Project Proposal: Fingerprint Recognition

UCLA EE 113D: Winter & Spring 2015
Professor Briggs

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Outline

- Motivation
- Benefits to Society
- Potential Technologies
- Work Breakdown
- Goals

Motivation

- Increasing importance of biometrics
- Computer security
  - User authentication
- Synthesizes core concepts of 113DA

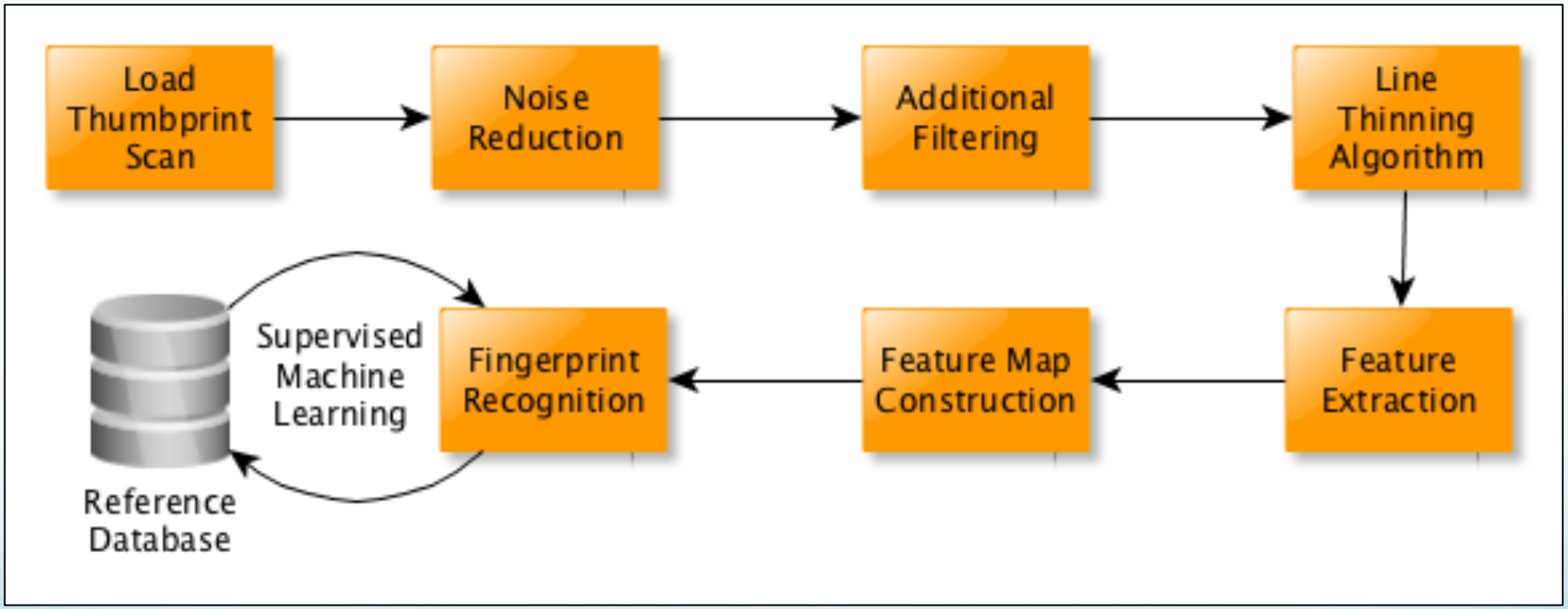
Image source: http://en.wikipedia.org/wiki/File:Fingerprint_Loop.jpg

Potential Benefits to Society

- User authentication
  - Two-factor authentication
  - Real time systems
- Forensics
- Lower barrier to entry for biometrics

Image source: http://en.wikipedia.org/wiki/File:Fingerprint_scanner_identification.jpg

Potential Technologies



Potential Technologies

- Futronic FS88 FIPS201/ PIV
- $88.00
- 500 DPI
- 8 bit 256 grayscale
- USB 2.0

Source: http://www.fulcrumbiometrics.com/Futronic-FS88-USB20-p/101113.htm

Potential Technologies

- Fingerprint Scanner - TTL (GT-511C3)
- $49.95
- 450 DPI
- Packet communication via UART (serial)
  - e.g. GetRawImage packet
- 4 pins (Vdd, Tx, Rx, Gnd)

Source: https://www.sparkfun.com/products/11792

Work Breakdown

- Ryan Baker:
- MATLAB testing/implementation:
  - Line thinning (week 1)
  - Feature extraction (week 3)
- C implementation:
  - Line thinning (week 2)
  - Feature extraction (week 4)
  - Feature map construction algorithm (weeks 5-7)
  - Scanning algorithm/communication (weeks 7-8)

Work Breakdown

- Russell De Guzman:
- MATLAB testing/implementation:
  - Noise reduction (week 1)
  - Filtering (week 2)
  - Feature mapping algorithm (week 4)
- C implementation:
  - Noise reduction and filtering (week 3)
  - Feature map construction algorithm (weeks 5-7)
  - Supervised machine learning algorithm (weeks 7-8)

Goals

- Week 3 milestone
  - Noise reduction, filtering, and line thinning
- Week 7 milestone
  - Determine identifying features, add feature extraction, construct feature maps
- Both MATLAB and C implementation

Goals

- Final goal
  - Fingerprint recognition with supervised machine learning
  - 95% accuracy
  - Data base of 20 people
- Stretch goals
  - Real-time thumbprint scanning
  - Scanner → LCDK communication
  - Optimization: parallelization between scanning and identification algorithm
    - e.g. Double buffering

Questions?