## A: Datasheet

Algorithm: deepsea\_001

Developer: Tencent Deepsea Lab

Submission Date: 2019\_07\_29

Template size: 2048 bytes

Template time (2.5 percentile): 731 msec

Template time (median): 738 msec

Template time (97.5 percentile): 1038 msec

Investigation:

Frontal mugshot ranking 73 (out of 265) -- FNIR(1600000, 0, 1) = 0.0043 vs. lowest 0.0009 from sensetime\_005

Mugshot webcam ranking 49 (out of 227) -- FNIR(1600000, 0, 1) = 0.0159 vs. lowest 0.0062 from sensetime\_005

Mugshot profile ranking 100 (out of 196) — FNIR(1600000, 0, 1) = 0.8138 vs. lowest 0.0591 from sensetime\_005

Immigration visa-border ranking 60 (out of 148) -- FNIR(1600000, 0, 1) = 0.0095 vs. lowest 0.0013 from visionlabs\_010

Immigration visa-kiosk ranking 61 (out of 145) -- FNIR(1600000, 0, 1) = 0.1398 vs. lowest 0.0568 from hr\_000

Identification:

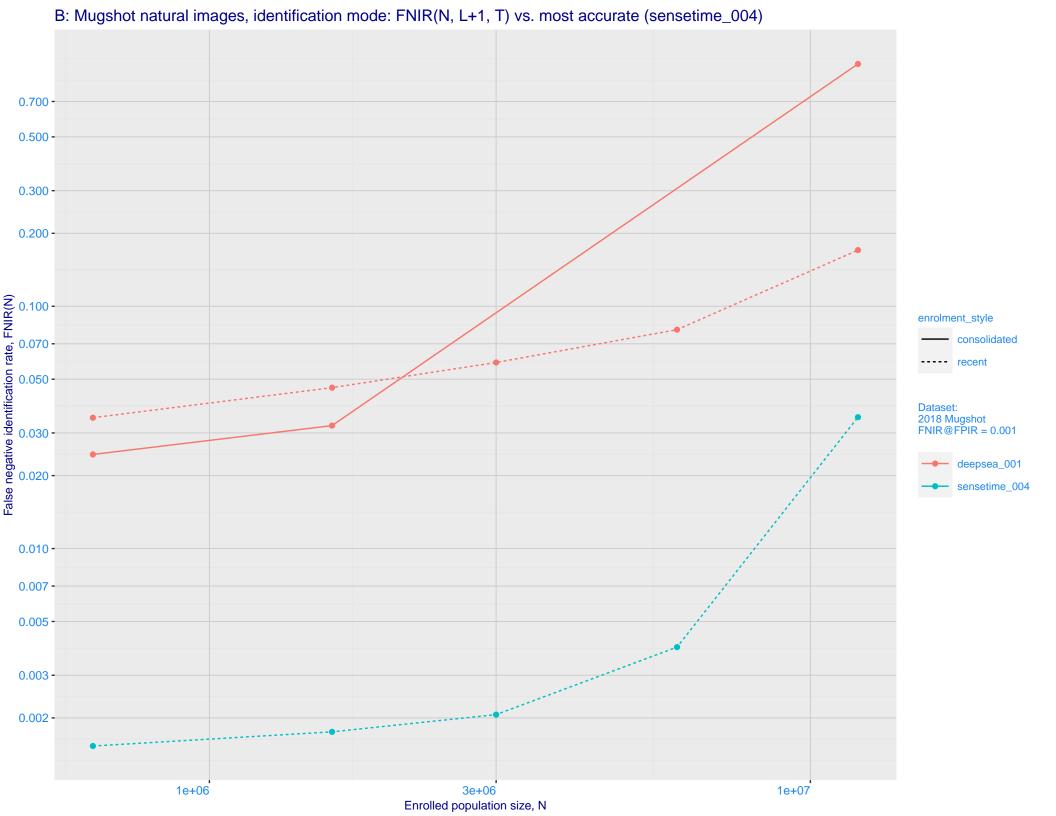
Frontal mugshot ranking 75 (out of 265) -- FNIR(1600000, T, L+1) = 0.0461, FPIR=0.001000 vs. lowest 0.0018 from sensetime\_004

