## A: Datasheet

Algorithm: remarkai\_000

Developer: Remark Holdings

Submission Date: 2019\_06\_12

Template size: 2048 bytes

Template time (2.5 percentile): 632 msec

Template time (median): 650 msec

Template time (97.5 percentile): 883 msec

Investigation:

Frontal mugshot ranking 53 (out of 259) -- FNIR(1600000, 0, 1) = 0.0034 vs. lowest 0.0009 from sensetime\_005

Mugshot webcam ranking 59 (out of 221) -- FNIR(1600000, 0, 1) = 0.0183 vs. lowest 0.0062 from sensetime\_005

Mugshot profile ranking 65 (out of 190) -- FNIR(1600000, 0, 1) = 0.6602 vs. lowest 0.0591 from sensetime\_005

Immigration visa-border ranking 47 (out of 142) -- FNIR(1600000, 0, 1) = 0.0076 vs. lowest 0.0014 from visionlabs\_009

Immigration visa-kiosk ranking 57 (out of 139) -- FNIR(1600000, 0, 1) = 0.1484 vs. lowest 0.0694 from cib\_000

Identification:

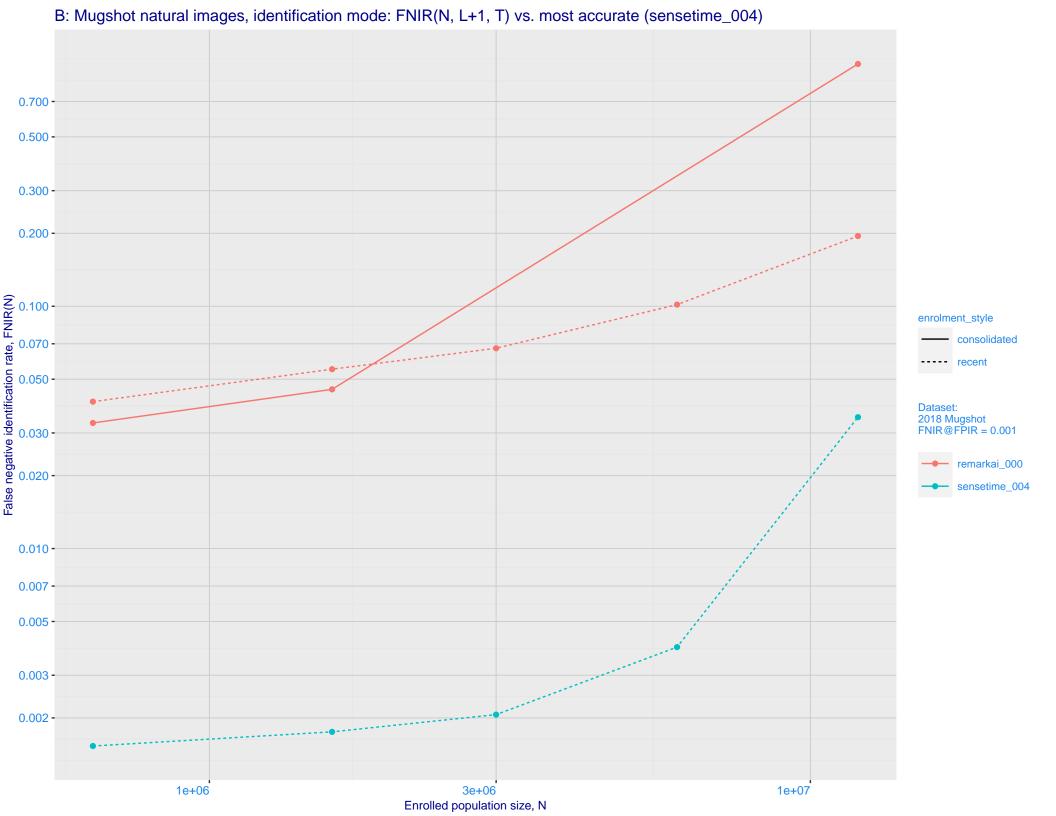
Frontal mugshot ranking 90 (out of 259) -- FNIR(1600000, T, L+1) = 0.0550, FPIR=0.001000 vs. lowest 0.0018 from sensetime\_004

