Friction Ridge Technology Evaluations at NIST

Greg Fiumara
greg@nist.gov

02 April 2025
International Face and Fingerprint Performance Conference (IFPC) 2025

NIST INFORMATION TECHNOLOGY LABORATORY

Objective

Assess the state-of-the-art in automated friction ridge technology

- Standards conformance
- Measure accuracy, performance, tradeoffs, …

CREDENTIAL

Evaluations of 1:1 fingerprint verification using standardized, interchangeable data.

LAW ENFORCEMENT

Evaluations of fingerprint verification, identification, and supporting algorithms.

FORENSICS

Evaluation of searching crime scene marks against law enforcement-style databases.

Twenty Years of Evaluations

NIST

1:1

1:N

MINEX

- MINEX 04
- MINEX II–MOC
- Ongoing MINEX

PFT

- PFT
- PFT II

SlapSeg

- SlapSeg 04
- SlapSeg II

FpVTE

- FpVTE 2003
- FpVTE 2012

ELFT

- ELFT 07
- ELFT-EFS Public Challenge
- ELFT-EFS #1
- ELFT-EFS #2

MINEX III | **PFT III** | **SlapSeg III** | **FpVTE** | **ELFT**

Active & Ongoing

Evaluation of Latent Friction Ridge Technology (ELFT)

NIST INFORMATION TECHNOLOGY LABORATORY

FNIR Trends @ FPIR = 0.01

Participant	Trend	Latest	First	Δ
Antheus	NA	0.9511	NA	NA
Beijing Hisign Technology	↑	0.5271	0.1786	-0.3485
Dermalog	NA	0.6075	NA	NA
Griaule	↓	0.5853	0.6710	0.0857
IDEMIA	↓	0.0624	0.1747	0.1123
Innovatrics	↓	0.0797	0.2582	0.1785
NEC	↓	0.1687	0.6241	0.4554
Neurotechnology	↓	0.0941	0.4079	0.3138
Peking University	NA	0.2930	NA	NA
ROC	↓	0.2050	0.271	0.066
Tech5	NA	0.5512	NA	NA
Thales (Cogent)	↓	0.1818	0.5113	0.3295

Department of Defense Provided Dataset #1

Rank-1 Hit Rate (%) Trends

Participant	Trend	Latest	First	Δ
Antheus	NA	14.47	NA	NA
Beijing Hisign Technology	↑	95.08	92.6	2.48
Dermalog	NA	67.26	NA	NA
Griaule	↑	79.35	66	13.35
IDEMIA	↑	96.16	89.58	6.58
Innovatrics	↑	95.49	90.91	4.58
NEC	↑	90.42	58.91	31.51
Neurotechnology	↑	94.88	80.47	14.41
Peking University	NA	91.56	NA	NA
ROC	↑	91.2	85.24	5.96
Tech5	NA	61.38	NA	NA
Thales (Cogent)	↑	88.04	74.31	13.73

Department of Defense Provided Dataset #1

Mean Search Duration Trends

Participant	Trend	Latest	-1	-2
Antheus	NA	2.1	NA	NA
Beijing Hisign Technology	↓	0.2	0.7	0.7
Dermalog	↓	1.3	5.6	6.5
Griaule	↑	4	1.5	2
IDEMIA	↑	0.8	0.7	0.5
Innovatrics	🤷	2.8	2.2	3.2
NEC	🤷	2.2	1.9	3
Neurotechnology	🤷	1.8	3.3	1.8
Peking University	↓	2.4	2.9	NA
ROC	≈	0.01	0.02	0.005
Tech5	NA	3.5	NA	NA
Thales (Cogent)	🤷	0.3	0.9	0.5

mated & single-threaded search times, in hours

ELFT Upcoming Datasets

- N2N Challenge *Sequestered*
  - EFS Profile 2
  - Quality Map
  - Palms (EOY)
- Department of Defense (TBD)

- Answer questions:
  - Plain vs roll
  - Exemplar resolution (500 vs 1000 PPI)
  - Palm (location)

