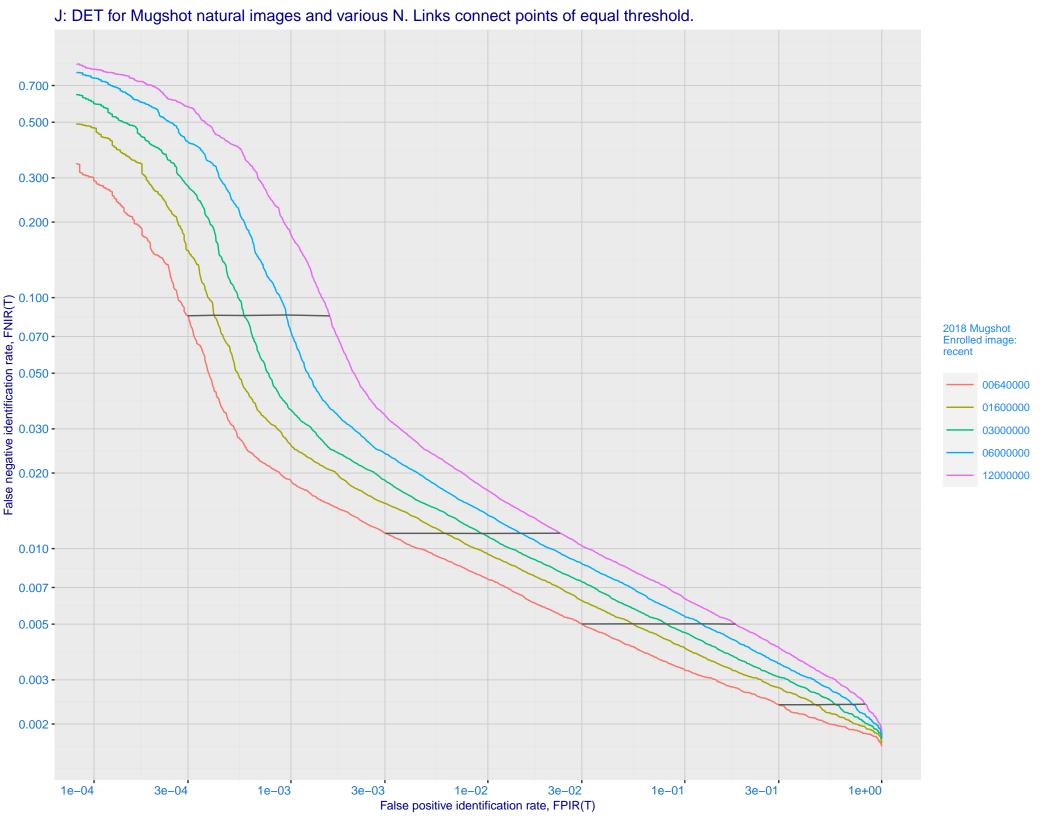
False positive identification rate, FPIR(T)

