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Face Recognition: Limiting Factors in Border Control

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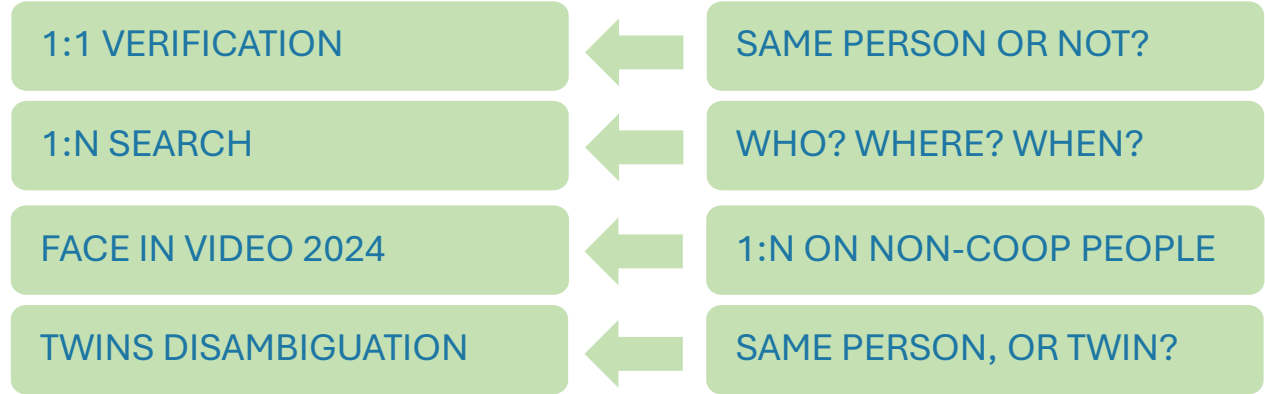
Chair ISO/IEC JTC 1 SC 37

NIST'S OPEN BENCHMARKS

FRTE

FACE RECOGNITION TECHNOLOGY EVALUATION

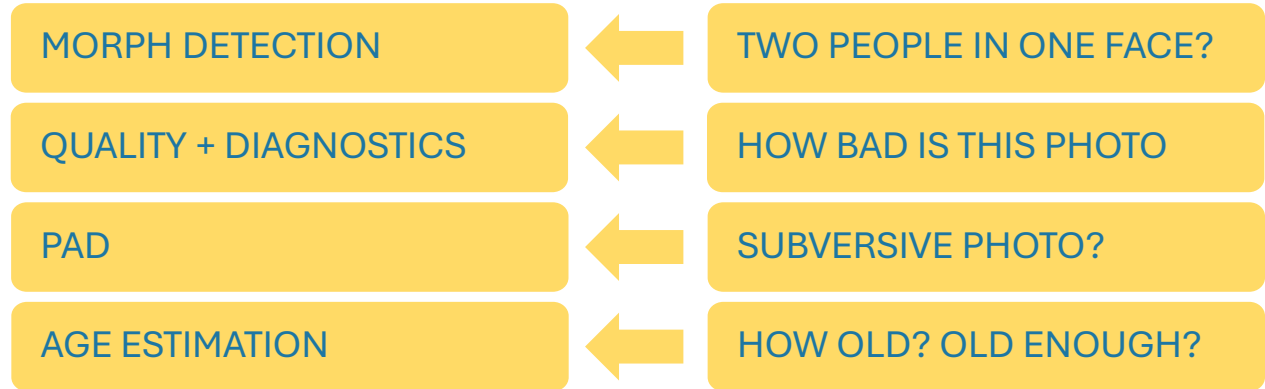
RECOGNITION: **WHO** IS IN AN IMAGE



FATE

FACE ANALYSIS TECHNOLOGY EVALUATION

ANALYSIS: **ABOUT** IN AN IMAGE



Benchmarks are:

