Real-world experiences from a vendor perspective

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Chief Technology Officer

WORKSHOP ON FINGERPRINT IMAGE QUALITY (NFIQ 2.1)

15-16 June 2021

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VERIDIUM ALIGNS WITH GLOBAL EES REQUIREMENTS

- The global leader in touchless biometric fingerprint capture on mobile devices
- Flexible mobile deployment options for officers and border agents
- No training needed to use
- Rapid capture & matching performance
- Works with almost all iOS and Android devices*

VERIDIUM4F

* w/5MP (or better) camera & rear flash/torch

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BILL & MELINDA GATES foundation

Dr. Anil Jain (MSU) 2018 study

CITeR

Full Affiliate since 2017

2 liveness (PAD) studies currently underway in 2021

NIST

National Institute of Standards and Technology

CRADA since 2015

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TECHNOLOGY EVALUATION IN JAIPUR, INDIA

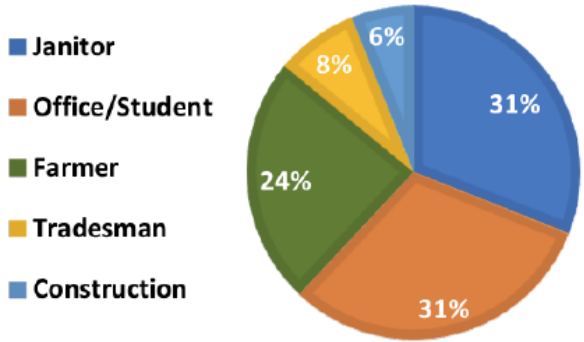
Prof. Anil Jain's team from MSU evaluated our technology for fingerprint capture on subjects with **poor** finger conditions (2018)

The team collected subjects who **primarily** work as construction workers, farmers, and domestic helpers

Our technology **surpasses** the target performance

"touchless technology proved that it is promising to authenticate individuals against a national ID database for **banking**, **welfare distribution**, and **healthcare applications** in developing countries"

https://www.youtube.com/watch?v=cVBdVOjNVwY



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Citizen

On Demand Citizen ID Verification: via an open platform that links to any external data source

Collaboration: Mobile-First Engagement with Citizens enhancing digital services

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4 FINGERS TOUCHLESS ID

Requirements

- iOS 9.x or above for iPhone
- Android 5.1 or above
- 5MP Camera / LED flash
- ~40MB SDK footprint

Performance

- FRR < 2.0%
- FAR 0.01%

Export in multiple formats

- ANSI/NIST-ITL 1-2007
- ANSI/NIST-ITL – INTERPOL
- ISO/IEC19794-4, 2005
- ISO 19794-2 (Minutiae)
- iBeta DEA-EPCS Biometric Test Protocol, using the ISO/IEC 19795-1:2006 standard
- RAW print images in greyscale (8-bit), output in JSON format
- WSQ print images in greyscale (8-bit), output in JSON format (customizable compression rate)
- PNG print images in greyscale (8-bit), output in JSON format
- NFIQ quality score available
- Other formats considered on request
- Downscale images to 500 PPI for external database compatibility

