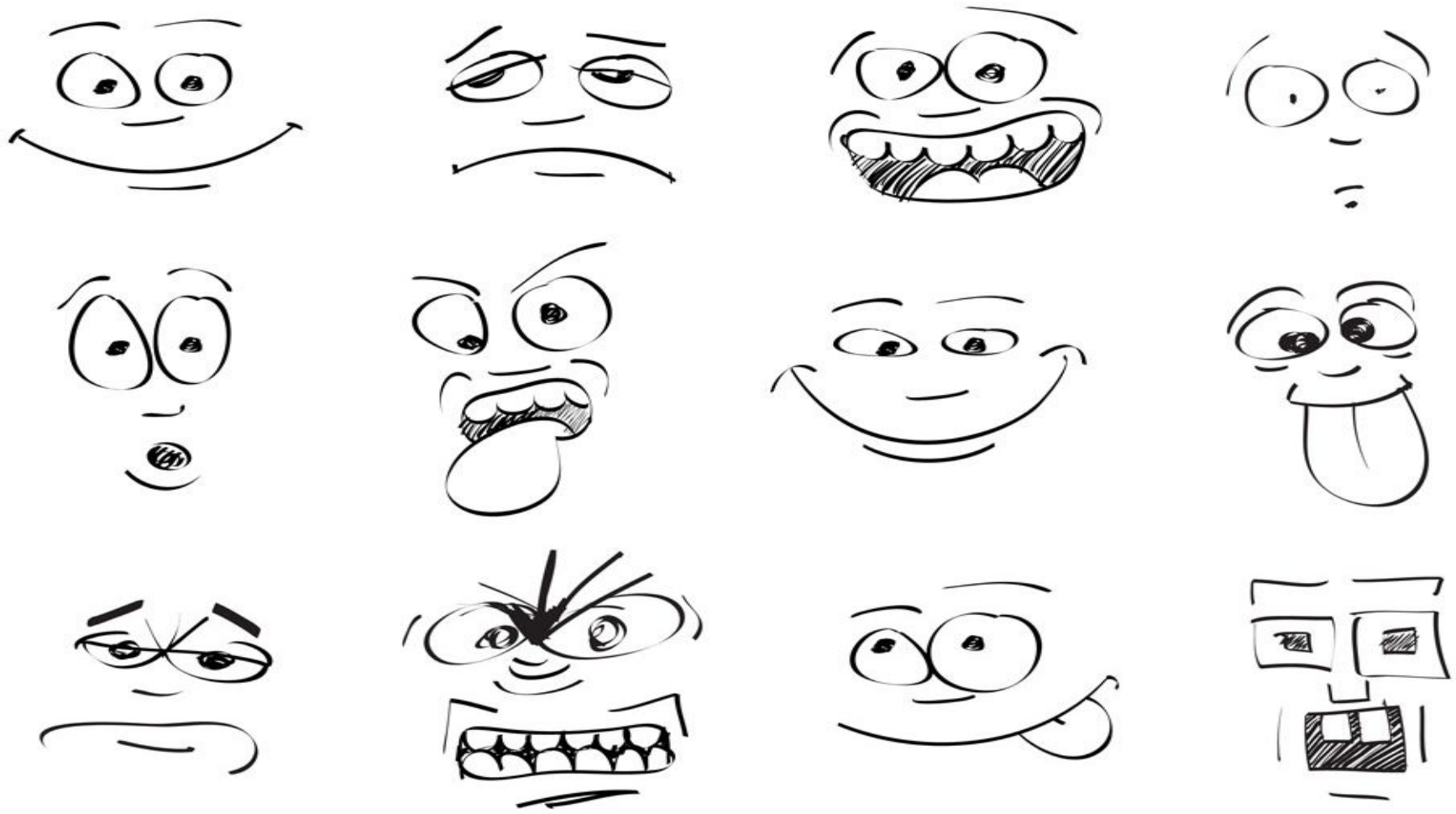

Facial Expression Recognition Using Eigenface Method

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2014-04-23

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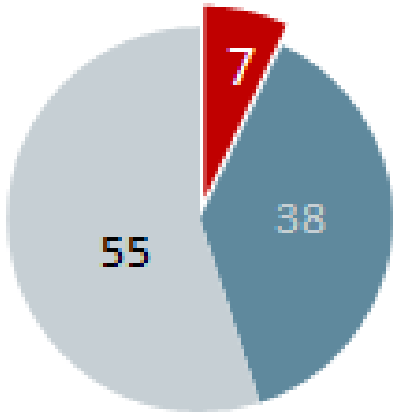
- Introduction
- Related Work
- Implementation Results and Discussion
- On-site Demo