- Open globally
- Independent
- Free
- Regular
- Fast

- Black box
- IP-protecting
- Public
- Transparent
- Extensible

- Sequestered datasets
- Fair
- Repeatable
- Large-scale
- Statistically robust

They inform:

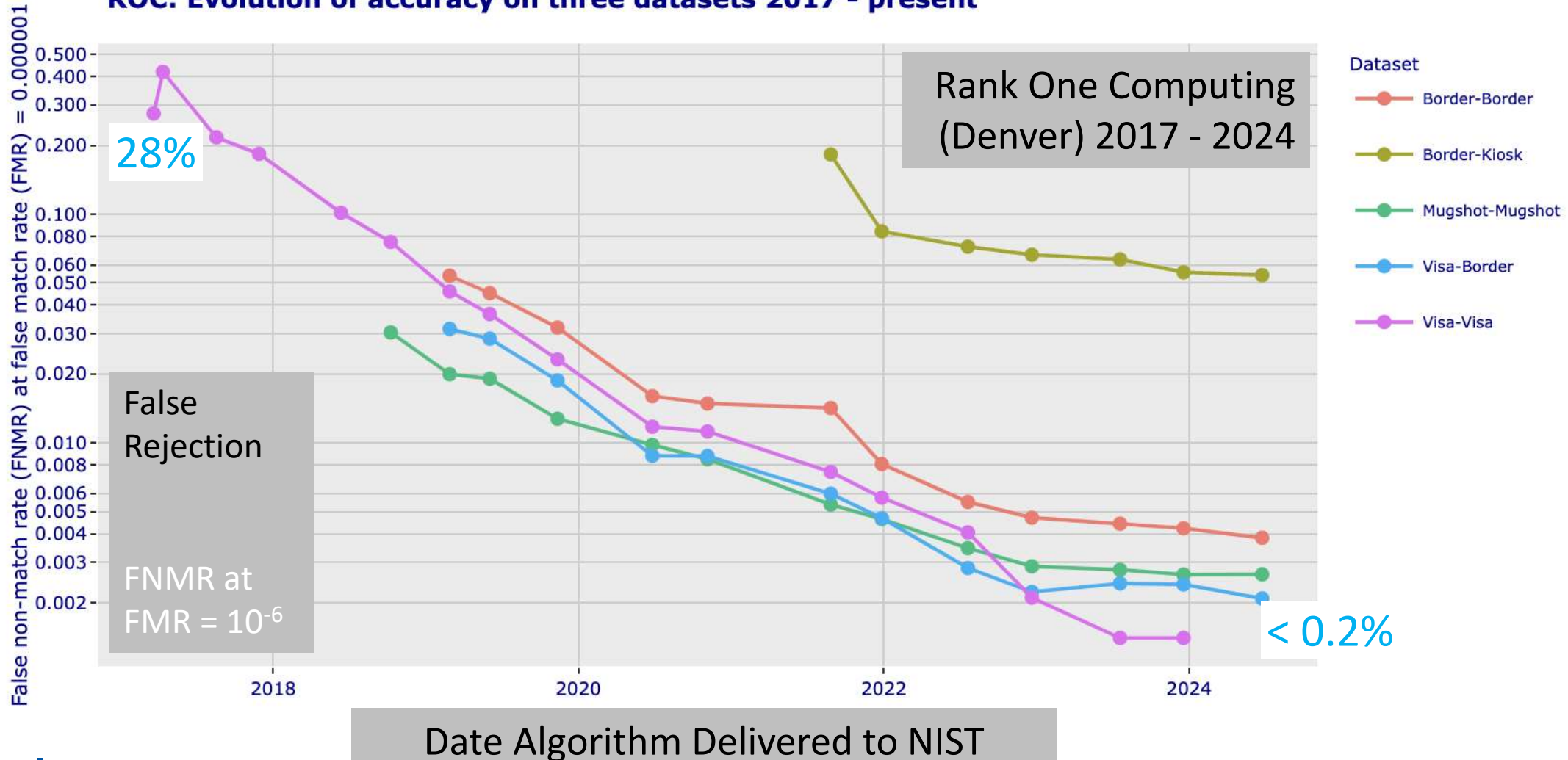
- Absolute capability
- Relative capability