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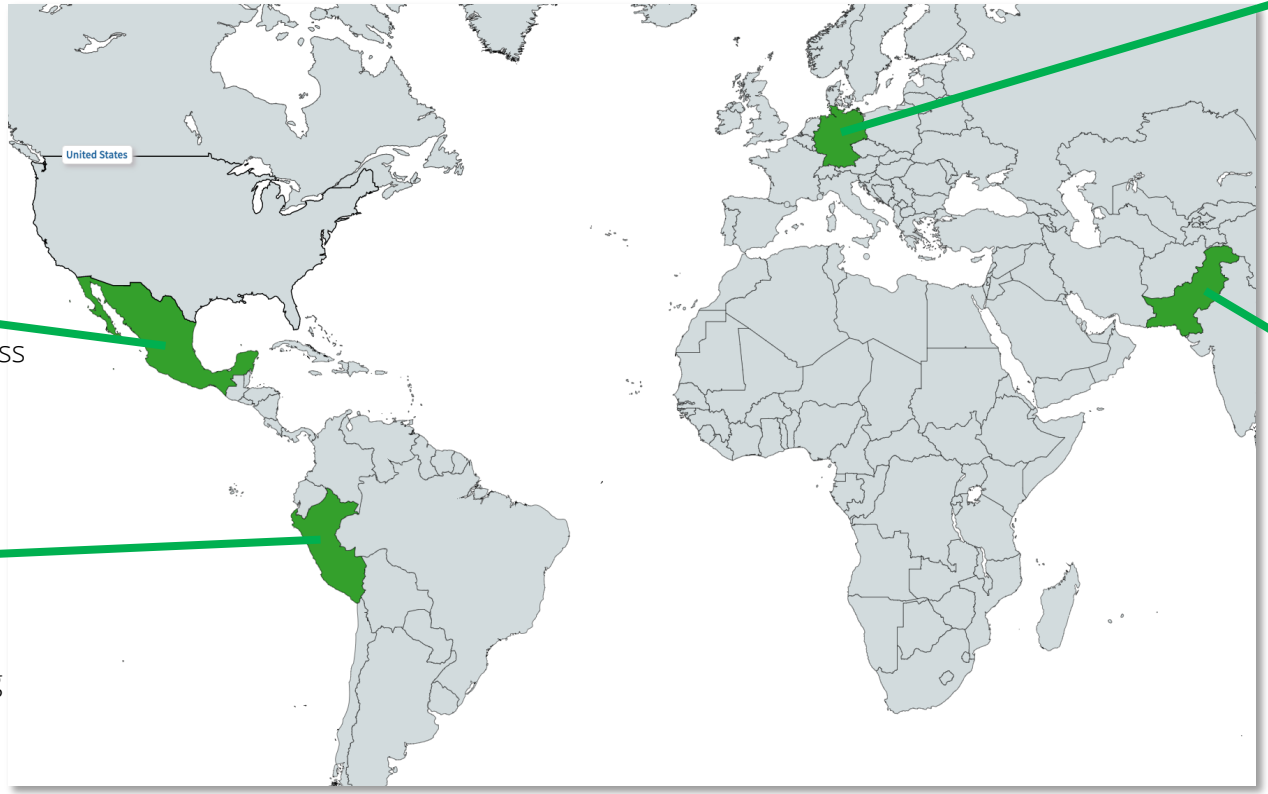
VERIDIUM4F



Germany

Police force uses 4Fingers in mobile apps with matching against national system

Mexico

INE pilots contactless fingerprint for KYC/AML app for matching against national system

Peru

Police force uses 4Fingers in mobile apps with matching against national system

Pakistan

Local integrator uses 4Fingers in mobile apps for KYC/AML compliance with matching against national system

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MEXICO

- Instituto Nacional Electoral (INE) conducted internal pilot study to determine efficacy of mobile fingerprint matching
- Required use of existing backend matcher service
- 117 subjects; 75% participated in full study with 100% matching rate
- Used *multiple finger matching* not just single digit
- RFP recently issued based on successful pilot

INE
Instituto Nacional Electoral

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PERU

- Peruvian National Police (PNP) needed to verify the identity of citizens at the 2019 Pan American Games which brought over 420K spectators to Lima
- Major telco operators require identity verification for SIM card registration
- All required a mobile app that integrated with existing mobile app and RENIAC national database using existing backend matcher
- Required *multiple finger matching* and no additional hardware
- Enabled identity verification checks to be conducted quickly and efficiently
- Improved officers' ability to confirm identity while providing superior experience for the public
- Telco customers successful at rapid and simple identity verification*

* https://andina.pe/Ingles/noticia-peru-exceeds-40-million-mobile-lines-highest-figure-since-nov-2019-845785.aspx

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GERMANY

- Mobile fingerprint matching for use by officers on patrol against national AFIS database
- Uses issued device to patrol officers (*not* BYOD)
- Pilot study required subjects to come to police station for capture of fingerprints using mobile device
- Currently used in streets by patrol force of 10K officers
- Security checks to be conducted quickly and efficiently
- Uses *multiple fingers* to match against existing national AFIS database

