## A: Datasheet

Algorithm: rankone\_009

Developer: Rank One Computing

Submission Date: 2020\_06\_26

Template size: 260 bytes

Template time (2.5 percentile): 179 msec

Template time (median): 185 msec

Template time (97.5 percentile): 242 msec

Investigation:

Frontal mugshot ranking 81 (out of 329) -- FNIR(1600000, 0, 1) = 0.0024 vs. lowest 0.0009 from sensetime\_006

Mugshot webcam ranking 67 (out of 291) -- FNIR(1600000, 0, 1) = 0.0126 vs. lowest 0.0057 from sensetime\_006

Mugshot profile ranking 106 (out of 260) — FNIR(1600000, 0, 1) = 0.5492 vs. lowest 0.0550 from sensetime\_006

Immigration visa-border ranking 80 (out of 218) -- FNIR(1600000, 0, 1) = 0.0056 vs. lowest 0.0009 from sensetime\_006

Immigration visa-kiosk ranking 106 (out of 215) -- FNIR(1600000, 0, 1) = 0.1345 vs. lowest 0.0487 from cubox\_000

Identification:

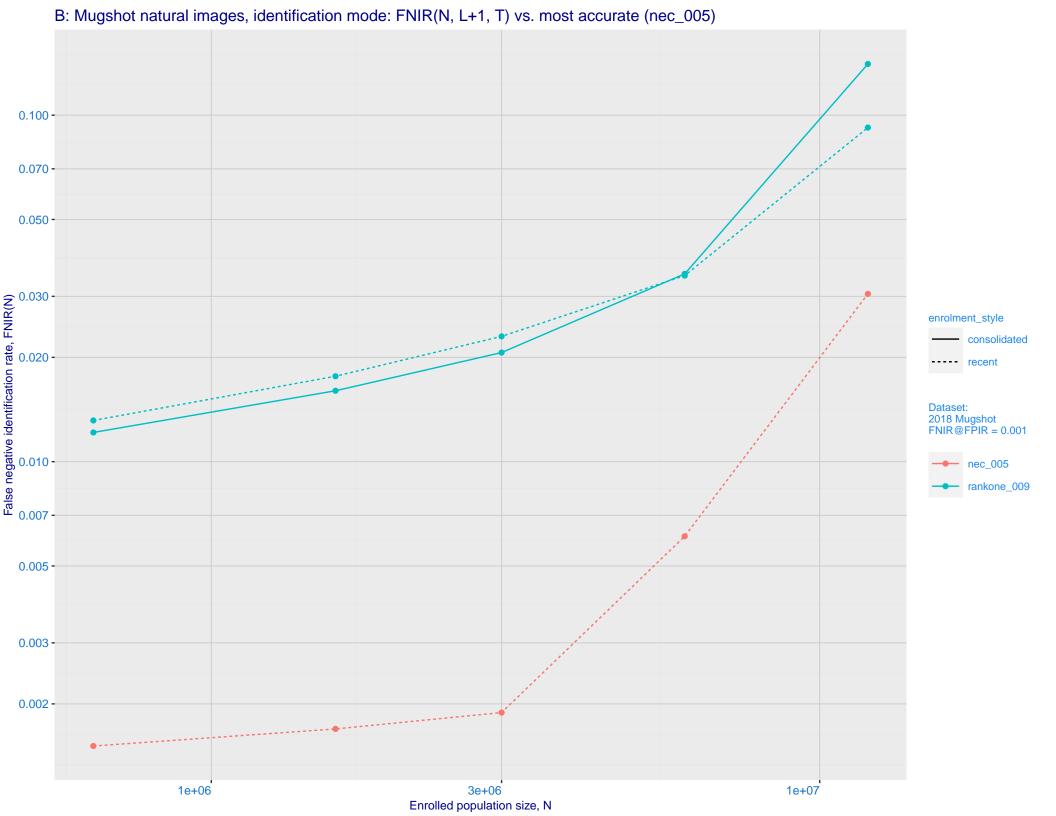
Frontal mugshot ranking 64 (out of 329) -- FNIR(1600000, T, L+1) = 0.0176, FPIR=0.001000 vs. lowest 0.0017 from nec\_005

