AI for Privacy and Security (BioInformatics)

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Types of Bioinformatics

Facial Recognition

Fingerprint Recognition

Iris Recognition

Facial Recognition Uses

➢ Advantages
  ○ Safety and Security
    ■ Catching criminals and finding missing people
    ■ Protect businesses against theft
    ■ Strengthen general Security Measures (airports, banks, etc)
    ■ Fraud
  ○ Medical Uses
    ■ Dispense medication based on a facial scan
  ○ Validation of Purchases
  ○ Advertising
    ■ Amazon's web experience brought into the real world
  ○ Automations
    ■ Reduce the numbers of touchpoints

Facial Recognition Ethical Dilemmas

- ➢ Privacy
  - ○ Data without consent
    - ■ Algos need lots of data
  - ○ Proportional Uses of invasive technologies
  - ○ Use data with lineage of intent
- ➢ Accuracy and Discrimination
  - ○ Example: Catching criminals
- ➢ Democratic Freedom
  - ○ Issue of information security and the threat of governments actively spying on their citizens
  - ○ Police can use facial recognition to run everyone in their database through a virtual criminal lineup, which is like treating you as a criminal suspect without probable cause

Fingerprint Recognition

➤ Advantages
- AFIS
- Unique / Distinctive
- Physical Evidence in Crimes

➤ Disadvantages
- Latent Prints
- Partial / High Fragmentation
- Requires Further Analysis

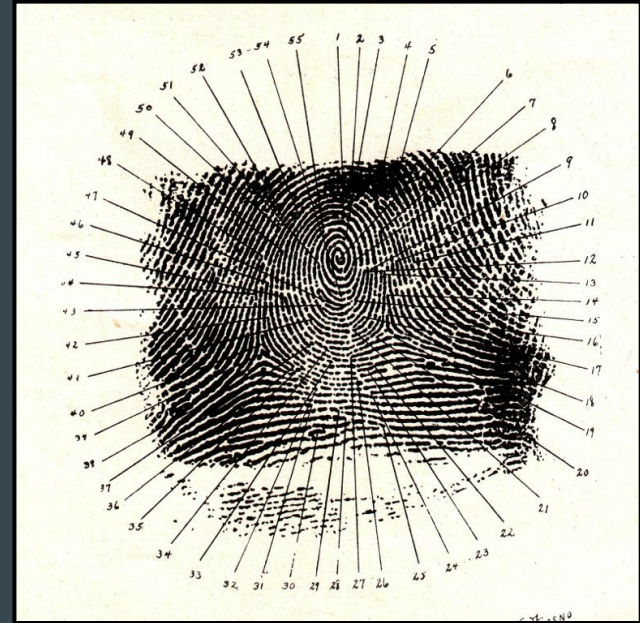*iPhone Fingerprint Recognition. Schwartz, M. (2014)*

AI's Role in Fingerprint Recognition

➤ # 1 Challenge in Fingerprinting: Storing Data

Core Components. Ace Project (2012)

Parts of a Fingerprint. Goldberg, S. (2016)

Iris Recognition Process

➢ Image Capture
- ○ A high-quality image of the iris is taken using near-infrared (NIR) sensors

➢ Compliance Check and Image Enhancement
- ○ Specialized software is used to analyze the image for sharpness, gray-level spread, margin, iris sclera contrast, iris pupil contrast and pupillary dilation, eyelash presence, eyelid occlusion

➢ Image Compression

➢ Biometric Template Creation for Matching

Iris Recognition Advantages & Disadvantages

➢ Advantages
  ○ More sanitary
  ○ Accurate matching performance
  ○ Does not change much as people age
  ○ Difficult to spoof
➢ Disadvantages
  ○ Cannot use a visible light (VIS) camera
  ○ Visible light must be minimized
  ○ Less value for criminal investigations

Where is Iris Recognition Used?

➢ Less common than voice and face recognition
  ○ Requires specific hardware
➢ Ideal for high throughput environments
➢ Frequently used in border control deployments
  ○ Otay Mesa US-Mexico land border
➢ Consumer mobile devices
  ○ Galaxy Note 7 and Windows phones
➢ Used at the European Organization for Nuclear Research in Geneva, Switzerland