E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images

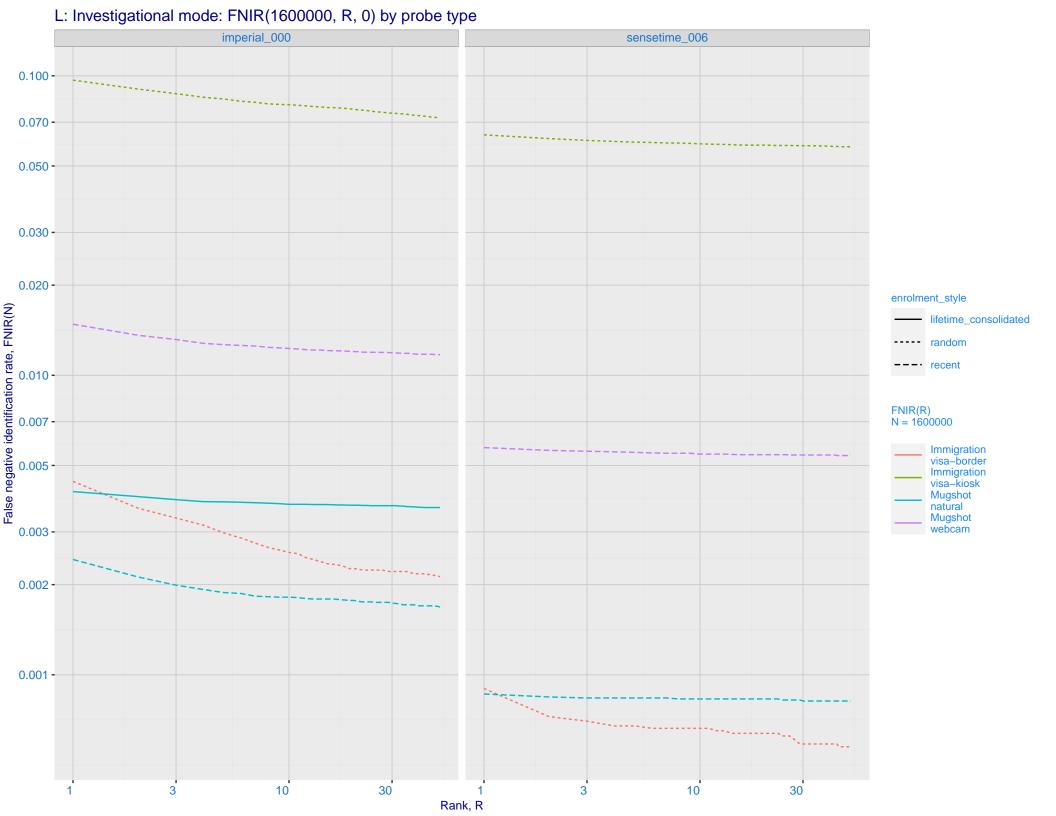


F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate 7e+01 -5e+01 -3e+01 -2e+01 -1e+01 -7e+00 -5e+00 -3e+00 -2e+00 -1e+00 -7e-01 -5e-01 -3e-01 -2e-01 -1e-01 -7e-02 -5e-02 -3e-02 -3e-02 -1e-02 -**Enrolled images:** recent N = 1600000 Mugshot natural Mugshot webcam 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)