Mugshot webcam ranking 66 (out of 225) -- FNIR(1600000, T, L+1) = 0.1013, FPIR=0.001000 vs. lowest 0.0122 from sensetime\_003

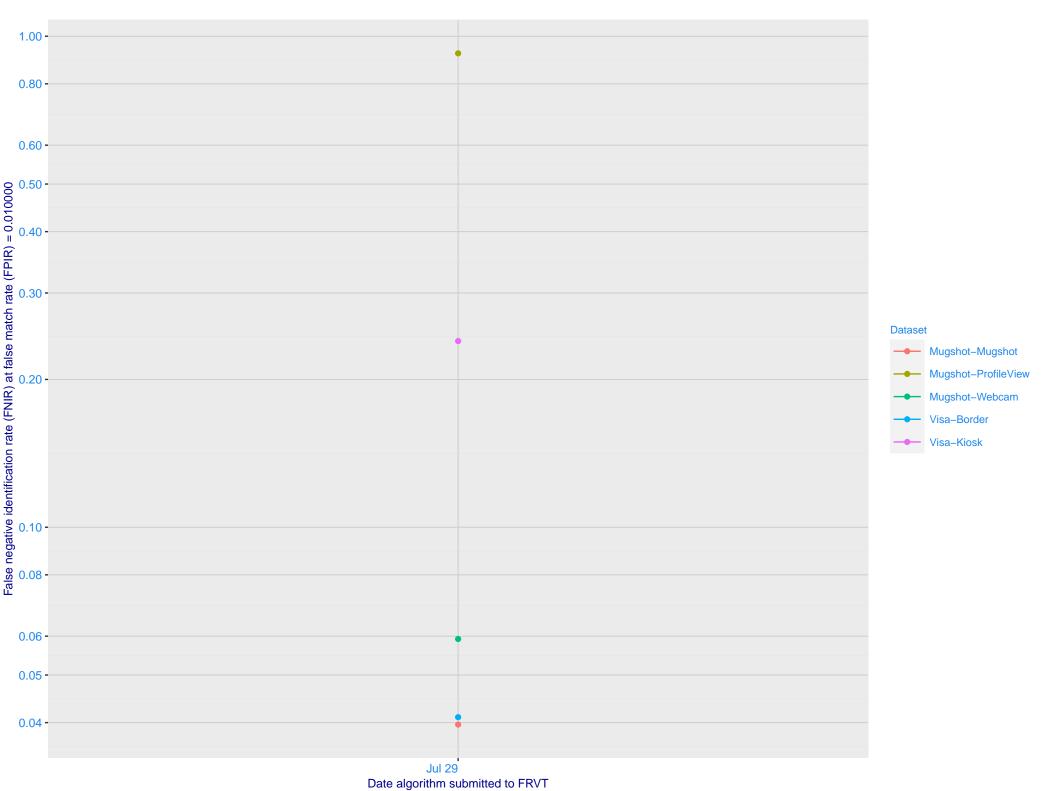
Mugshot profile ranking 69 (out of 195) -- FNIR(1600000, T, L+1) = 0.9846, FPIR=0.001000 vs. lowest 0.1331 from hr\_000

Immigration visa-border ranking 61 (out of 146) -- FNIR(1600000, T, L+1) = 0.0768, FPIR=0.001000 vs. lowest 0.0049 from hr\_000

Immigration visa-kiosk ranking 47 (out of 141) — FNIR(1600000, T, L+1) = 0.3280, FPIR=0.001000 vs. lowest 0.0996 from hr\_000