Mugshot webcam ranking 79 (out of 219) -- FNIR(1600000, T, L+1) = 0.1193, FPIR=0.001000 vs. lowest 0.0122 from sensetime\_003

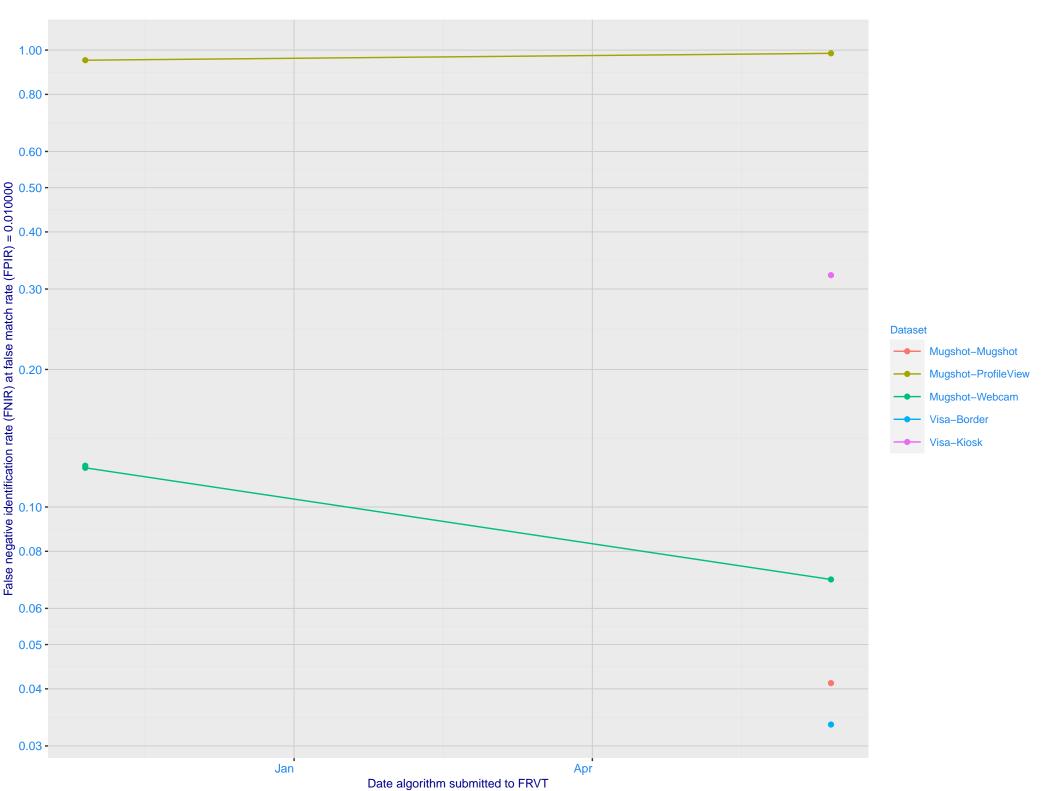
Mugshot profile ranking 130 (out of 189) -- FNIR(1600000, T, L+1) = 0.9991, FPIR=0.001000 vs. lowest 0.1733 from sensetime\_005

Immigration visa-border ranking 52 (out of 139) -- FNIR(1600000, T, L+1) = 0.0690, FPIR=0.001000 vs. lowest 0.0059 from sensetime\_004

Immigration visa-kiosk ranking 73 (out of 134) -- FNIR(1600000, T, L+1) = 0.7303, FPIR=0.001000 vs. lowest 0.1048 from sensetime\_005



