CDEFFS

ANSI/NIST
Committee to Define an
Extended Fingerprint Feature Set

Workshop

April 2006

MTS™ Mitretek Systems

Extended Features Under Consideration

Level 1 Features

a. Ridge flow
b. Cores and deltas
c. Finer level of classification

Level 2 Features

a. Ridge path elements
b. Open field of ridges
c. Greater definition of minutiae
d. Scars
e. Creases
f. Incipient ridges
g. Dots

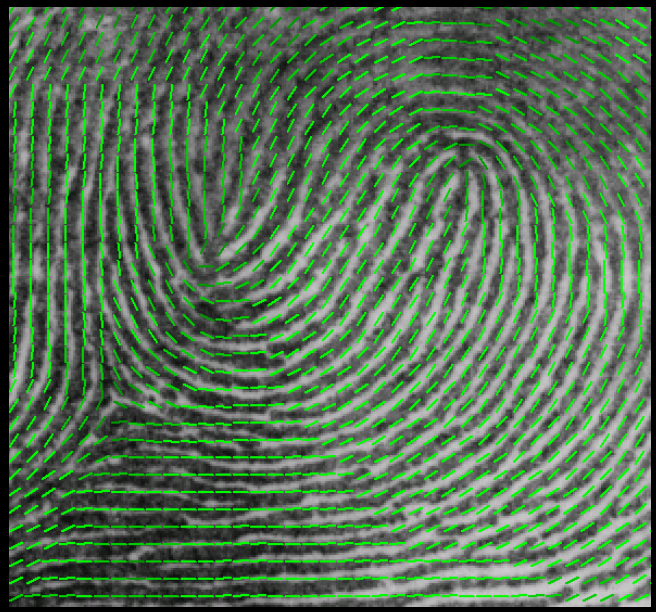
Level 3 Features

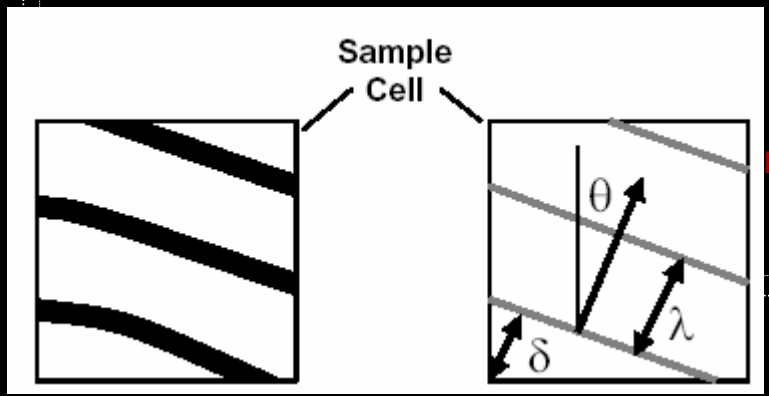
a. Pores
b. Ridge edge shapes/width

3d Features

a. Ridge height / valley depth

1a: Ridge flow



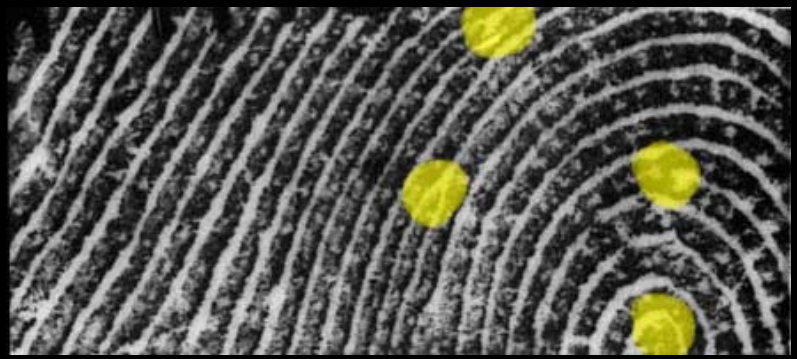


- Define the direction of ridge flow for every NxN pixel block in the image (or every pixel), if it can be determined.
- Issues:
  - How big is NxN? (0.016” = 8/500) Is it configurable or fixed?
  - How big is the window? (0.048” = 24/500)
  - How do we quantize angles? (degrees, 1/32 circle …)
  - Are angles along ridgeflow (traditional) or perpendicular to ridgeflow (ANSI-INCITS-377)
  - Note this is tied to local ridge flow quality (next)
- Elaborations (re [ANSI-INCITS-377])
  - ridge spacing (distance between ridges)
  - phase offset (position that the ridges enter the block)

1a: Ridge flow direction

- Definition example (16-direction, in hex):
  - x.yyy:
  - 888888889999aaaabbbbbaaaa99888888888<rs>
  - 889999999aaabbbbbbccbbbaaa9999988888<rs>
  - 99999999aaaabbbbccccccbbbbaa999999999<rs>
  - 999999aaaabbbbcccddddddccbbbbaa999999