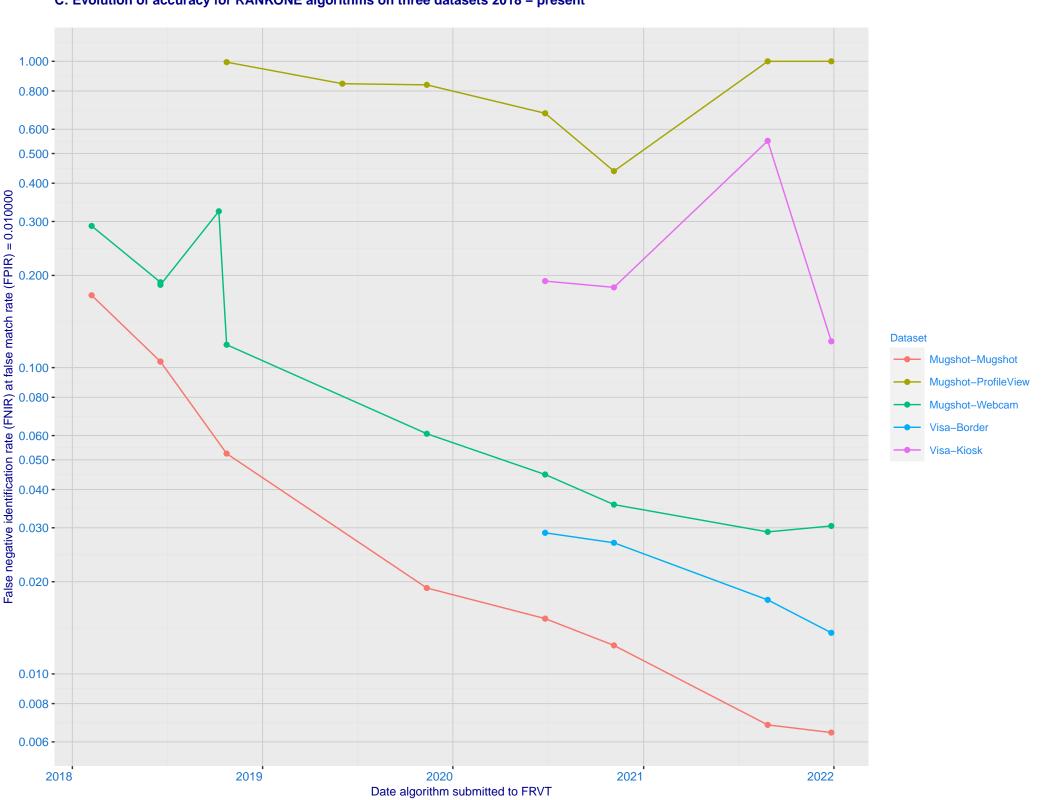
Mugshot webcam ranking 87 (out of 289) -- FNIR(1600000, T, L+1) = 0.0763, FPIR=0.001000 vs. lowest 0.0120 from nec\_005

Mugshot profile ranking 68 (out of 259) — FNIR(1600000, T, L+1) = 0.9695, FPIR=0.001000 vs. lowest 0.1331 from cloudwalk\_hr\_000

Immigration visa-border ranking 102 (out of 217) -- FNIR(1600000, T, L+1) = 0.0616, FPIR=0.001000 vs. lowest 0.0032 from paravision\_009

Immigration visa-kiosk ranking 83 (out of 212) -- FNIR(1600000, T, L+1) = 0.3278, FPIR=0.001000 vs. lowest 0.0728 from paravision\_009