Risk: Use of legacy algorithm

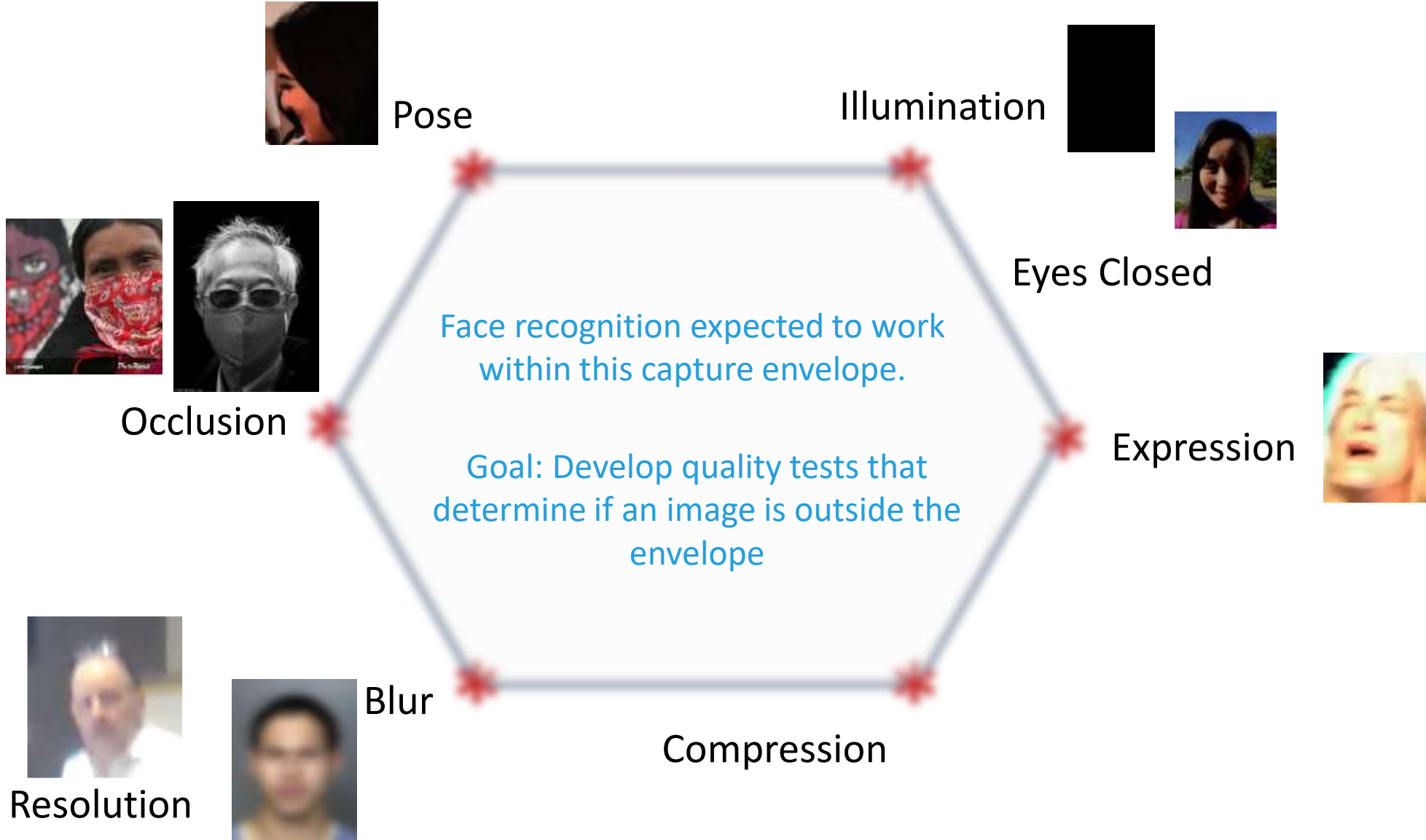
Management + Mitigation

- Algorithms improve regularly
- Do tech refresh!