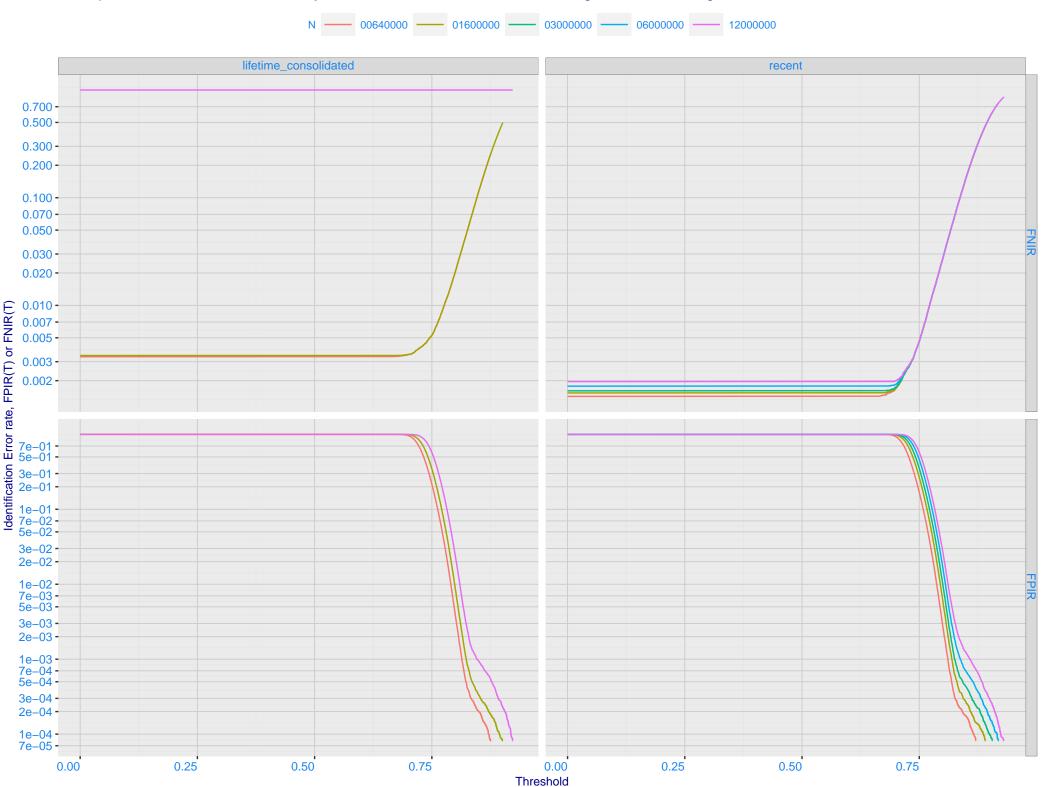
C: Evolution of accuracy for REMARKAI algorithms on three datasets 2018 – present