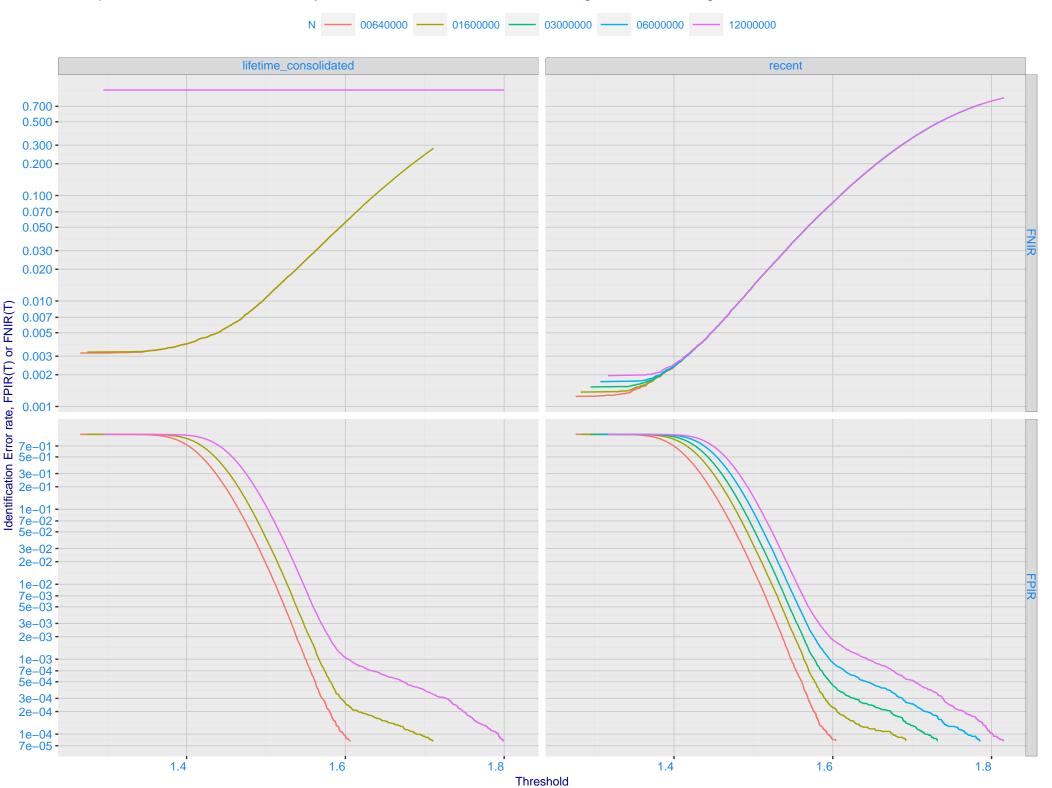


## C: Evolution of accuracy for DEEPSEA algorithms on three datasets 2018 – present

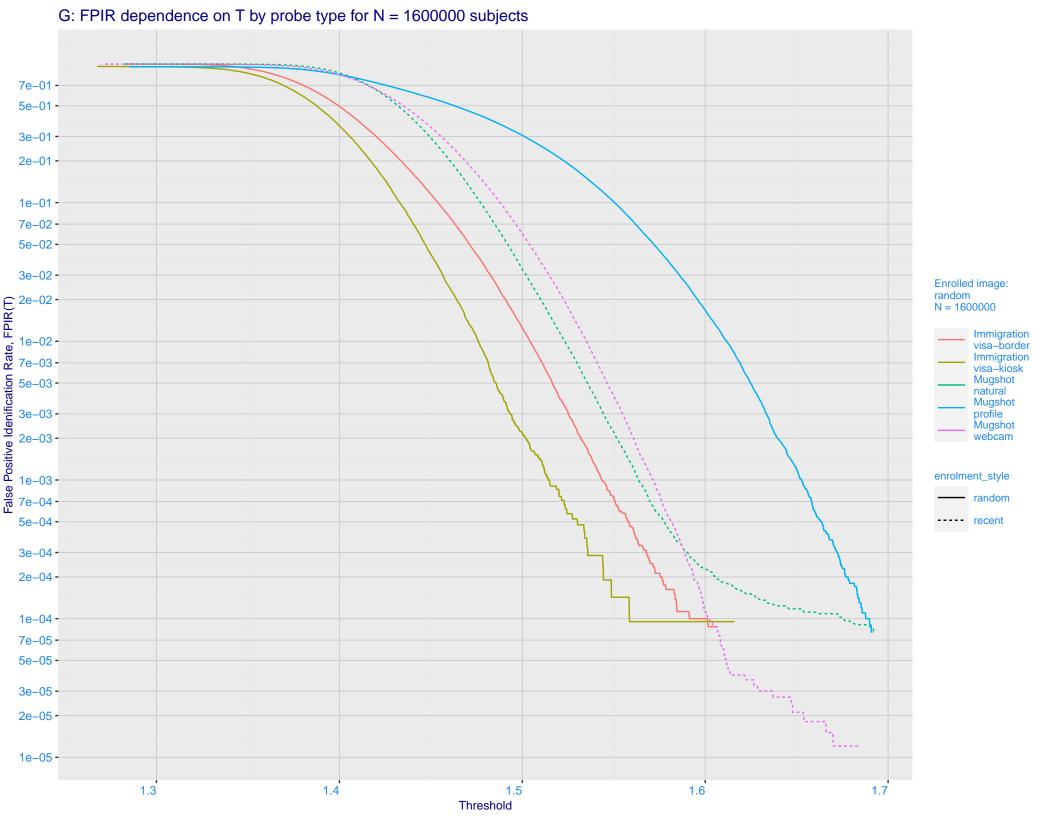


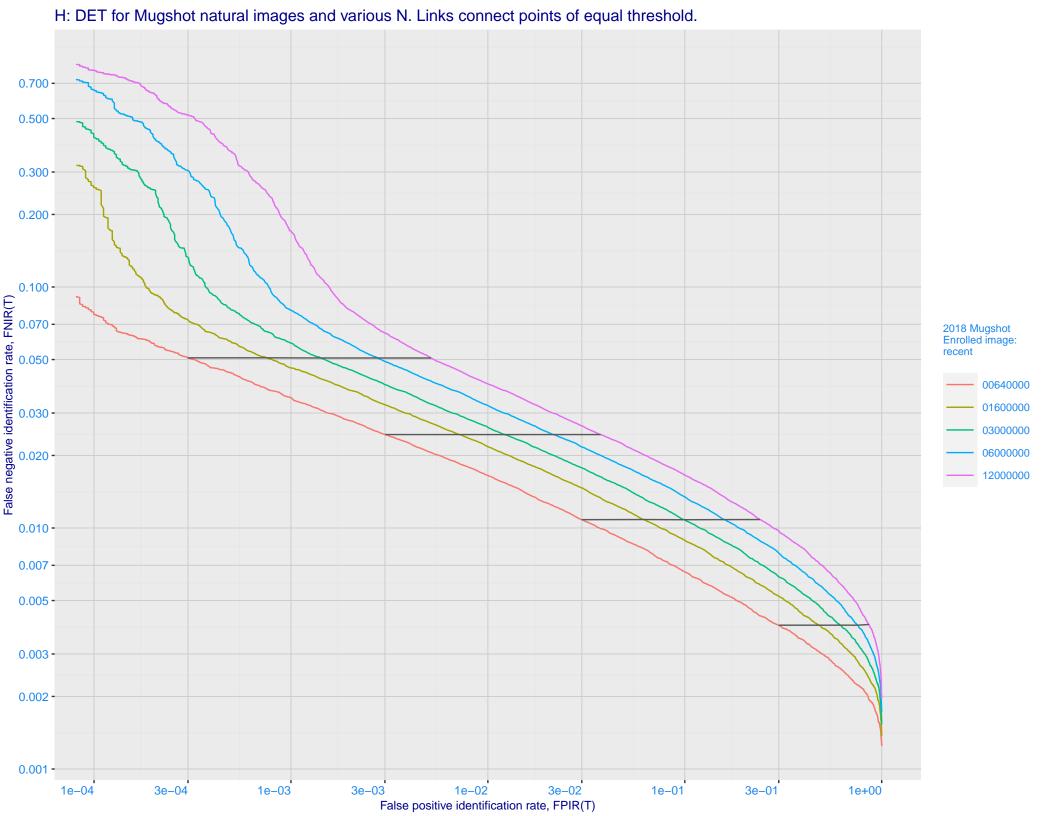
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals **Immigration Immigration** Mugshot visa-border visa-kiosk natural 0.700 -0.500 -0.300 -0.200 -0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 -Ealse negative identification rate, FNIR(T) 0.003 - 0.0001 - 0.700 - 0.500 - 0.200 - 0.100 - 0 enrolment\_style consolidated-ONE-MATE random-ONE-MATE recent-ONE-MATE unconsolidated-ALL-MATES unconsolidated-ANY-MATE 0.070 -0.050 -0.030 -0.020 -0.010 -0.007 -0.005 -0.003 -0.002 -0.001 -