- Contracts, agile procurement

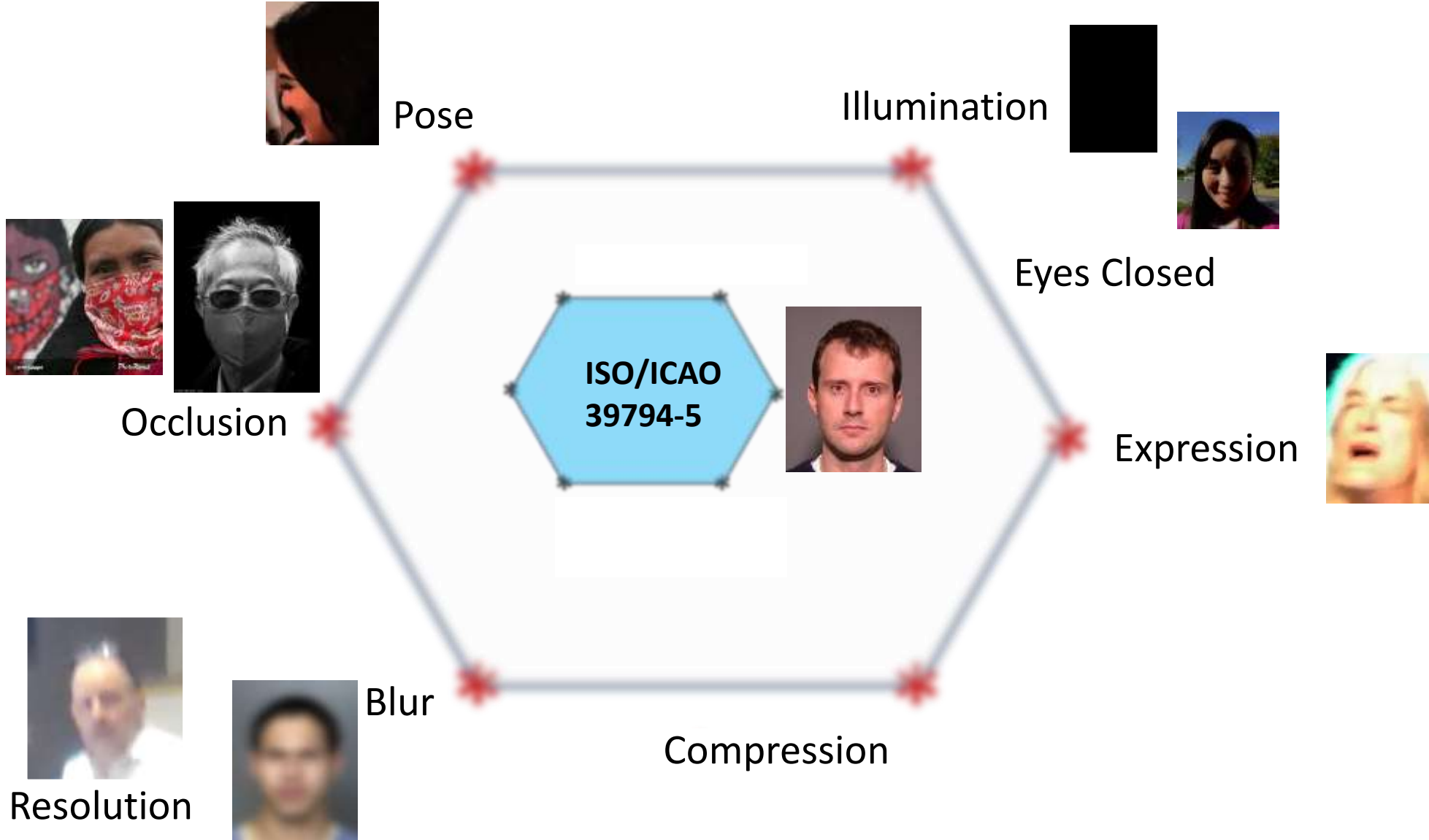
ROC: Evolution of accuracy on three datasets 2017 - present



