An Evaluation of Facial Recognition in an Operational Test at Purdue University Airport

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This study will evaluate a facial recognition algorithm in operational testing and evaluation at Purdue University Airport. This study will collect face images at the student flight operations center over a period of time to assess template aging, user habituation, as well as algorithm performance over time. The study will be operational and unattended.

Biometric testing and evaluation has a number of technical problems that are associated with it. According to Wayman (2000), the first major problem with error testing of biometric devices is that the “error variance of each of the terms is highly application dependent.” There is currently no way to predict the error terms for all applications from measurements made in any one test environment. Consequently, test results are always dependent upon the test environment and will not reflect errors in dissimilar application environments of the “real world.”

The second issue surrounding biometric research and testing is that “the sample data across the entire population of users is ‘non-stationary’, meaning that multiple measures from a single user cannot be used to approximate the distribution for the entire population. This adds a second major complication to biometric testing, the requirement for a large test population that adequately represents the target population of the application” (Wayman, 2002, pg. 72).

The third major factor in the testing and evaluation of biometric technologies is that “Sensor and presentation changes over time may also be contributing factors. This represents a third major problem in the error testing of biometric devices: performance estimation may depend upon the time difference between enrollment and test samples” (Wayman, 2002, pg. 73).

We will use the general biometric model to examine template aging, habituation and performance. These areas are circled below.

**Aims of the study**

This study enables template aging to be assessed over a long period of time.
The research also enables

**Enrollment**

Subjects will be enrolled in a negative enrollment situation. This prevents duplicate entries.

Subjects will then stand in front of the camera and 100 images will be taken of their face in a number of different orientations.

**Identification**

Subjects will then be identified everytime they stand in the area

If they are not in the database, then the facial recognition algorithm should not be able to recognize them

If they are in the database, then the facial recognition algorithm should be able to recognize them, even though they are not claiming any identity

**Measurements**

- False Accept Rate
- False Reject Rate
- Failure to Enroll
- Failure to Acquire
- Throughput Time
- User Habituation
- End User Survey
- System up / down time

**Other benefits**

- Analysis of network security
- Live laboratory for analysis
- Educational benefits to students
- Impacts 250 students per semester in a learning environment
- Engagement with biometrics community
- Results presented at Biometrics meetings

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![Diagram of the General Biometric Model](Mansfield & Wayman, 2002)