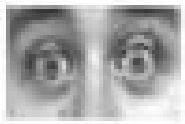

Introduction

Facial Expression

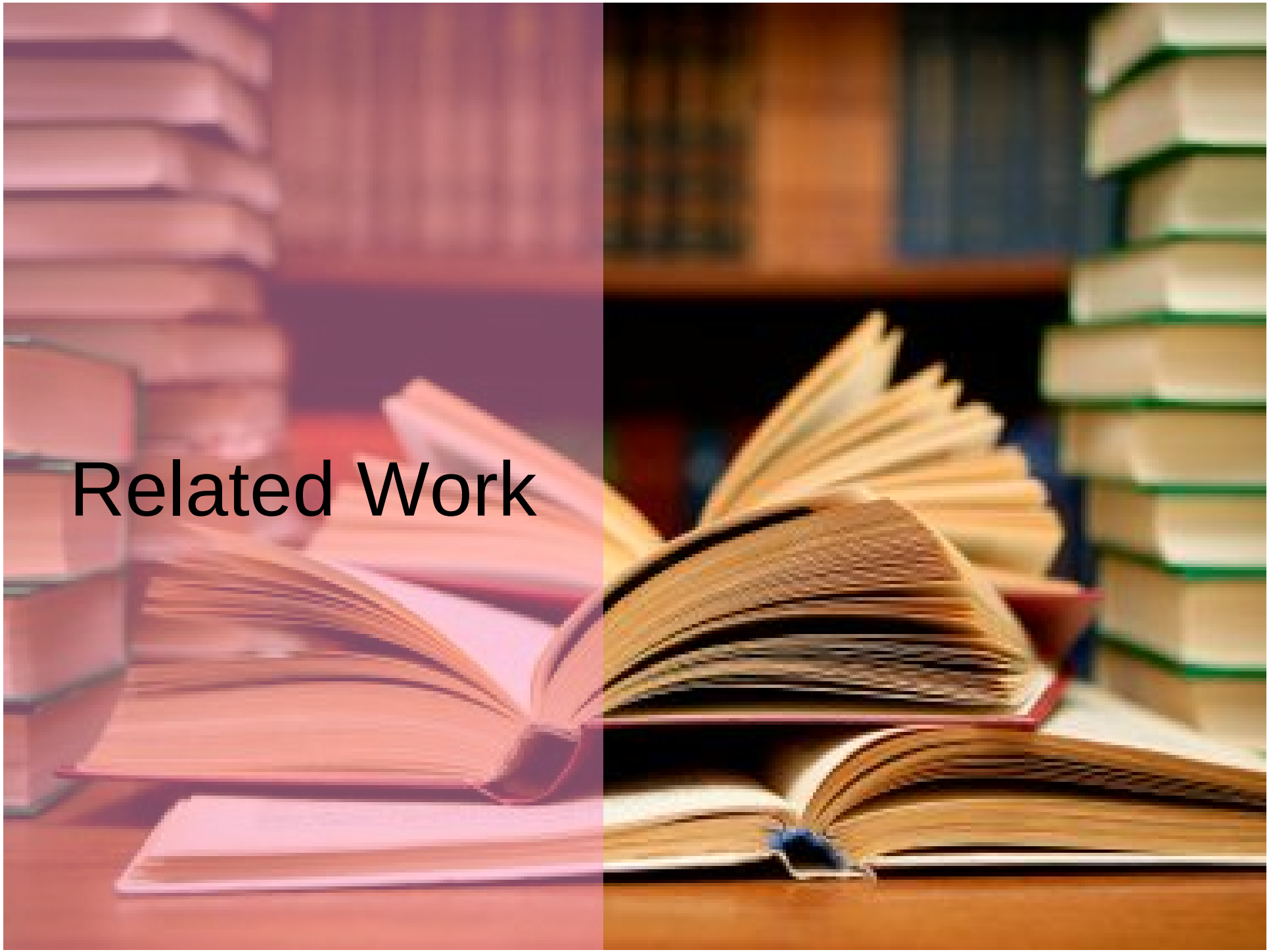


6 basic expressions, FACS and AU

6 basic expressions, FACS and AU

AU1  Inner brow raiser	AU2  Outer brow raiser	AU4  Brow Lowerer	AU5  Upper lid raiser	AU6  Cheek raiser
AU7  Lid tighten	AU9  Nose wrinkle	AU12  Lip corner puller	AU15  Lip corner depressor	AU17  Chin raiser
AU23  Lip tighten	AU24  Lip presser	AU25  Lips part	AU26  Jaw drop	AU27  Mouth stretch

