Roadmap of ELFT

Past, Present, and Future...

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Chronology

**Fingerprint Community**

- 1940 – FBI evaluates early automation in the form of card sorters
- 1970s – Rockwell, Autonetics Div. performs pioneering work in automated fingerprint matching (evolves to become Printrak division)
- 1975 – First automated fingerprint matcher sold (Printrak)
- 1987 – FBI Identification Division’s Automated Services (IDAS) becomes operational
- 1995 – It is determined automated classification is sufficiently mature to pose low risk for IAFIS
- 1999 – IAFIS goes online
- Ongoing NGI development

**NIST**

- 1960s – Early work by Ray Moore and Joseph Wegstein
- 1969 – Following a two-year study, NIST determines that a minutiae-based automatic matcher is technically feasible
- 2003 – The Fingerprint Vendor Technology Evaluation (FpVTE) – first major fingerprint test conducted by NIST
- 2006 (April) – First NIST Latent Workshop
- 2006 (Nov) – ELFT07 initiated
- 2006 (Dec) – ELFT07 Concept of Operations (CONOPS) drafted
- 2007 (April) – Phase I Testing begins
- 2008 (April) – Phase II Testing begins
- 2009 (March) – Second Latent Workshop
The overall goal: to assist and expedite the development of automated latent matching and searching technology

1 – Provide Standards and Best Practices [Metrology, Interop]

2 – Assess State-of-the-art in automated latent matching

3 – Facilitate information exchange

NIST Contributions
The overall goals of ELFT are to advance automation for latent searches.
Steps that comprise a latent performance test

1. Publish Concept of Operations (CONOPS) and Software API.
2. Create and maintain Website.
3. Create/Compile Latent Test Sets.
Possible directions for ELFT as originally envisioned

2007

Augmented Features/Advanced Matchers Testing

Phases I and II Testing
(Latents against rolled ten-prints) (2007)

Core Testing

Supplemental Testing

2008

Latents against mixed rolled and flats
(Phase III – 2008)

Large Background
(Phase IV – 2008)

2009+

Augmented Features
(CDEFFS and other advanced matching) concepts – 2008+

Addition Augmented Features Testing/Advanced Matchers

Reverse Searches
(Plain impressions searched against latents)

Enhanced Resolution
(Effect of higher resolution scans of latent and ten-print)

Other “Special Test”
(Multi-finger, types of latent prints, etc.)

Single Latent Matched against Rolled + Plain (dual data)

March 2009

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IAD - Image Group
Automated feature extraction and matching -- AFEM

- It is important to distinguish AFEM-based latent fingerprint identification from the general concept of *lights-out identification*.

- *Lights-out* identification refers to a system requiring minimal or zero human assistance in which an image is presented as input, and the output consists of a short candidate list.

- AFEM emphasizes the “front end” automated feature extraction, and does fully address the “back end” candidate list reduction

- ELFT emphasizes AFEM – but includes steps toward candidate list reduction
Series of tests initiated in 2007 (workshop ‘06)
  • Eleven participants (all commercial) to date

Phase I (2007)
  • “proof of concept” (100 latents)
  • Public report (aggregate results, anonymous)
  • Individualized vendor reports (detailed results)

Phase II (2008)
  • Operational images (800+ latents)
  • Core results to participants (March 2009)
  • Final Report (to be released)
ELFT-EFS Objectives

Evaluates:

- **Accuracy of examiner-assisted searches**
  - Effectiveness of examiner selected features (EFS)
  - Features defined by CDEFFS (proposed addendum to ANSI-NIST-ITL 1-2007)
  - Performance of image+EFS, EFS, and image (i.e. AFEM) as baseline

- **Interoperability of standardized Extended Feature Sets**
  - Repeatability of examiner markup?
  - Which features “work” across multiple matchers?
ELFT-EFS Test Plan

- Two tests announced in November 2008
- **Test I (March 2009 – Kick off workshop)**
  - “challenge problem” (take home test)
  - SD27-1000 (with “juried” EFS markup) and SD30
  - EFS supp. CDEFFS devel. (prop. mods to ANSI/NIST)
- **Test II (Spring-Summer ‘09)**
  - Sequestered images
  - **SDK test executed by NIST & Noblis**
  - *Includes an image-only (AFEM) test*
Future Directions

- Automatic determination of matching method (AFEM or human-assisted?)
- Latent print quality metrics
- Reverse latent searches (watch lists, UL files)
- Fully automated EFS extraction
- Fusion (latent prints, rolled and flat ten-prints)
- Latent fingerprint reference data
For More Information…

Web ➔ http://fingerprint.nist.gov/latent

Email ➔ latent@nist.gov
Thank you!

Questions?