Face recognition works within the “capture envelope”



FR capability exceeds standardized photo specs



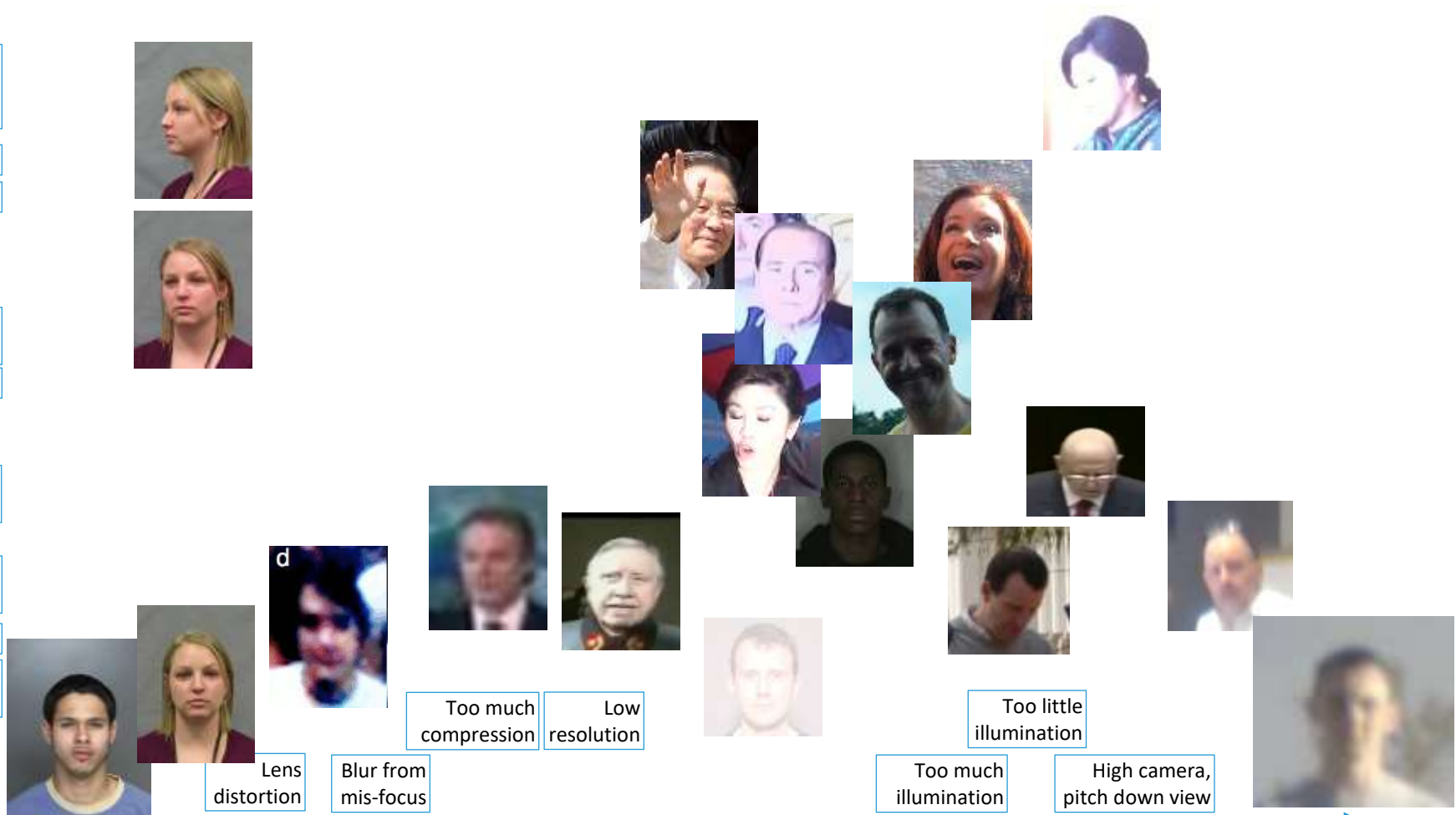
Subject- vs. Imaging-specific problems

Nominal severity of problem

Quality factors determined by subject behavior

These can typically be remedied via detection, feedback and recapture.

