# Fingerprint Image Quality Across Different Populations Activities of the SC37/WG 5/Biometric Equipment Performance

**Stephen Elliott Ph.D.**
Biometric Standards, Performance, and Assurance Laboratory
Department of Industrial Technology
Purdue University

# Fingerprint Image Quality Across Different Populations

**Stephen Elliott Ph.D., Shimon Modi, Justin Williams, Patrick Graham**
Biometric Standards, Performance, and Assurance Laboratory
Department of Industrial Technology
Purdue University

# Motivation

- Evaluate fingerprint quality across two populations (elderly >62; young 18-25
- The research hypothesis was to establish whether there was any significant difference in image quality across the two different age groups

# Data Collection

- Data collected using a Digital Persona U are U 2000 sensor
- Image acquisition surface was 13mm x 18mm
- Fingerprints collected from 18-25 and >62 years old
- For the 18-25 years old group, the n=79; left / right index, 4 samples per person, 632 samples
- For the >62 years old group, the n=60; left / right index, 4 samples per perso 480 samples

# Methodology

- Process fingerprints using MINDTCT
- Compare the minutiae count of both age groups
- Process the fingerprints using NIST Fingerprint Image Quality Algorithm
- Compare the NFIQ scores of both age groups

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# NFIQ scores / examples from the 2 groups

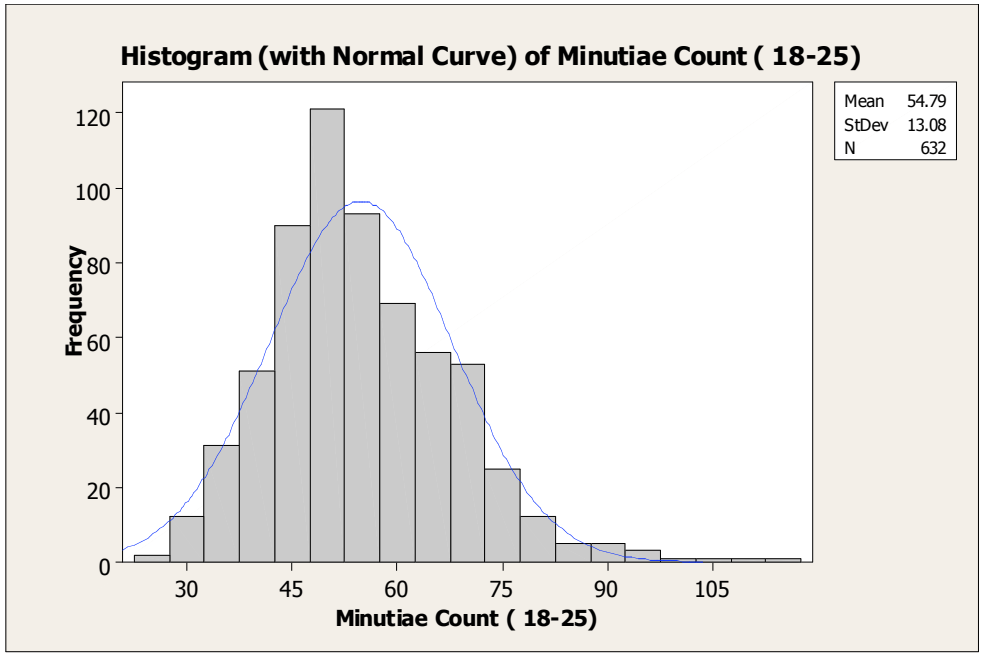
## > 62 Years

| Score =1 | Score = 2 | Score = 3 | Score = 4 | Score = 5 |
|---|---|---|---|---|