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)

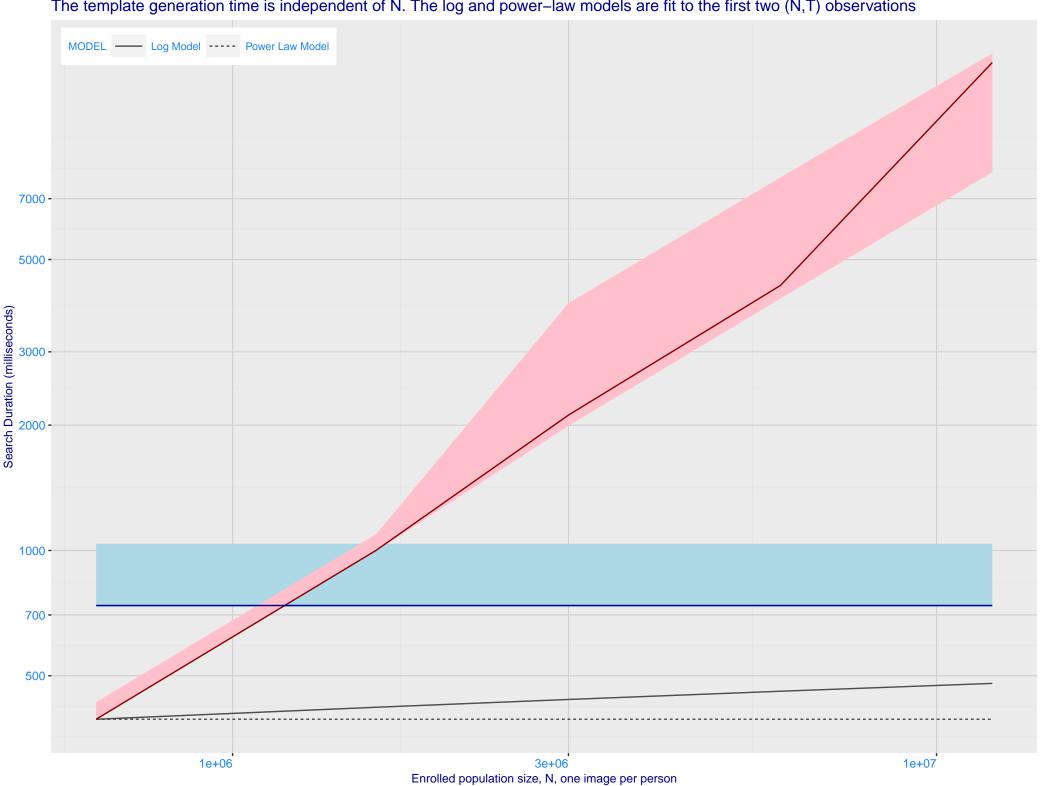




I: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime\_005) Immigration **Immigration** visa-border visa-kiosk 0.700 -0.500 -0.300 -0.200 -0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 -0.005 - 0.003 - 0.002 - 0.001 - 0.001 - 0.000 - 0.300 - 0.200 enrolment\_style consolidated ---- random --- recent Mugshot Mugshot webcam natural FNIR@Rank = 1 deepsea\_001 - sensetime\_005 0.100 -0.070 -0.050 -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

J: Investigational mode: FNIR(1600000, R, 0) by probe type deepsea\_001 sensetime\_005 0.100 -0.070 -0.050 -0.030 enrolment\_style False negative identification rate, FNIR(N) - 0.000 - 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

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



M: Identification FNIR(N, T, L+1) and Investigational FNIR(N, 0, R) under ageing