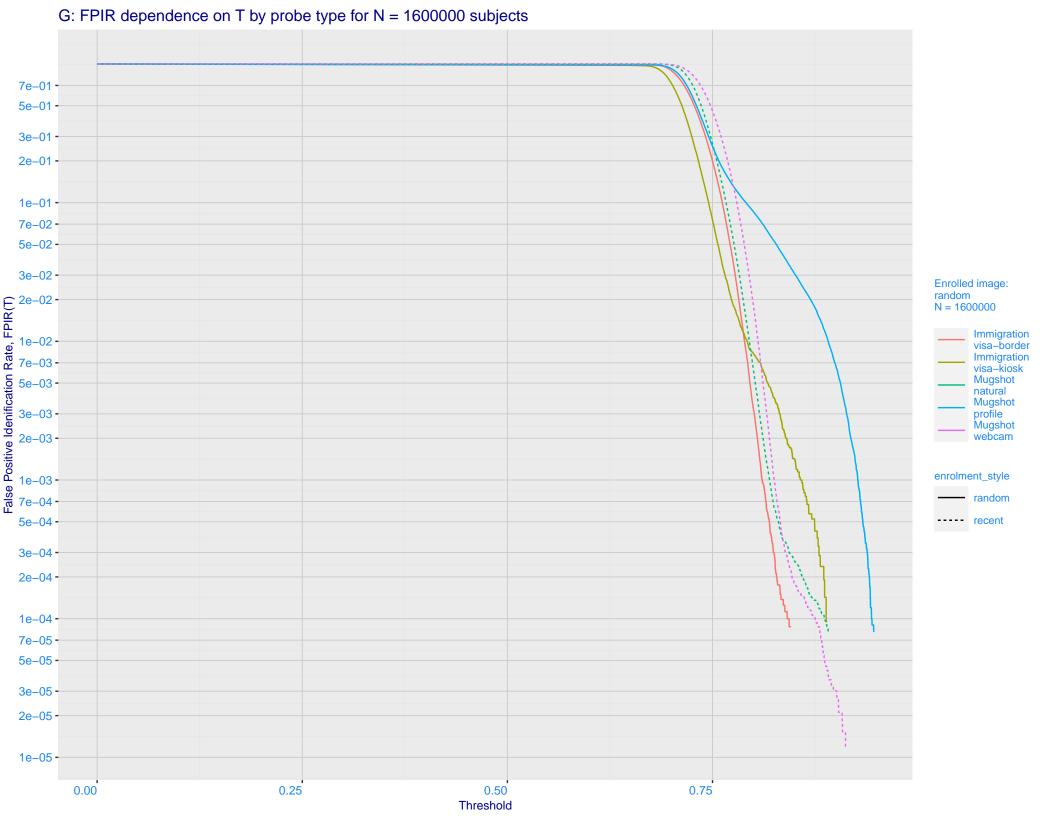
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals **Immigration Immigration** Mugshot visa-border visa-kiosk natural 0.700 -0.500 -0.300 -0.200 -0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 - 0.005 - 0.005 - 0.002 - 0.001 - 0.001 - 0.700 - 0.500 - 0.200 enrolment\_style 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 -

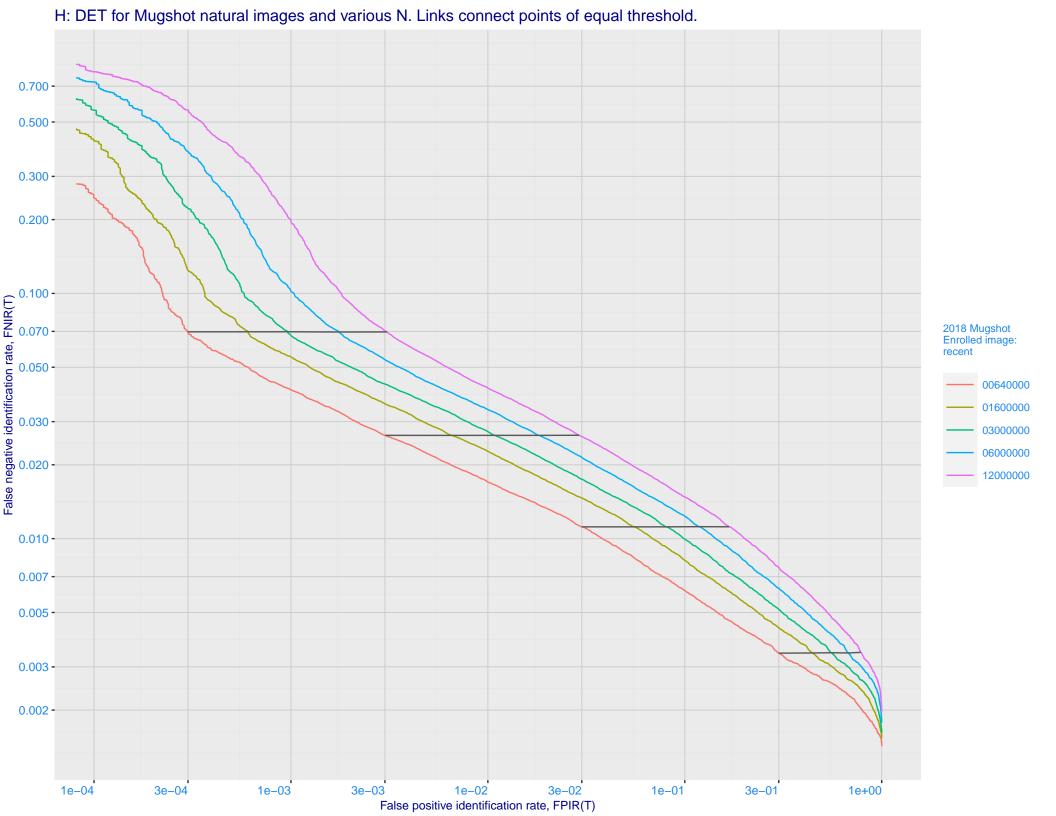
False positive identification rate, FPIR(T)