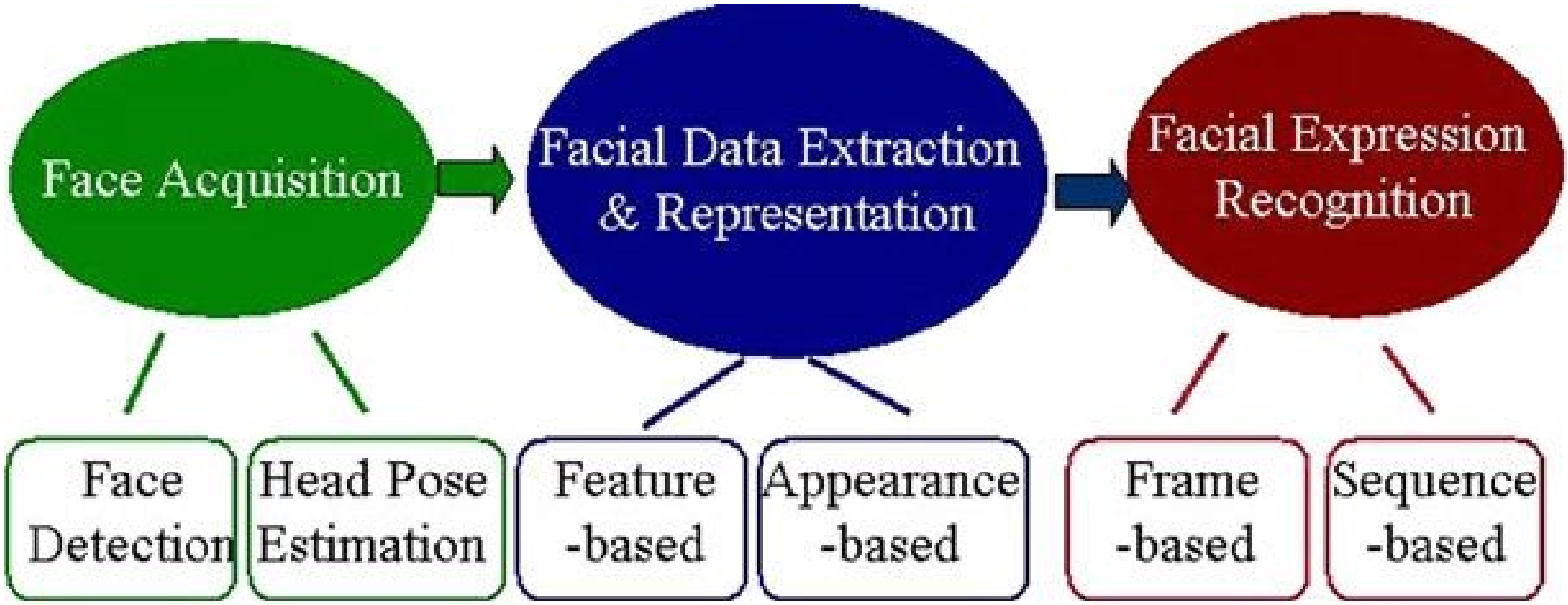
Related Work



Two types of Facial Expression Recognition

- Single Static Image Based
  - Relatively simple
  - Light computation
- Dynamic image Sequence Based
  - Consider the face movement and time information
  - Heavy computation

The Basic Working Flow



* Figure Cited from the handbook of face recognition, 2nd Edition by Stan Z. Li and Anil K. Jain

Face Detection

- Global consideration
  - template based
  - skin color based
- Feature analysis
  - detecting important features such as eyes and mouth and then calculating the face

Facial Feature Extraction

- Geometric feature extraction
  - Data size would be compressed
  - Some important facial expression changing features may be lost
- Statistical feature extraction
  - Requires large size of sample training
  - The eigenface method belongs to this category
- The Gabor filter – frequency domain feature extraction
- The movement feature extraction
  - Optical Flow and Feature points tracking

Recognition Method

- Expert rules
- Neural Network
- Support vector machines (SVM)
- Hidden Markov model (HMM)