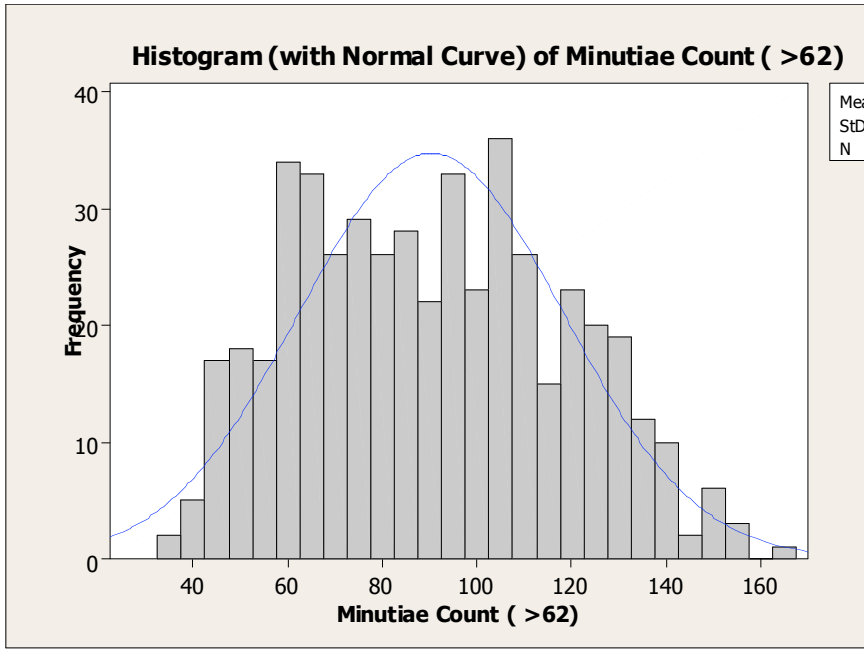
## 18-25 Years

# Minutiae Count

## 18-25 Years

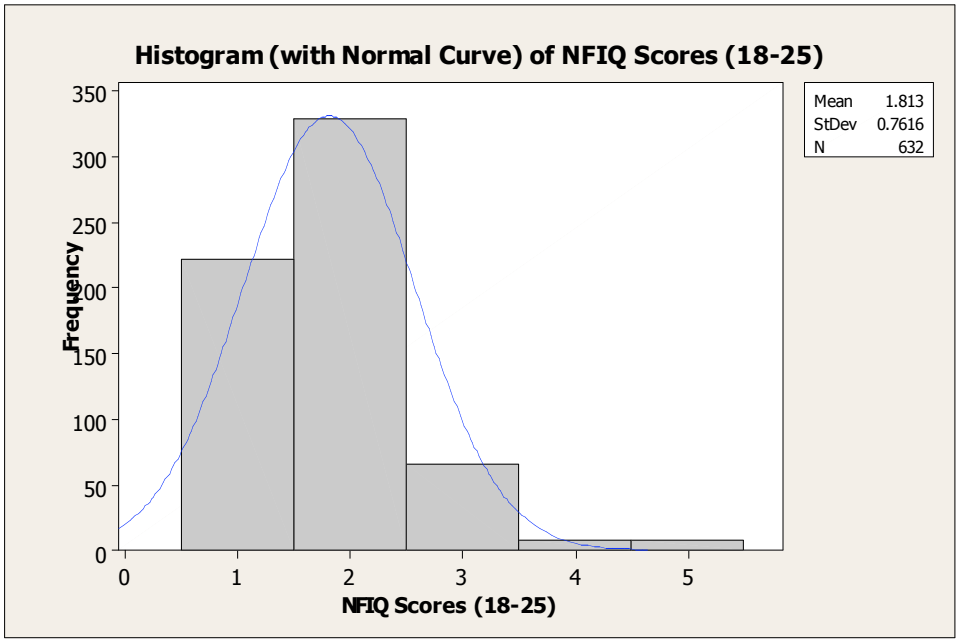



## > 62 Years

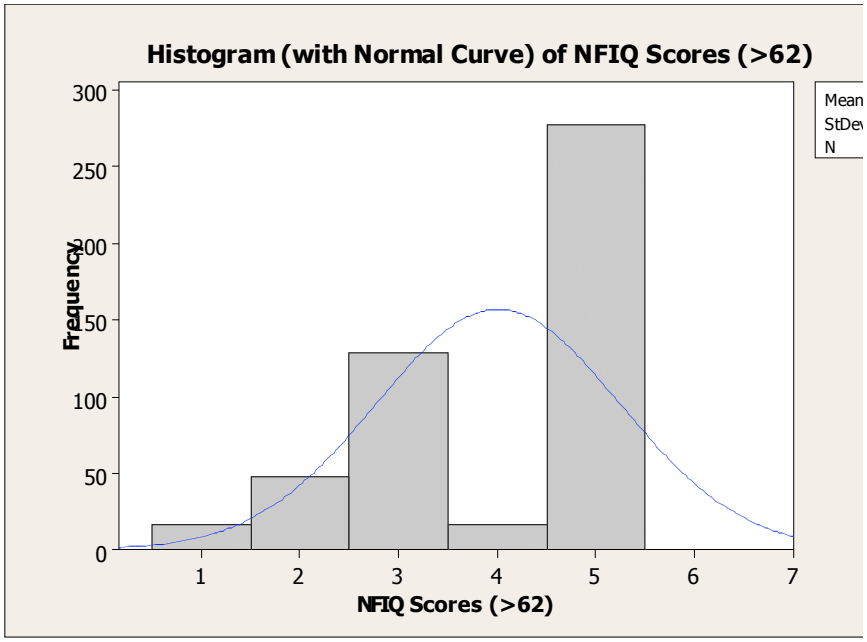


# NFIQ Scores

## 18-25 Years




## > 62 Years



# Analysis of Variance

- A two sample t-test indicates that there is a statistically significant difference across the two groups (p=0.000)

# Further Research

- Future research to assess the performance of a matcher across the two populations
- Remove poor quality prints to see impact on performance
- Remove poor performing prints and calculate image quality on these prints
- Results will be available April 27th at www.biotown.purdue.edu

# Any Questions?

# Activities of the SC37/WG 5/Biometric Equipment Performance

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# Progress

- The rapporteur group has met several times, and given presentations in South Africa, and Kyoto
- Following the South Africa meeting, the rapporteur group combined the Japanese and Korean National Body contributions
- The rapporteur presented its progress at the ISO/IEC JTC 1 SC37 meeting Kyoto, Japan, and it was reconstituted
- The fingerprint quality image output from a fingerprint scanner is another factor, which affects the accuracy of fingerprint authentication
- Methods for evaluating fingerprint image quality is out-of-scope for the rapporteur group, but should be followed as it will impact our work

# Terms of Reference

- Produce a recommendation to WG5 on the appropriate methods for evaluati biometric performance, including but not limited to the quality of image / sin capture of biometric devices

- Provide a recommendation based upon the input received from the call for contributions on a strategy for progressing this work

- A teleconference will be conducted March 30, 2006

# Overview

- Purpose is to formulate a standard set of methods for evaluating qualities of fingerprint scanner as the “main entrance” for a live fingerprint for the authentication and / or verification process