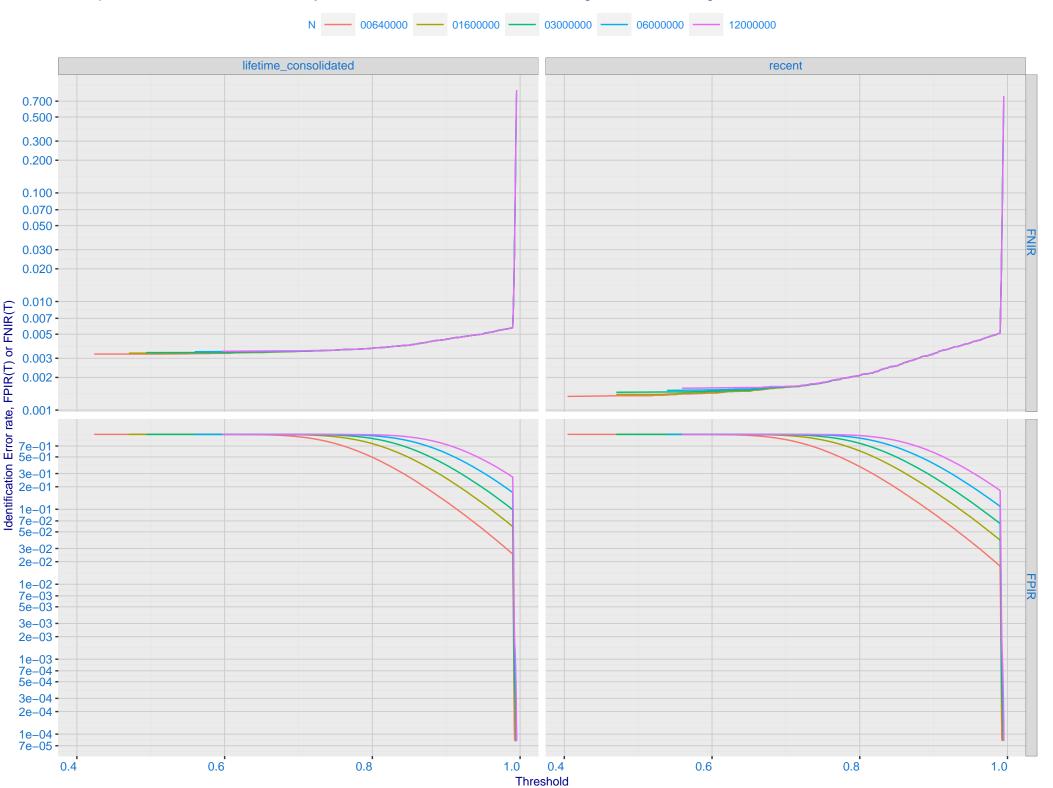




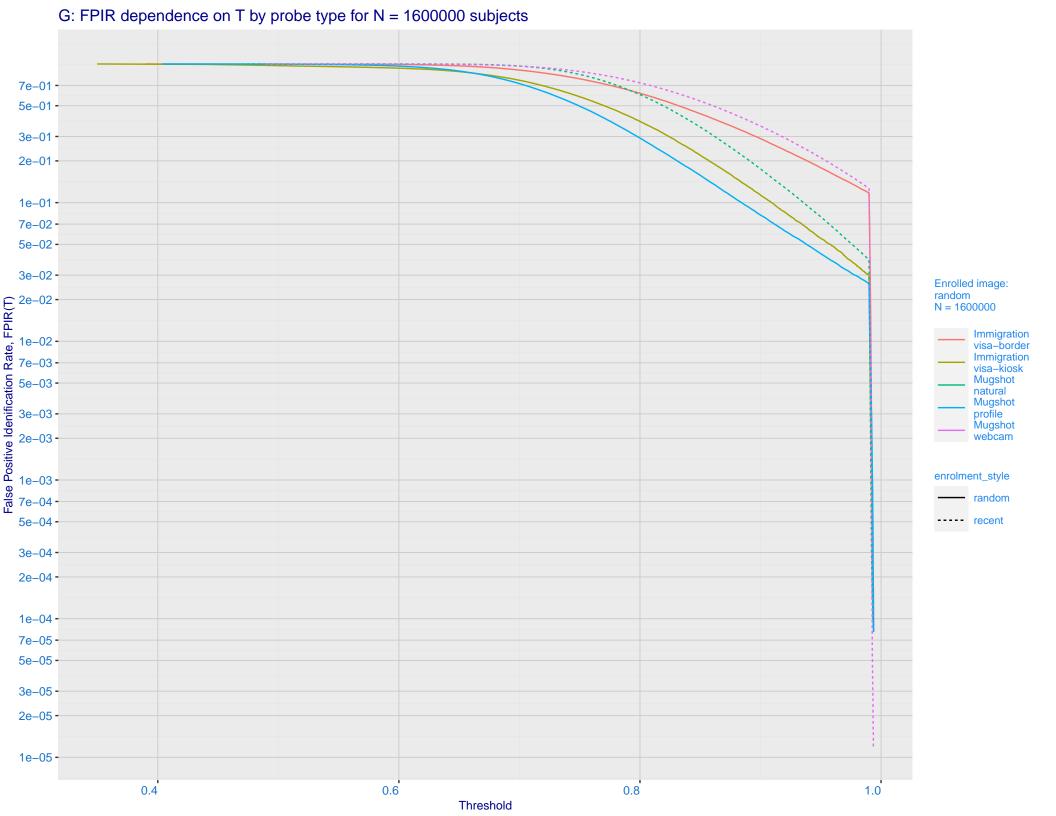
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals Immigration **Immigration** Mugshot visa-border visa-kiosk natural 0.700 -0.500 -0.300 -0.200 -0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 - 0.005 - 0.003 - 0.002 - 0.001 - 0.500 - 0.200 enrolment\_style consolidated-ONE-MATE random-ONE-MATE recent-ONE-MATE unconsolidated-ALL-MATES unconsolidated-ANY-MATE 0.100 0.070 -0.050 rankone 009 0.030 -0.020 -0.010 -0.007 -0.005 -0.003 -0.002 -0.001 -1e-03e-04e-03e-03e-03e-02e-03e-01e+001e-03e-04e-03e-03e-02e-03e-01e+001e-03e-01e+001e-03e-04e-03e-03e-02e-01e+00