2b: Open Field of Ridges
Local Ridge Flow Quality

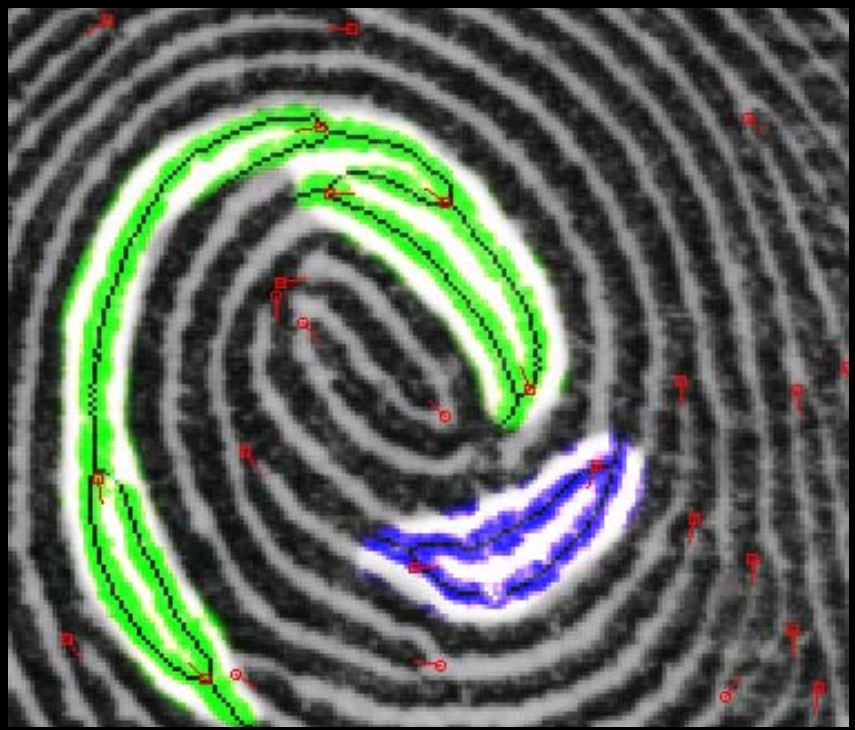


- Logically related to ridge flow
- Boolean (good | bad)
- Tristate:
  - Good | Marginal | Unusable
- Multi-level:
  - 0: No ridge information
  - 1: Level 1/direction unclear
  - 2: Level 1 OK, level 2 unclear
  - 3: Level 2 OK, level 3 unclear
  - 4: All levels clear

2b: Local Ridge Flow Quality

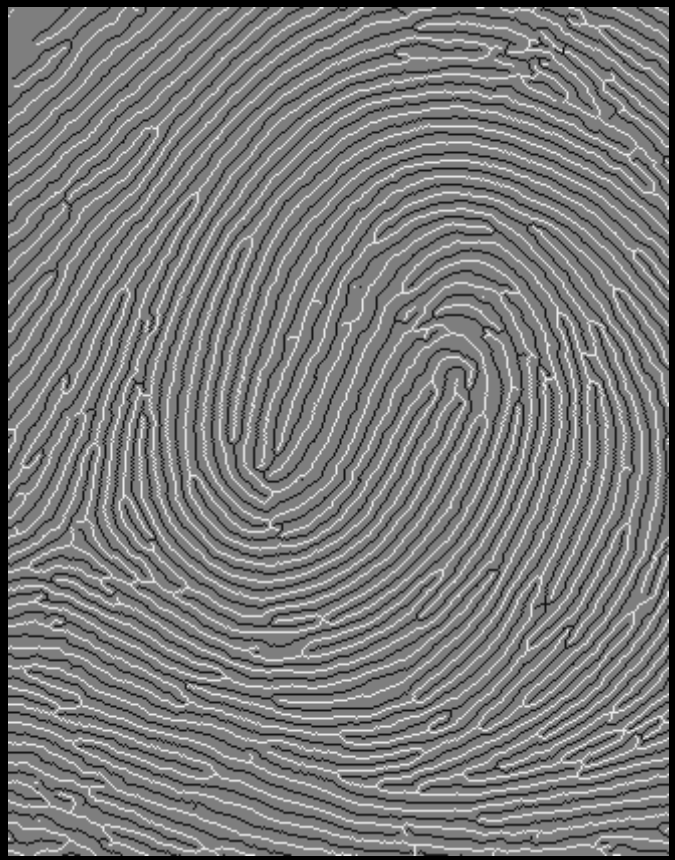
- Definition:
  - 01 00000000001111111111111111111110000000
  - 02 00000001111111111111111111111100000
  - 03 00000011111111111111111111111110000
  - 04 00000011111111111111111111111110000
  - 05 00000111111111111111011111111110000
  - 06 00000111111111111111111111111110000
  - 07 00001111111111111111111111111110000
  - 08 00001111111111111111111111111110000
  - 09 00001111111111111111111111111110000

2a: Ridge Path



- Option 1:
  - Index all ridge segments (ridge between two minutiae, end of image, or poor quality area). Each ridge ending is affiliated with one indexed ridge (3 for bifurcation).
  - Each ridge can be defined in a series of X, Y locations with fixed distance between OR by splines.
  - Level-3 details can reference back to the ridge segment number.

2a: Ridge Path



- Option 2:
  - Use the tracing as a representation

2g: Dots

- Are they treated as directionless minutiae? Are both ends defined as endings?
- How can (should) width be noted?

3c: Ridge/Valley width

- Major deviations
  - indentations
  - protrusions
  - discontinuities
- Measurements from
  - Edge-to-edge of a ridge
  - Edge-to-edge of a valley
  - Center-to-center of adjacent ridges