- Non-frontal pose, pitch and yaw
- Occlusion
- Sun glasses
- Crop, out-of-view
- Motion blur
- Thick-rimmed eye glasses
- Facial expression
- Eyes closed
- Perspective distortion

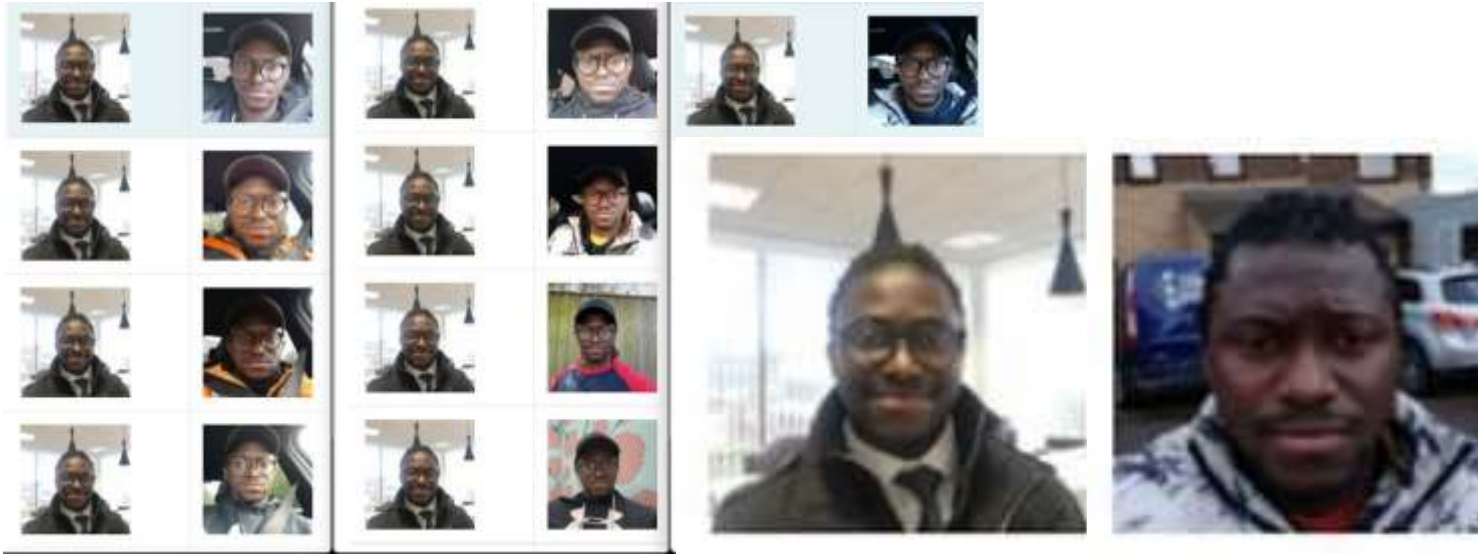


Quality factors determined by optics and environment

These are typically systematic and persistent. They can be remedied if a persistent drop in quality attribute is detected and the system is modified.

Nominal severity of problem

Demographics: A False Negative Anecdote



Source: <https://www.adcu.org.uk/news-posts/uber-facial-recognition-discrimination>

Respondent(s) of Microsoft facial recognition software. This requires drivers to take a real time photograph of themselves (a 'selfie') for verification when using the app. The photograph is then checked against the driver's account profile picture.