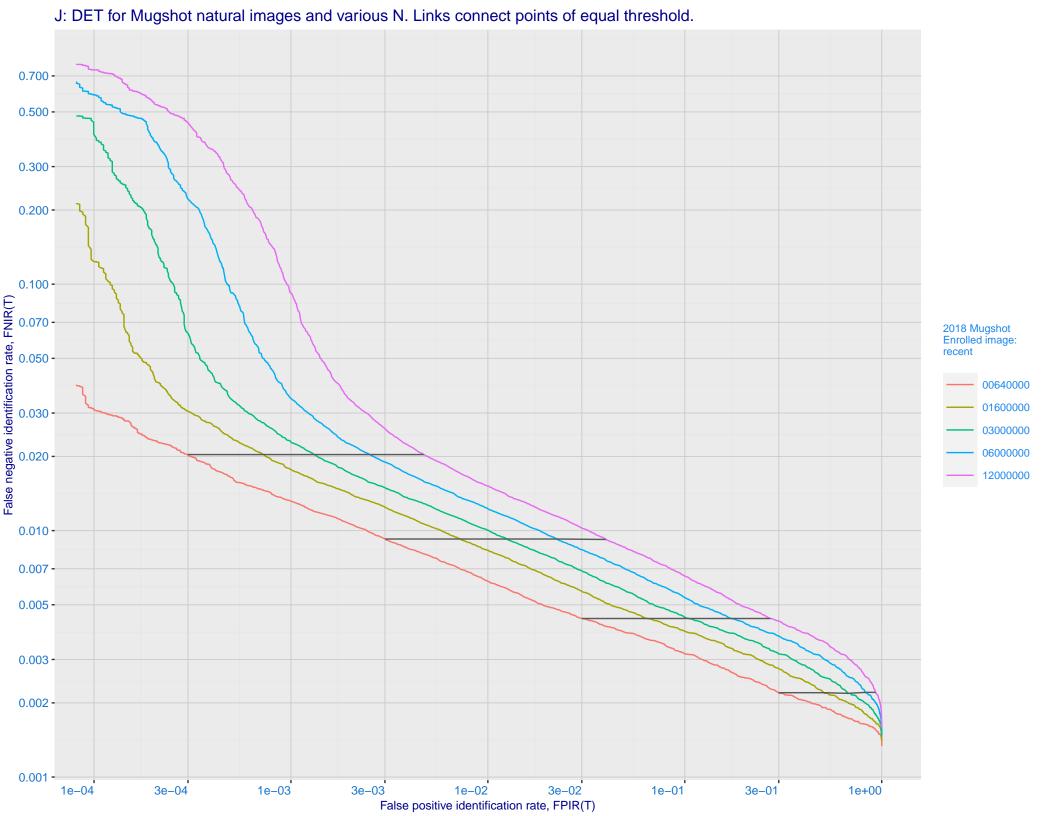
False positive identification rate, FPIR(T)