Twenty Years of Evaluations

NIST

1:1

1:N

MINEX

- MINEX 04
- MINEX II–MOC
- Ongoing MINEX

PFT

- PFT
- PFT II

SlapSeg

- SlapSeg 04
- SlapSeg II

FpVTE

- FpVTE 2003
- FpVTE 2012

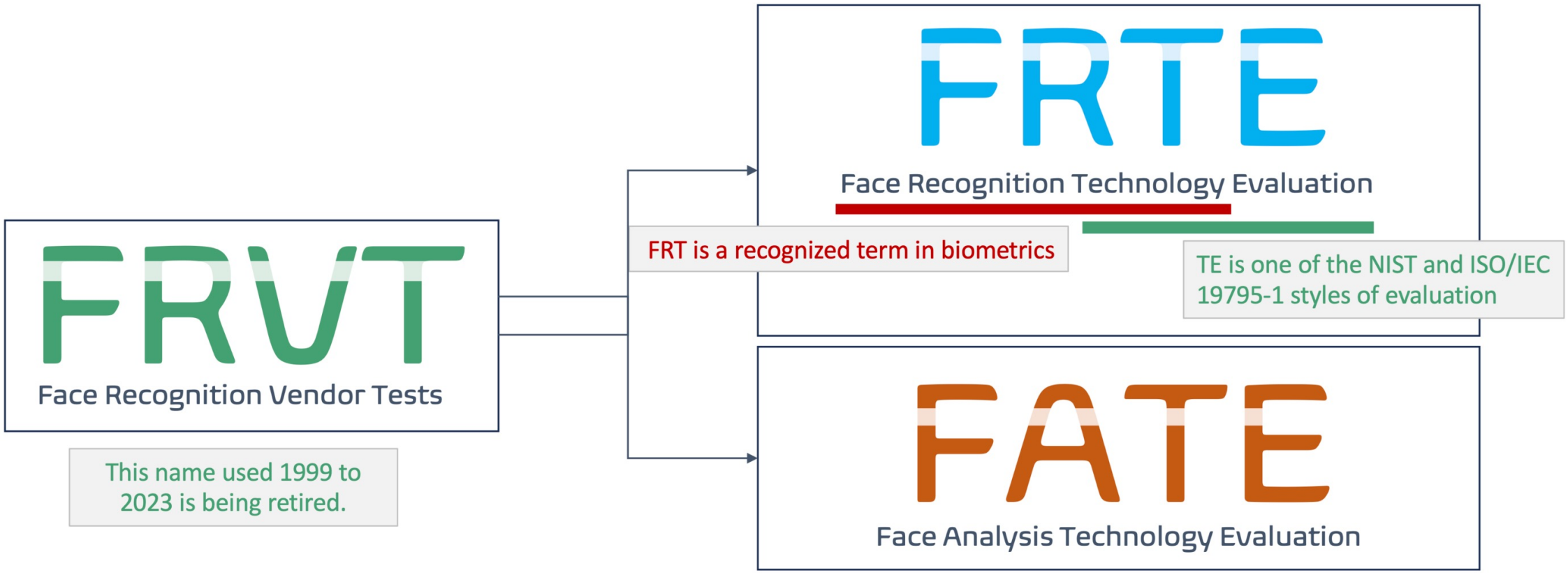
ELFT

- ELFT 07
- ELFT-EFS Public Challenge
- ELFT-EFS #1
- ELFT-EFS #2

MINEX III | **PFT III** | **SlapSeg III** | **FpVTE** | **ELFT**

Active & Ongoing

Face Rebrand



Friction Ridge Image and Features Technology Evaluation

FRIF TE

“Thrifty”