Pleadings of Pa Edrissa Manjang linked from <https://www.adcu.org.uk/news-posts/uber-facial-recognition-discrimination>

"The system includes robust human review to make sure that we're not making decisions about someone's livelihood in a vacuum, without oversight," the [Uber] spokesperson said.

<https://www.uktech.news/ai/uber-eats-racist-ai-dismissal-20220728>

Couriers say Uber's 'racist' facial identification tech got them fired

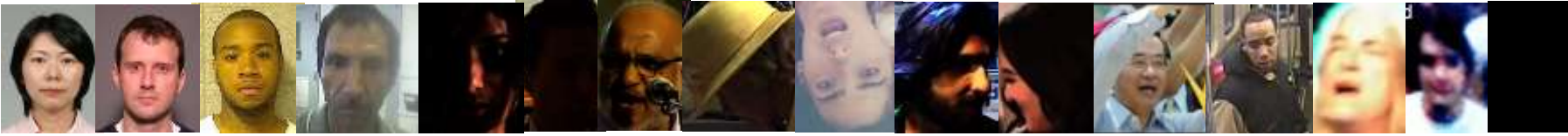
BAME couriers working for Uber Eats and Uber claim that the company's flawed identification technology is costing them their livelihoods



GETTY IMAGES / WIRED

Uber Eats couriers say they have been fired because the company's "racist" facial identification software is incapable of recognising their faces. The system, which Uber describes as a "photo comparison" tool, prompts couriers and drivers to take a photograph of themselves and compares it to a photograph in the company's database.

<https://www.wired.co.uk/article/uber-eats-couriers-facial-recognition>



So why maintain quality gold “aspirational” standards?

Human Review



Source: Frøy Løvås, Team Identity, biometrics and biometric data EUIS-programme, National Police Directorate, Norway
froy.lovassdal@politiet.no

Mitigate Twins’ False Positives



SOURCE: TWINS DAY OHIO COLLECTED BY NOTRE DAME

Morph Attack Detection



Presentation Attack Detection



1:N SEARCH BIAS FALSE POSITIVES IN OPERATIONS

Rite Aid's A.I. Facial Recognition Wrongly Tagged People of Color as Shoplifters

Under the terms of a settlement with the Federal Trade Commission, the pharmacy chain will be barred from using the technology as a surveillance tool for five years.

<https://www.nytimes.com/2023/12/21/business/rite-aid-ai-facial-recognition.html> Eduardo Medina, 2023-12-21