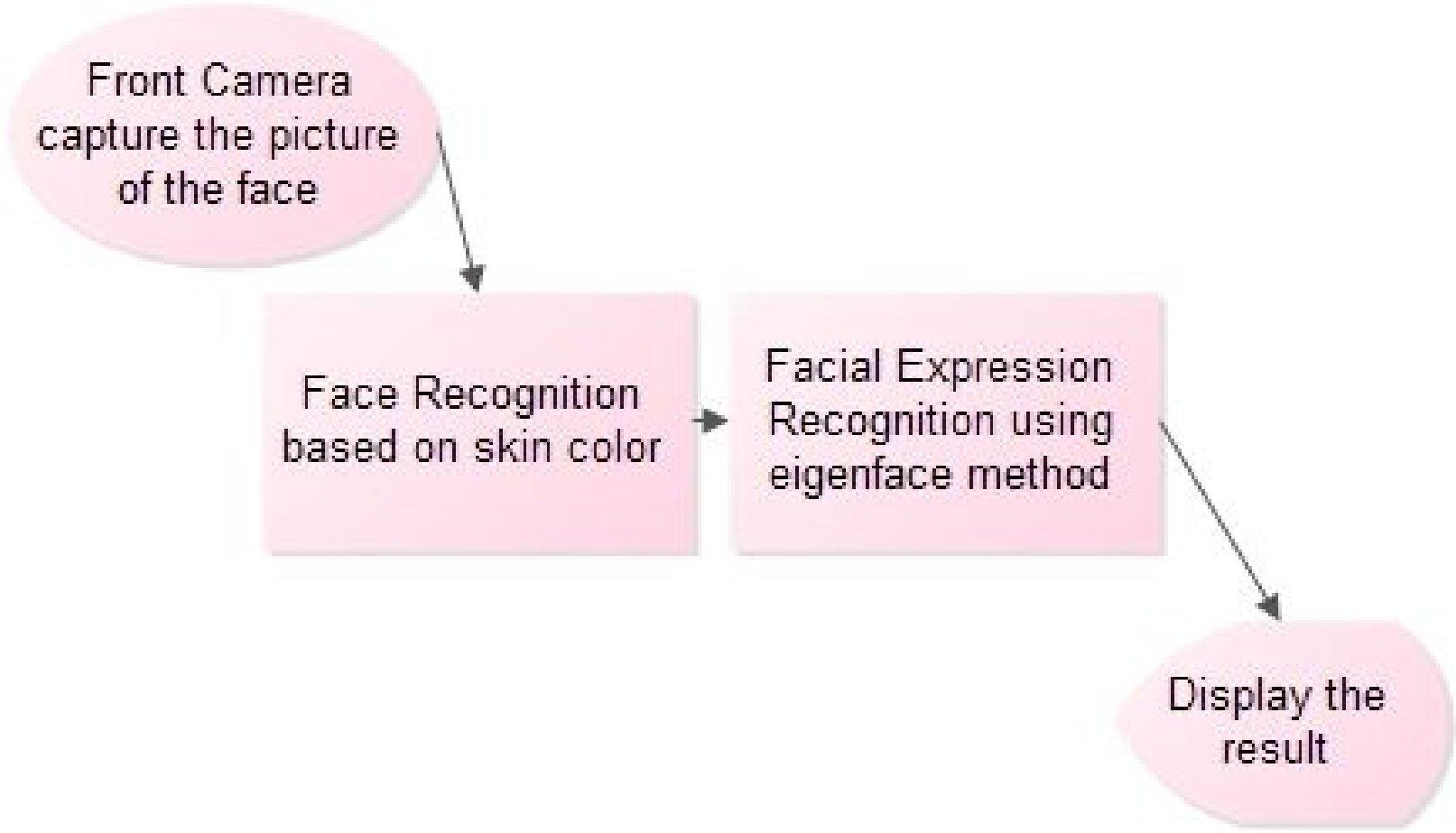
Implementation

Result

&

Discussion

The major steps of this project



The eigenface method

- The training images were generated a low dimensional face space and also the projected versions of all these training images.
- The captured image was also projected onto the face space, which means that the captured image was represented by the selected principal components
- The Euclidian distance of the projected test image from each projected training image was calculated.
- The minimum Euclidian distance represented that the right training image was the most similar one to the captured image

Result

- The same face, and with good light condition, the recognition result was optimized.
- Different faces, it would influence the recognition rate.
- The size of face in the image would affect the result.

Discussion

- The Eigenface method is a classical method
- The basic concept of the eigenface method is Principal Component Analysis and distance calculation.
- It depended on the gray level similarity of the training image set and the given test image
- It would be influenced greatly while the light, angle, face size and face color

On-site Demo

Q & A