Mobile AFIS Finger Image Quality Challenges

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MOBILE AFIS?

Mobile Solutions

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

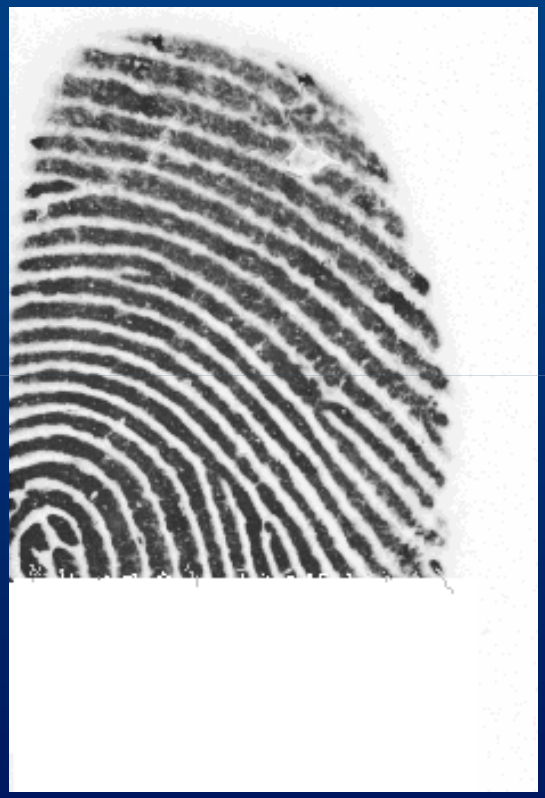
1. *Indication of whether the captured image contains a fingerprint.*
2. *Contrast level*
3. *Size of actual fingerprint area.*
4. *Auto Centers fingerprint*
5. *Determination of area of fingerprint.*
6. *State of sensor (i.e. calibrate, clean).*
7. *Image Rotation.*

Mobile AFIS Example 1

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

Image size: 256x360 pixels
Resolution: 512 dpi

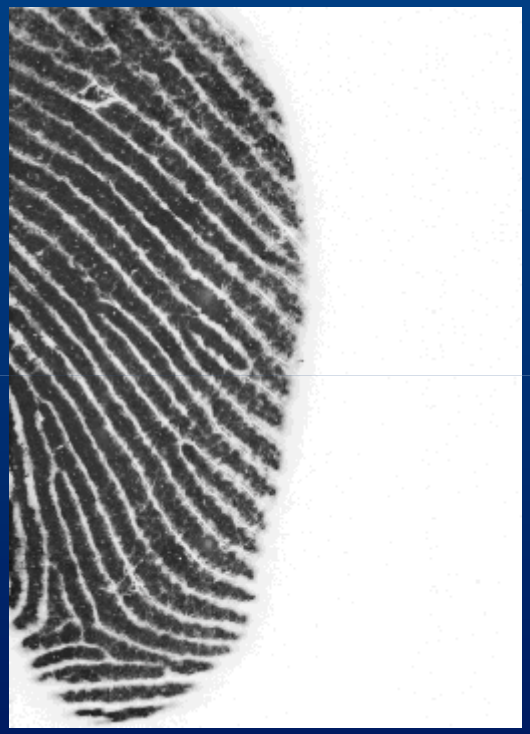
Mobile AFIS Example 2



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

Image size: 256x360 pixels
Resolution: 512 dpi

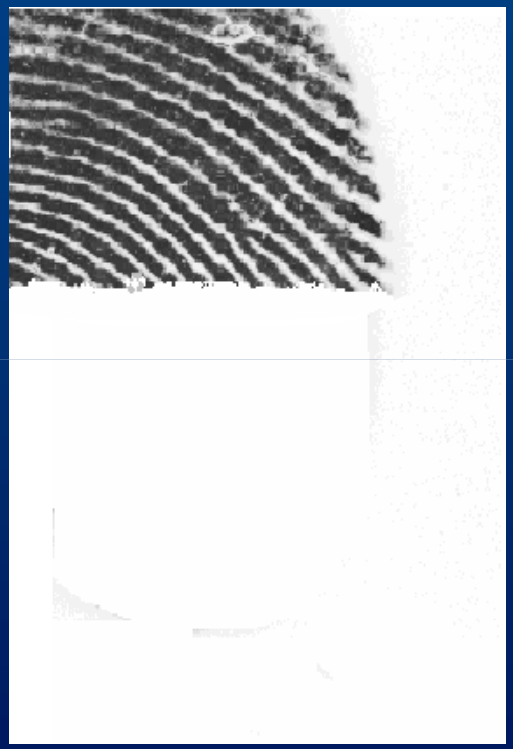
Mobile AFIS Example 3 finger edge



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