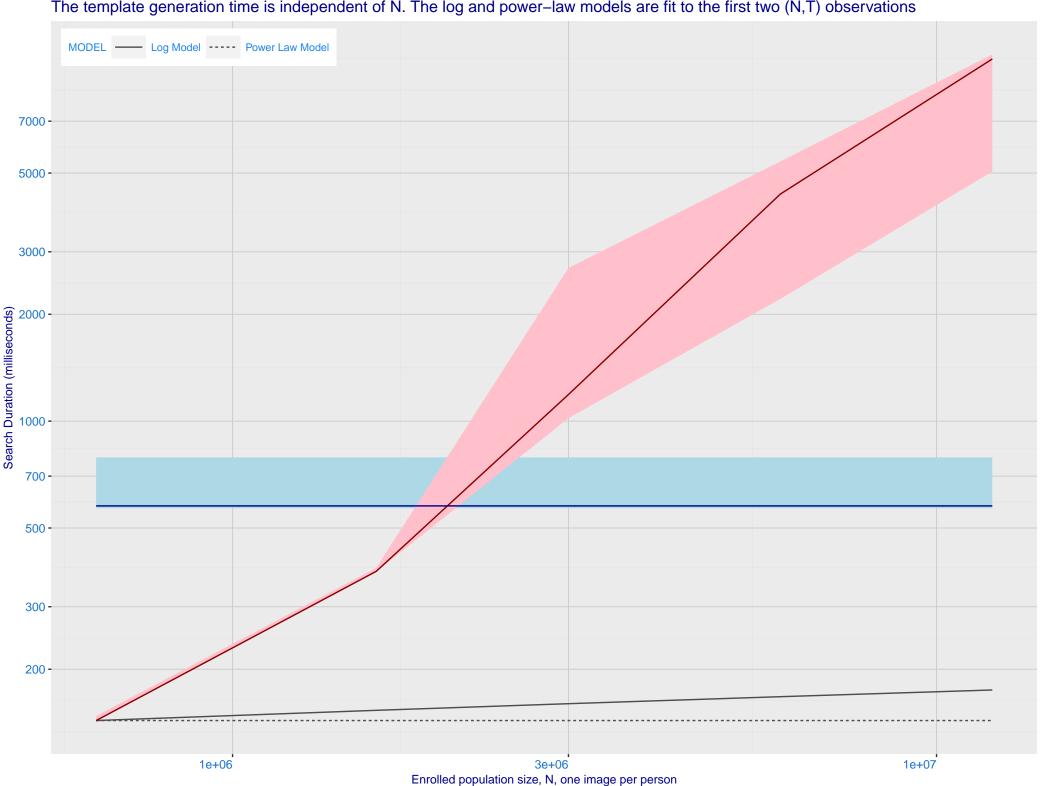




K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_006) Immigration **Immigration** visa-border visa-kiosk 0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 -0.005 -0.003 -Ealse negative identification rate, FNIR(N) 0.002 - 0.001 - 0.000 - 0.050 - 0.030 - 0. enrolment_style consolidated ---- random --- recent Mugshot natural Mugshot webcam FNIR@Rank = 1 imperial_000 sensetime_006 0.020 -0.010 -0.007 -0.005 -0.003 -0.002 -0.001 -1e+06 3e+06 1e+07 1e+06 3e+06 1e+07 Enrolled population size, N

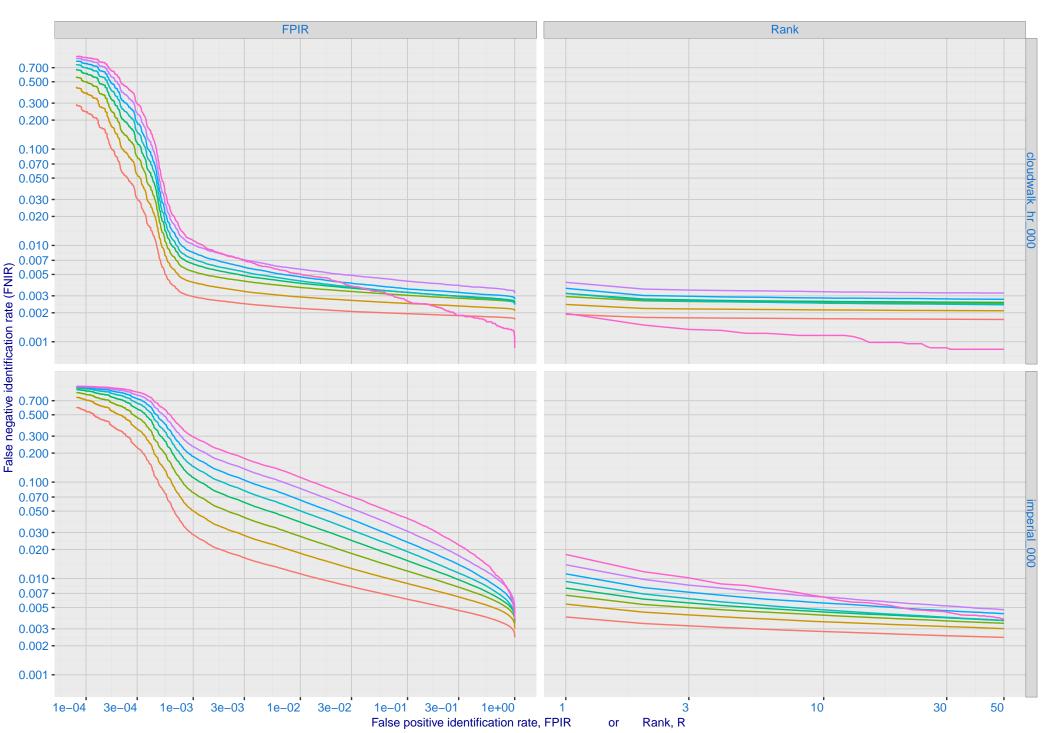


M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements. The template generation time is independent of N. The log and power–law models are fit to the first two (N,T) observations



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 2.0 -Dataset: 2018 Mugshot N= 3.1M Color encodes FNIR (Rank = 1) 1.8 -0.15 0.10 0.05 0.00 1.6 -TVAL - FPIR = 0.001 FPIR = 0.003 FPIR = 0.010FPIR = 0.030 1.4 -(00,02](02,04](04,06](06,08](08,10](10,12](12,14](14,18]Time lapse between search and initial encounter enrollment (years)

Score