NIST INFORMATION TECHNOLOGY LABORATORY

Fingerprint Rebrand

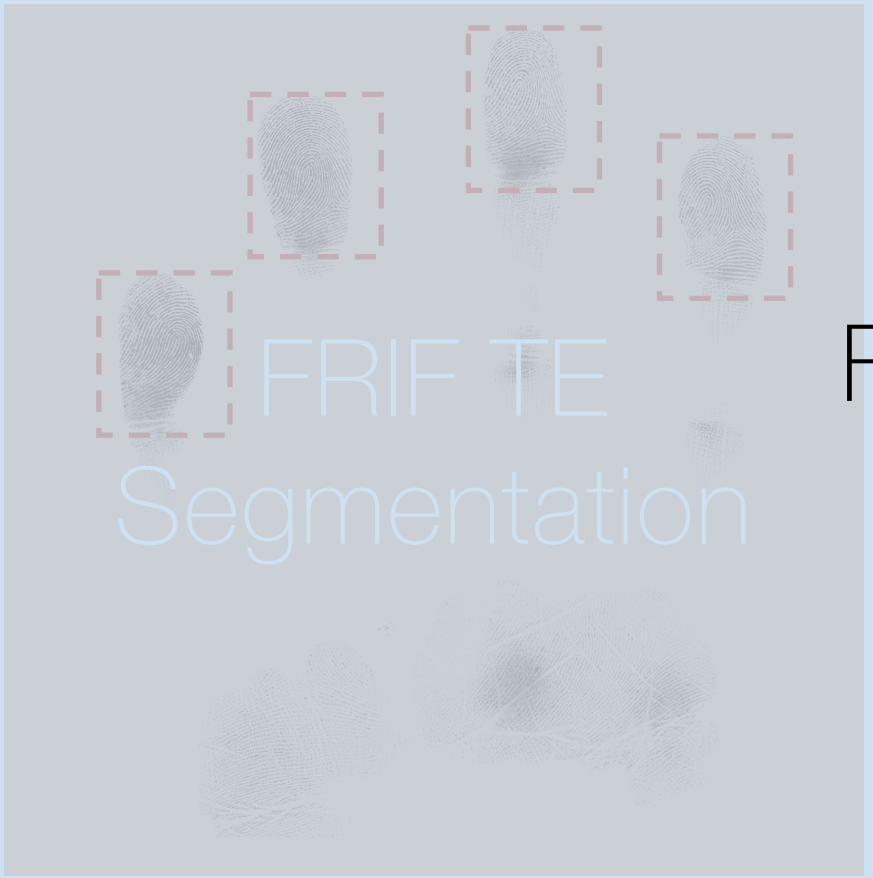
In progress!

Old Name	New Name Suffix	New Abbreviation
FpVTE	Exemplar One-to-Many	FRIF TE E1N
ELFT	Mark One-to-Many	FRIF TE M1N
MINEX	PIV One-to-One	FRIF TE P11
PFT	One-to-One	FRIF TE 11
SlapSeg	Segmentation	FRIF TE Segmentation