POLIZEI
Hamburg

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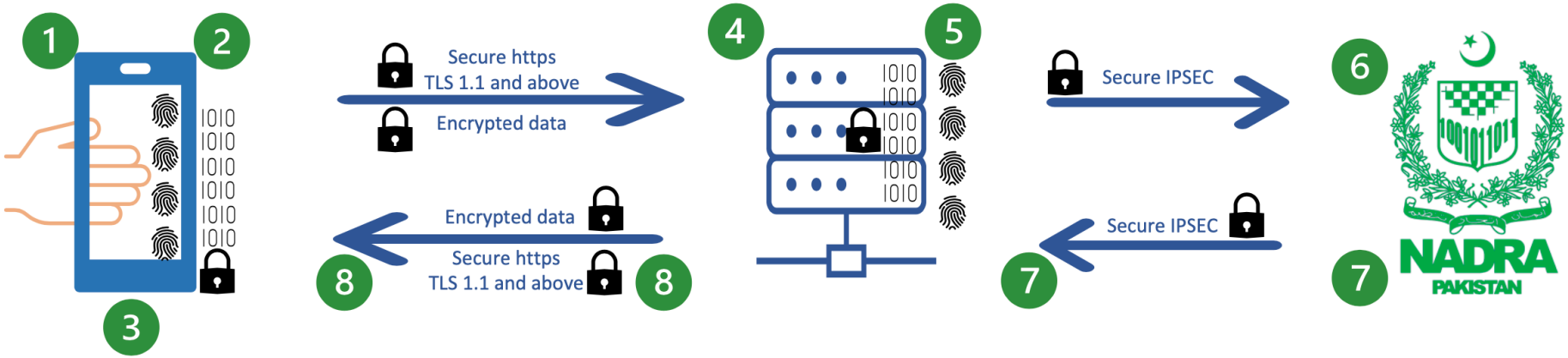
PAKISTAN

- Production applications with 4 banks to satisfy immediate need for national KYC/AML
- Successfully used by new and current customers to quickly confirm their identity credentials remotely during COVID-19 pandemic
- Currently on administrative hold due to questions regarding concerns over NFIQ2 and contactless for enrollment



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VERIDIUM CALIBRATOR PROGRAM

vCalibrator logout admin Tests Devices jcallahan@veridiumid.com

Tests New Test

Search

- All phones
- Google Pixel phones
- Huawei
- LGE
- Motorola
- Oppo
- Samsung
- Sony
- TP-Link
- ZTE

Google Pixel phones Edit Delete Download as XLS

Datetime	Device Id	Manufacturer	Device	OpSystem	OpVersion	sdk	4F sdk	appversion	Details
2021-03-24T10:31:32.769Z	490ea412a4eb36c3	google	pixel 4a	android	11				result success 11000024065
2021-03-24T10:31:32.439Z	490ea412a4eb36c3	google	pixel 4a	android	11				nfiq 2
2021-03-19T20:47:30.286Z	1049e0b96bf9abb5	google	pixel 3a xl	android	11	4.3.0	5.0.12	2.1.4	result success 12848884457
2021-03-19T20:47:30.152Z	1049e0b96bf9abb5	google	pixel 3a xl	android	11	4.3.0	5.0.12	2.1.4	nfiq 2
2021-03-19T15:36:52.976Z	55aa3d1b35154900	google	pixel 3	android	10	4.3.0	5.0.12	2.1.4	result fail 490917958749

