# Mobile AFIS Finger Image Quality Challenges
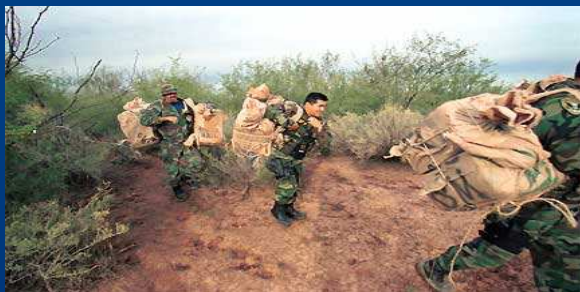
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# MOBILE AFIS?

# *Mobile Solutions*

**Bus**

**Train**

**Harbor**

# Components of a Motorola Quality Algorithm

## *Needs to predict the accuracy of the matching process

- *Use traditional visual image-based features such as contrast, valid direction, curvature, ridge detail, etc,*
- **Minutiae Confidence**
- **Classification**
- **Adaptable (or multiple flavors)**
    - **Use Cases**
        - 1:1 vs. 1:n
        - number of fingers
    - **Types of Images (search and file)**
        - rolls, flats, latents, palms
    - **Capture Devices**
        - Certified livescan vs. single finger

# Components of a Motorola Quality Algorithm (continued)

Concern: If the images are from different areas of the finger or the overlapping area is minimal, no matter how good the visual quality, finding a match is very difficult.

Solution: Compute the estimated potential overlapping area between search and mate.

# *Mobile Device Quality Challenges*

- **Image Size (e.g. 256x360 )**
- **Image Resolutions (500 ppi or less)**
- **Typically only 1 or 2 fingers**
- **Non Certified Appendix F or G devices/sw**
- **Processor Speeds available (200 MHZ)**
- **Residual prints on sensors**
- **Sensors more sensitive to dirt**
- **Resemble "Flats" not "Rolls"**
- **Identify "enough" of the fingerprint**

# *Traditional Tenprint A and B Quality*

## A - Good Quality

Has well defined ridge structure, sufficient number of minutiae, no major smudges/scars thus excellent probability of a hit.

## B - Workable Quality

Acceptable ridge structure, sufficient number of minutiae, may have some smudges/scars, a good probability of getting a hit.

# *Traditional Tenprint Quality C, D/R*

## C - Bad Quality but still workable

It has poorly formed ridges, may suffer from scars/smudges, may have some false minutiae, bad contrast with the background etc. However, it is still searchable and may be salvaged by image processing

## D/R - Latent Quality or Worse.

Very hard to detect reliable features due to very bad ridges, smudges, scars etc.

Needs Quality Control

# *Basic Mobile Quality Features*

**Two main quality features or inputs**

1.  **The ratio of population of high contrast areas to the overall image.**

2.  **The distance between the center of mass of fingerprint area to image center to check whether the fingerprint is off-center or not.**

# Robust Mobile Quality Features

1. *Indication of whether the captured image contains a fingerprint.*
2. *Contrast level*
3. *Size of actual fingerprint area.*
4. *Auto Centers fingerprint*
5. *Determination of area of fingerprint.*
6. *State of sensor (i.e. calibrate, clean).*
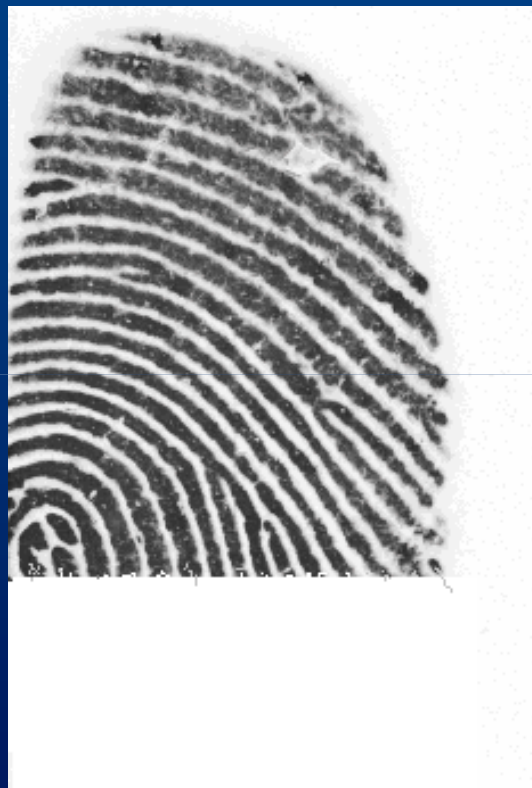7. *Image Rotation.*