Unified API Example

Image source: NIST Special Database 302

Unified API Example



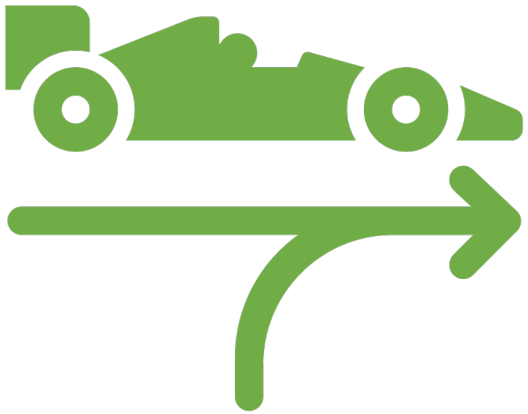
FRIF TE
E1N

Image source: NIST Special Database 302

Other Benefits

Synchronization

- Validation
- Test harness
- Analysis



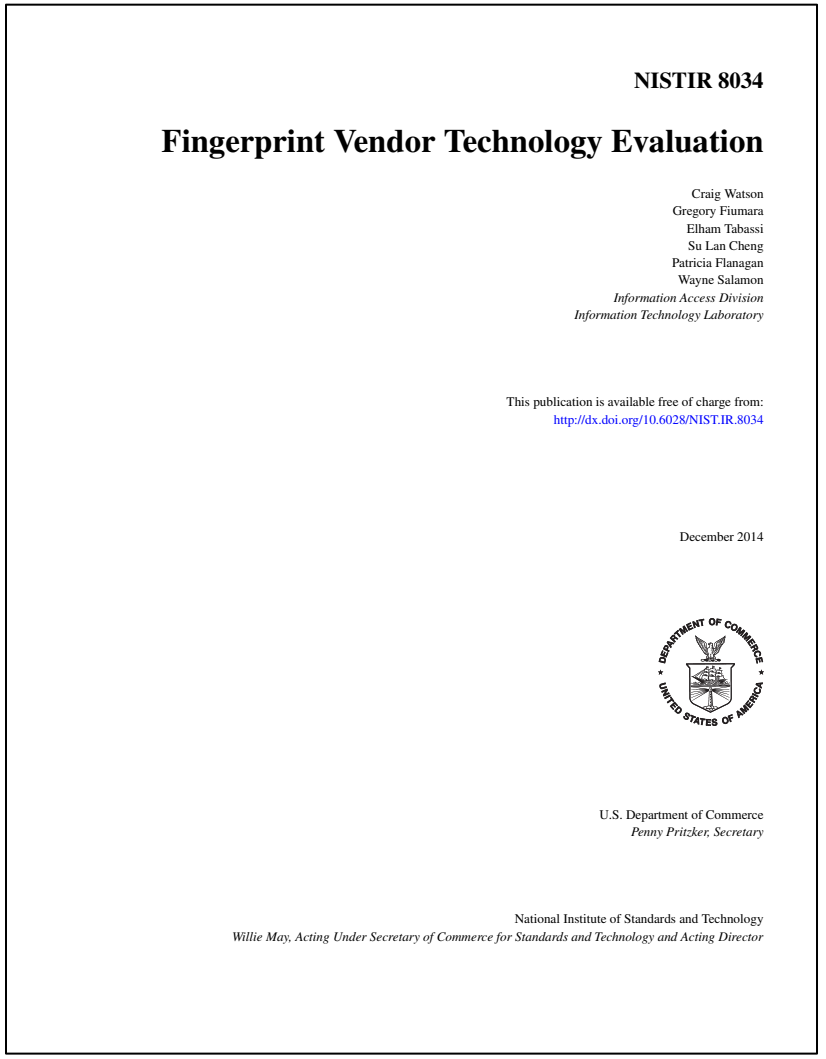
Faster Adoption

- Operating system
- C++ standard

FRIF TE E1N

- 1 submission in progress
  - Results shortly

- Repeat FpVTE 2012
- **B I G G E R** data *soon*
  - Accuracy gate?
  - Multi-stage searching?



NISTIR 8034

Fingerprint Vendor Technology Evaluation

Craig Watson
Gregory Fiumara
Elham Tabassi
Su Lan Cheng
Patricia Flanagan
Wayne Salamon
Information Access Division
Information Technology Laboratory

This publication is available free of charge from:
http://dx.doi.org/10.6028/NIST.IR.8034

December 2014

U.S. Department of Commerce
Penny Pritzker, Secretary

National Institute of Standards and Technology
Willie May, Acting Under Secretary of Commerce for Standards and Technology and Acting Director

Friction Ridge Evaluations

NIST

MINEX

- MINEX 04
- MINEX II–MOC
- Ongoing MINEX
- ***MINEX III***

PFT

- PFT
- PFT II
- ***PFT III***

SlapSeg

- SlapSeg 04
- SlapSeg II
- ***SlapSeg III***

FpVTE

- FpVTE 2003
- FpVTE 2012

ELFT

- ELFT 07
- ELFT-EFS Public Challenge
- ELFT-EFS #1
- ELFT-EFS #2
- ***ELFT***

FRIF TE

greg@nist.gov | frifte@nist.gov
https://fingerprint.nist.gov/frifte