Previous Page Next Page Page *1 of 3*

5 (of 8) devices have NOT reported

Last ping	Device Id	Manufacturer	Device	OpSystem	OpVersion	sdk	4F sdk	appversion
2021-05-18T18:13:46.224Z	12798042cac871b4	google	pixel 2 xl	android	11	4F5.0.12	unknown	unknown
2021-03-25T17:11:27.680Z	490ea412a4eb36c3	google	pixel 4a	android	11	unknown	unknown	unknown
2021-03-22T11:37:43.277Z	0c06295e0aa8478d	google	pixel 4a	android	11	4.3.0	5.0.12	2.1.4
2021-06-14T13:42:31.255Z	490ea412a4eb36c3	google	pixel 4a	android	11	unknown	unknown	unknown
2021-05-14T15:21:08.448Z	0c06295e0aa8478d	google	pixel 4a	android	11	4.3.0	5.0.12	2.1.4

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SUMMARY

- Use of all 4 fingers for matching
- Use of contactless for enrollment avoided due to lack of image quality standard
- Size of library (AAR on Android; Framework on iOS) is *critical*
- NFIQ2 not applicable (500-334) but continues to be used post-capture on features
- Real-time quality assessment *during capture* using neural networks
  - Greatly improves user experience
  - Takes advantage of phone capabilities (and eccentricities)
  - Reduces footprint on mobile device

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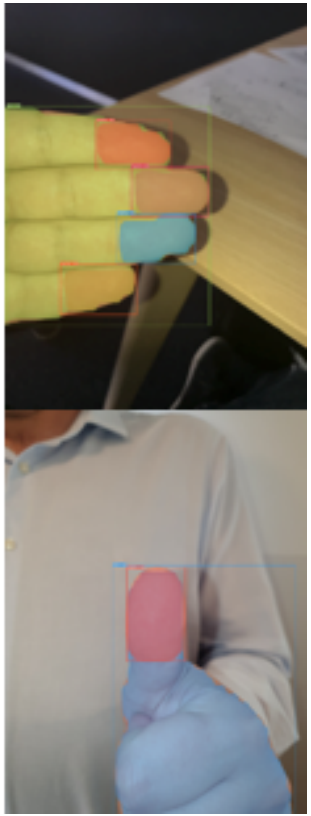
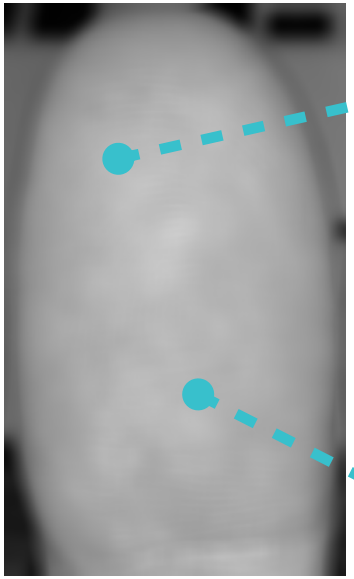
NEURAL NET BASED DETECTION / SEGMENTATION AND PROOF OF CONCEPT PRINT QUALITY ASSESSMENT

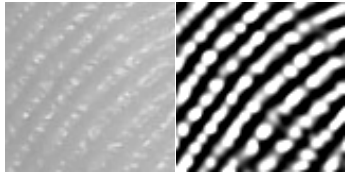
Segmentation

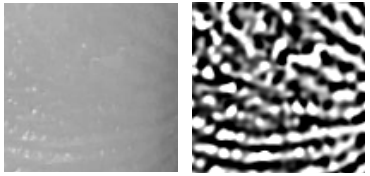


INPUT:
greyscale print photo



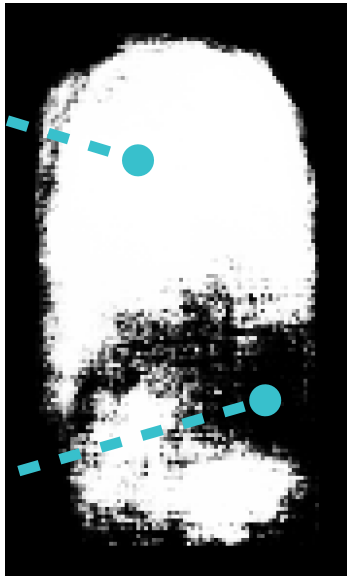
(Blurred for data protection)





Convolutional Neural network

OUTPUT:
Quality Map



- Binary ground truth
- < 1MB in size

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