- The standardization of methods for evaluating the qualities of the fingerprint scanner can be applied to other biometric modalities

- Document that has been produced is now in its 2nd iteration

- Currently, the rapporteur group is examining the evaluation of Fingerprint Scanner Performance

# Fingerprint Scanner Performance

An artificial fingerprint will be used to test several characteristics of the sensor

1. Distortion
2. Tolerance to environmental change
3. Tolerance to the change in the finger’s condition
4. Uniformity of the captured image
5. Linearity of captured images
6. Signal – to – noise (S/N) ratio
7. Effect of latent fingerprint's, such as blur, blemish, and / or blotch
8. Mechanical deformation of scanner performance

# Out of Scope

- Requirement for evaluation of the sensor requires some analysis of the fingerprint image quality

- The fingerprint quality image output from a fingerprint scanner is another factor, which affects the accuracy of fingerprint authentication

- Methods for evaluating fingerprint image quality is out-of-scope for the rapporteur group, but should be followed as it will impact our work

# Fingerprint Scanner Performance

- Various methodologies are proposed for the creation of the artificial fingerprints – this work is currently being undertaken at Purdue University

- The fingerprint quality image output from a fingerprint scanner is another factor, which affects the accuracy of fingerprint authentication

- Methods for evaluating fingerprint image quality is out-of-scope for the rapporteur group, but should be followed as it will impact our work

# Other modalities

- Recommendation to do a call for contributions on other modalities such as iris, hand, and face

- Further report and recommendations will be presented at the ISO / IEC JTC SC 37 WG 5 meeting in London, UK

Any Questions