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)

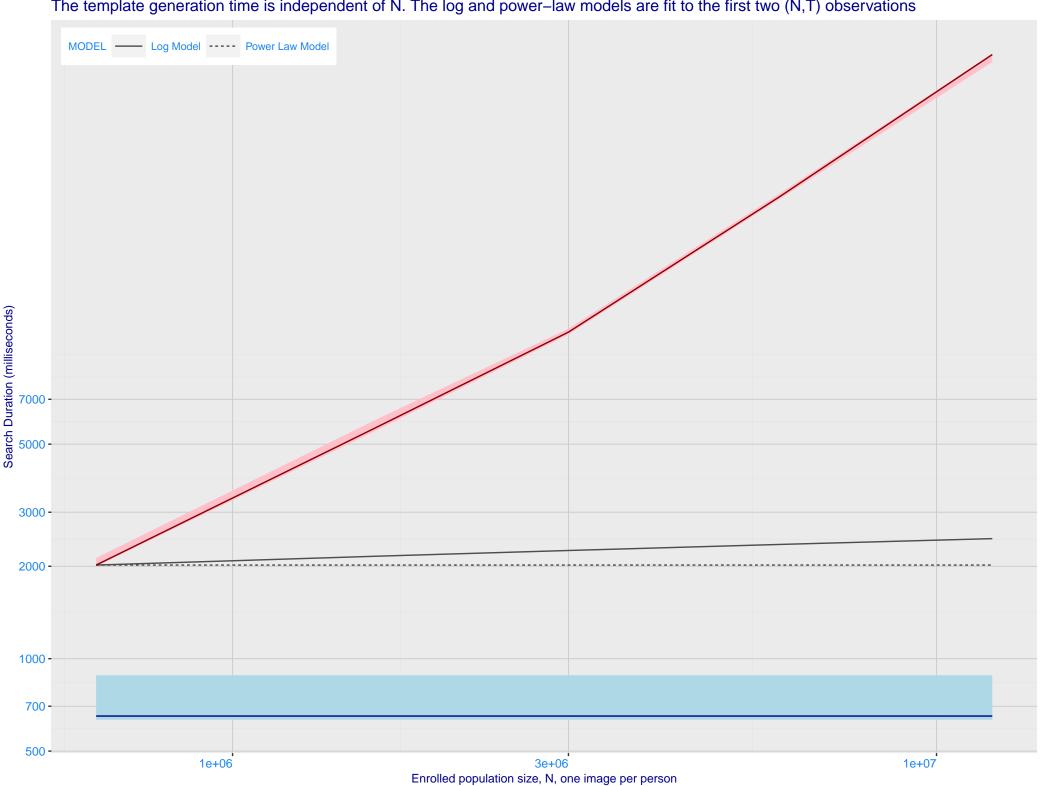




I: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime\_005) Immigration **Immigration** visa-border visa-kiosk 0.700 -0.500 -0.300 -0.200 -0.100 -0.070 -0.050 -0.030 -0.020 -0.010 -0.007 -0.005 - 0.003 - 0.002 - 0.001 - 0.001 - 0.000 - 0.300 - 0.200 enrolment\_style consolidated ---- random --- recent Mugshot Mugshot webcam natural FNIR@Rank = 1 remarkai\_000 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 remarkai\_000 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