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 - 0.002 - 0.001 - 0.001 - 0.000 enrolment\_style consolidated ---- random --- recent Mugshot natural Mugshot webcam FNIR@Rank = 1 rankone\_009 - sensetime\_006 0.030 -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

L: Investigational mode: FNIR(1600000, R, 0) by probe type rankone\_009 sensetime\_006 0.100 -0.070 -0.050 -0.030 enrolment\_style False negative identification rate, FNIR(N) 0.000 0.00 lifetime\_consolidated ---- random --- recent FNIR(R) N = 1600000 Immigration visa-border Immigration visa-kiosk Mugshot natural Mugshot webcam 0.003 -0.002 -0.001 -10 30 3 10 30 Rank, R

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 - Log Model ---- Power Law Model 700 -500 -300 -200 -100 -70 -50 -

3e+06

Enrolled population size, N, one image per person

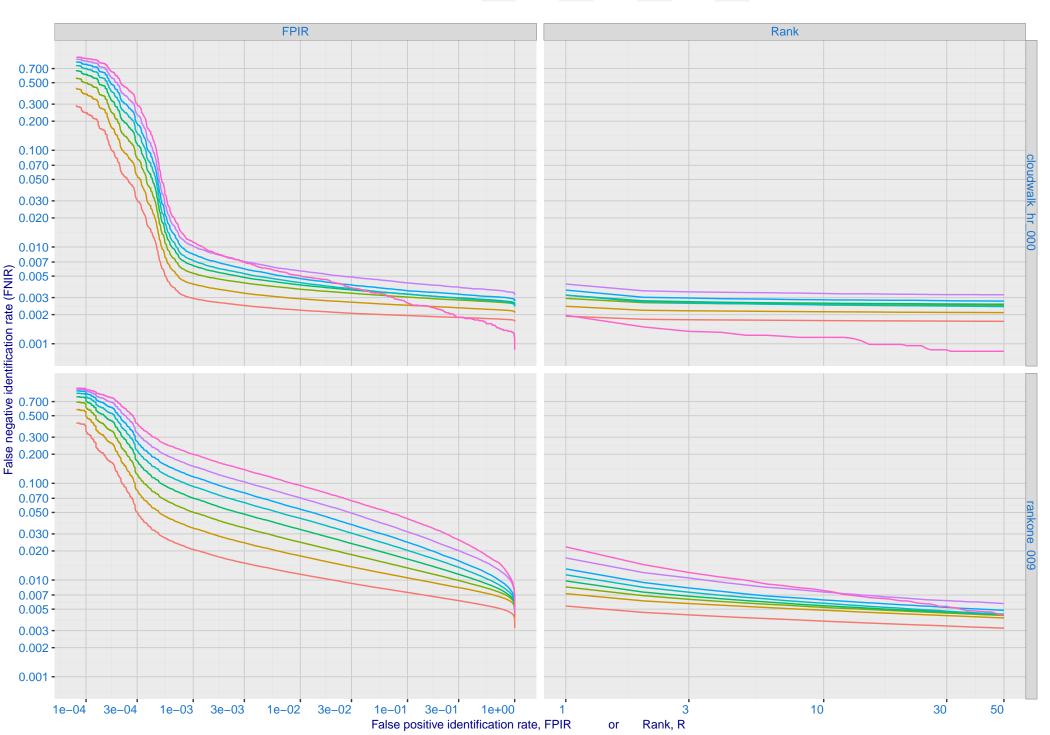
1e+07

Search Duration (milliseconds)

1e+06

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 1.0 Dataset: 2018 Mugshot N= 3.1M Color encodes FNIR (Rank = 1) 0.20 0.8 -0.15 0.10 0.05 0.00 **TVAL** 0.6 -- FPIR = 0.001 FPIR = 0.003 FPIR = 0.010 FPIR = 0.030 0.4 -(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)