# *Mobile AFIS Example 1*

Mot Basic Quality: A
Mot Robust Quality: A
NFIQ: 1

Image size: 256x360 pixels
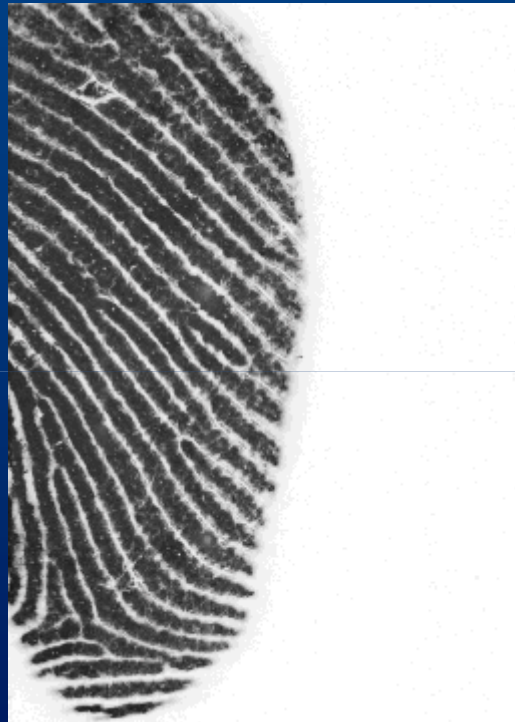Resolution: 512 dpi

# *Mobile AFIS Example 2*

Mot Basic Quality: B
Mot Robust Quality: C
NFIQ: 2

Image size: 256x360 pixels
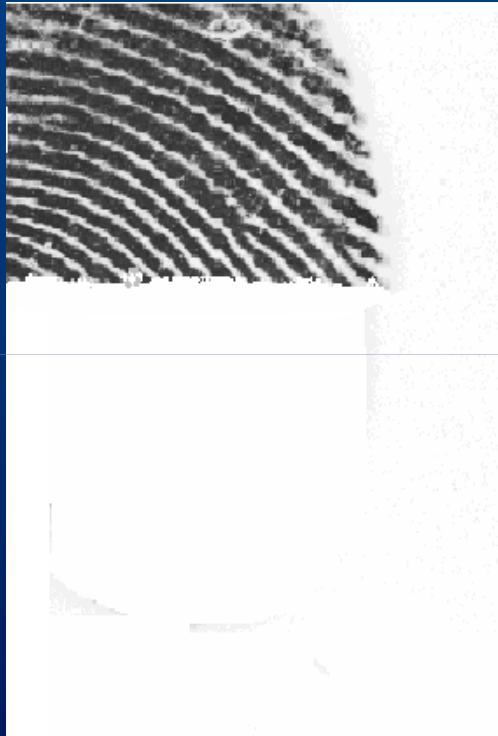Resolution: 512 dpi

# Mobile AFIS Example 3
## finger edge



Mot Basic Quality: C
Mot Robust Quality: D
NFIQ: 2

Image size: 256x360 pixels
Resolution: 512 dpi

# *Mobile AFIS Example 4*
## *finger tip*



Mot Basic Quality: C
Mot Robust Quality: R
NFIQ: 3


Image size: 256x360 pixels
Resolution: 512 dpi

# *Thank You*