FACE RECOGNITION VENDOR TEST 2002

Overview of the Face Recognition Vendor Test 2002

Dr. Jonathon Phillips, DARPA & NIST
Patrick Grother, NIST
Duane Blackburn, DoD Counterdrug Program Office
Mike Bone, NAVSEA
Ross Michaels, NIST

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• **Motivation**
  
  • Patriot Act
  • Interest after 9/11
  • Accuracy for
    • Airport security
    • Enter/exit from US
  • State-of-the-art

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• Goals
  • Assess performance on large real-world data sets
  • Identify new promising approaches
  • Measuring progress on hard problems
    • Pose variation
    • Images taken months/years apart
    • Video sequences
• Conducted by NIST

• **Principals**
  • Dr. Jonathon Phillips, Test Director
  • Duane Blackburn
  • Mike Bone
  • Patrick Grother
  • Ross Micheals

• **Principals from FERET and FRVT 2000**

• **Twenty support personnel**

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• **Sponsors**
  - National Institute of Standards and Technology
  - Defense Advanced Research Projects Agency
  - Department of State
  - National Institute of Justice
  - Transportation Security Administration
  - Federal Bureau of Investigation

• **Supporters**
  - Counterdrug Technology Assessment Center
  - U.S. Customs Service
  - Department of Energy
  - Drug Enforcement Administration
  - U.S. Secret Service
  - Technical Support Working Group
  - Immigration and Naturalization Service
  - Canadian Passport Office
  - UK Biometrics Working Group
  - Australian Customs

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Participants

- AcSys Biometrics
- Cognitec Systems GmbH
- C-VIS
- Dream Mirh Co.
- Electronic System Products
- Eyematic Interfaces
- Iconquest
- Imagis Technologies
- IRID
- Phoenix Systems Corporation
- VicarVision
- Viisage
- Visionics
- VisionSphere

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FERET (93-96)
- Tech Agent: J. Phillips
- Face Recognition
- Established Face Database
- Established Standardized Evaluation Methodologies
- Basis of all Face Recognition Technology on HumanID

Facial Recognition Vendor Test 2000
- Assessed improvements since FERET
- Evaluated commercial state-of-the-art

FACE RECOGNITION VENDOR TEST 2002

Enabling Future HumanID Technologies

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Scenario and Operational Systems

- Face Image
- Face Recognition System
- Image Database
- Human Operator
- Further Investigation
  - Good Guy
  - Bad Guy

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Technology Systems

Gallery/Target
(known)

Recording Data Sets

Face Image

Face Recognition System

Probes/Query

Similarity Matrix

Image Database

Human Operator

Further Investigation

Good Guy

Bad Guy

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Identification

Identity Unknown → Identification Algorithm → Estimate Identity

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Identification Scoring

Performance reported on a cumulative match score

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Verification

Verification Algorithm

Claimed Identity +

= Claimed Identity?

Accept or Reject

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Verification Scoring

Trade-off is reported on Receive Operating Characteristic (ROC)

Equal error rate is summary statistic

$P_F = 1 - P_V$

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Increasing Gallery Size

Gallery 1

Gallery 2

... ...

Gallery N
(30,000)

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Performance as a Function of Gallery Size

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Different People in the Gallery

Gallery 1

Gallery 2

Gallery N

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Measurement of Standard Error

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Overall Test Programmatic

• Technology evaluation
• All participants given exactly the same data sets
• Evaluates automatic face recognition systems
• Announced 25 April 2002
• Administered Under Tight Government Supervision
• Administered July and August 2002
• Administered at U.S. Navy facility in Dahlgren, VA
• Results released in November 2002

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Test Design

Two tests:

- **High Computational Intensity Test (HCinT)**
  - Measure performance on very large data sets
- **Medium Computational Intensity Test (MCinT)**
  - Still image evaluation
  - “Video style” evaluation

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High Computational Intensity Test

• Demanding real-world images
• 121,000 still images (15 Billion matches)
• Greater than 30,000 individuals
• Measure:
  - Performance on very large data sets
  - Effects of gallery size
  - Variability (error bars)
Medium Computational Intensity Test

- Two parts
- Still
  - 7,500 images
  - Pose variations
  - Months/years between images
  - Illumination
- “Video”
  - Improvement of video over still?
  - JPEG sequences from video

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• **Protocol documentation**
  • XML based
  • Designed to transportable to new evaluations
  • User community can use
  • Design your own evaluations

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Results

- Large scale evaluations
- Documentation
  - Technical report
  - User report
  - Appendix of in depth results
- Supporting protocol
- XML based protocol