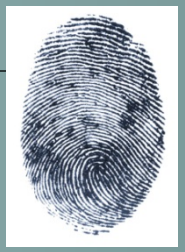
Understanding Biometrics



4. Architecture and Processes

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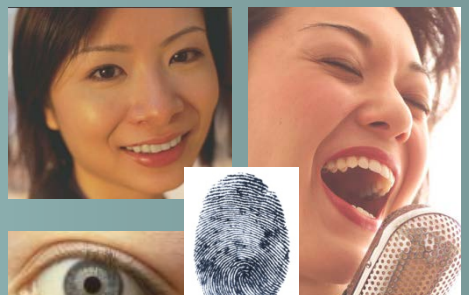
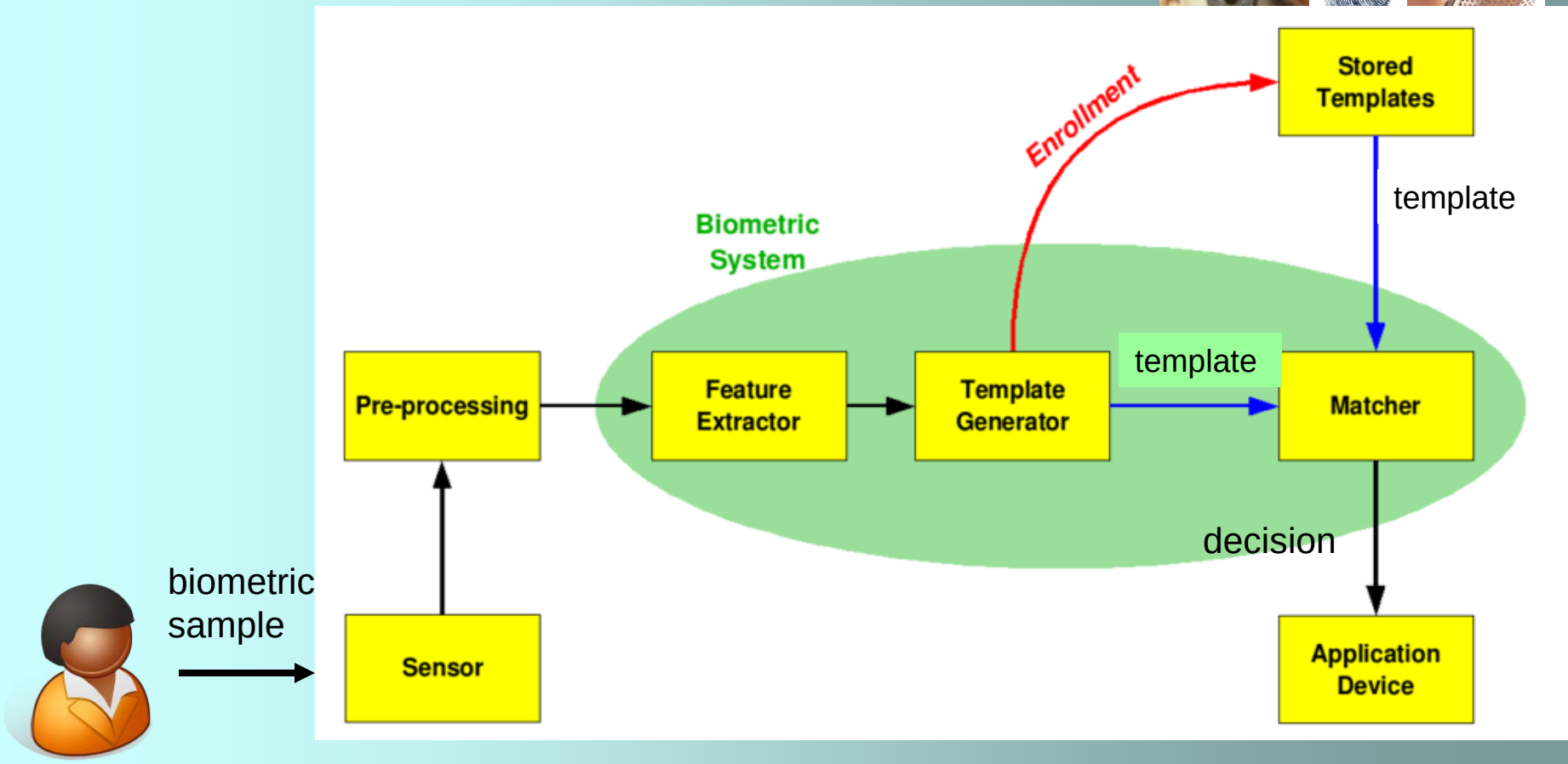
Typical architecture





Adapted from: http://en.wikipedia.org/wiki/Image:Biometric_system_diagram.png

Terminology

- Biometric sample
  - What the user presents to the system, e.g. fingerprint
- Pre-processing
  - Usually to remove noise, correct distortions, amplify signal, enhance image, etc.
- Feature extraction
  - “Image” or signal is not used for comparison, instead, features (e.g. minutiae) are extracted.
- Template
  - Small “file” of the features.
  - Templates cannot be used to reconstruct sample.

Terminology

- Enrollment
  - To register the user to the system, so that s/he may subsequently be identified.
  - This may require the user to present several biometric samples, so that system can “learn” the inherent variation.
  - One or more templates are then generated and stored in a database.
- Matching
  - Comparison of two templates to determine *similarity* (or difference).
- Score
  - Numeric value representing (dis-)similarity

Terminology

- Threshold
  - For verification, usually the score is compared to a pre-defined threshold.
  - If score < threshold, then *Accept*, else *Reject*
  - Threshold can be set according to requirements.
- Decision
  - For verification: *accept* or *reject*
  - For identification: *identity* of the person
  - Sometimes, decision may be *unknown*, or *undecided*

Remarks

- The processes shown (boxes) need not be physically located at one place.
  - e.g. the database could be remotely and centrally stored.
- Some systems check the quality of the acquired biometric sample and reject samples of poor quality.
- Vendors typically have their own proprietary features, processing, templates, and matching algorithms.
- Over time, users may have to re-enroll, to update their biometric samples.