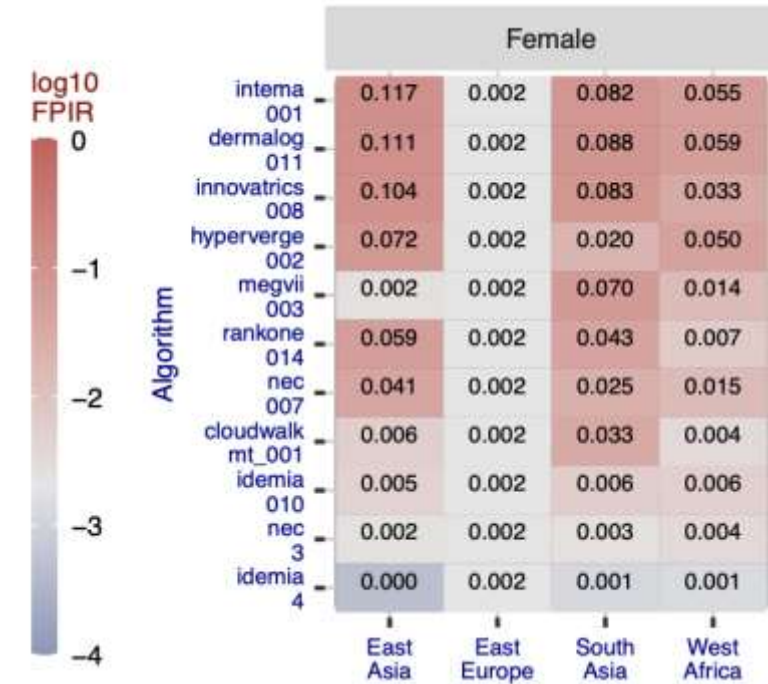
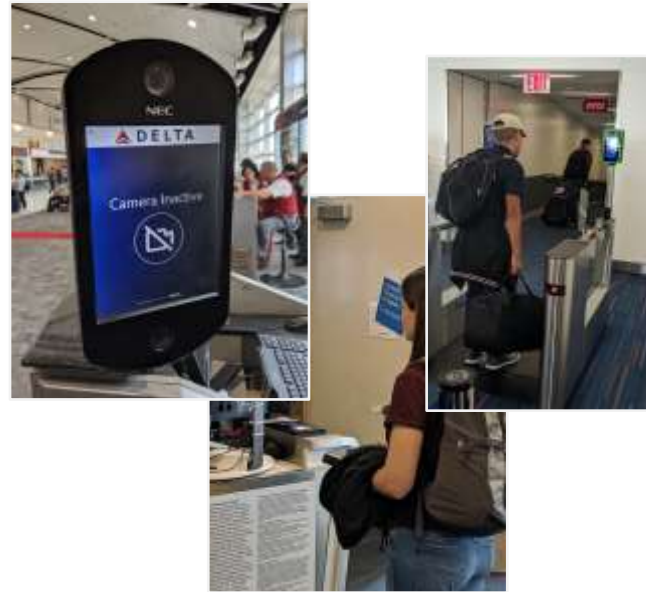
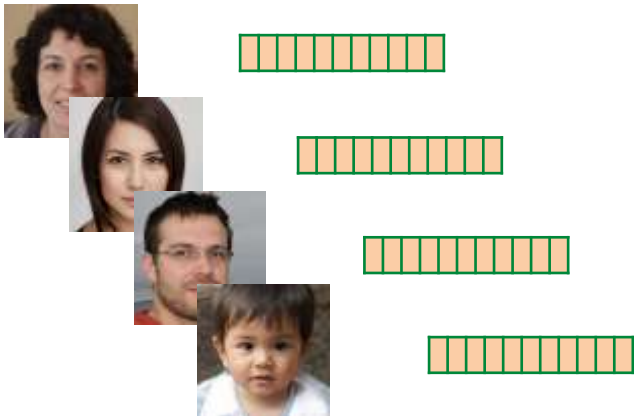
FTC REPORTS THAT “THE SYSTEM GENERATED THOUSANDS OF FALSE-POSITIVE MATCHES”

<https://www.ftc.gov/news-events/news/press-releases/2023/12/rite-aid-banned-using-ai-facial-recognition-after-ftc-says-retailer-deployed-technology-without>

<https://www.engadget.com/ftc-bans-rite-aid-from-using-facial-surveillance-systems-for-five-years-053134856.html>

Digital Travel Credentials

An opportunity and potential hazard for seamless travel based on 1:N face recognition



Cloud-based FR populated with FR templates from advance-manifest DTC photos submitted to airline

Seamless "paperless" travel across touchpoints, including inbound immigration. $N < 100K$?

Some algorithms produce many more false positives with people from some countries of origin, and in women.

- FR IS IMPROVING
- QUALITY:
 - PHOTOGRAPHY MATTERS
 - QUALITY REMAINS IMPORTANT
 - QA ALGORITHMS EXIST
 - OFIQ 1.0 EXISTS
- 1:N TRAVEL ENABLED BY DTC
- UNSOLVED:
 - MANY DEVELOPERS HAVE NOT SOLVED FALSE POSITIVES ACROSS DEMOGRAPHICS
 - TWINS



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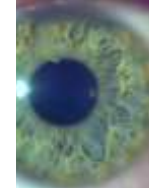
Kayee Hanaoka (+ Mei Ngan)



Austin Hom



(not) Mei Ngan



George Quinn



Joyce Yang

