Face is unique

- Face-to-face interaction/communication is essential
Has worked for millions of years
Convey nonverbal clues
Exchange feeling
Psychological & physical connection
Computer ↔ Face is challenging
Face understanding is the key

Face Understanding
(low-level, high-level)

Application-dependent
Face understanding is the key

- Direction?
- Where?
- Emotion?
- Who?
Low-level face understanding

- **Face Detection**
  - Detect 2D frontal face
- **Face Alignment**
  - Locate face features
- **Face Segmentation**
  - Extract the whole face region
- **3D Face Pose Tracking**
  - Track the face pose and orientation
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Face understanding framework

**Low-level Representation:**
- Detection
- Alignment and pose tracking
- Representation

**High-level Understanding:**
- Same or not?
- Male or Female?
- Smiling or not?

Identify, age, race, expression, emotion (sad, happy...), ...
Knowing where you are

- Focus/Exposure control
Knowing where you are

- For TV - personal settings, parental control, and energy saving
Knowing where you are

- “Auto Self Portrait”
Face $\leftrightarrow$ Computer $\leftrightarrow$ Face

Face Understanding
(low-level, high-level)

Application-dependent
Protect Privacy

- Facial region segmentation
Protect Privacy

- Background blur
Protect Privacy

• Virtual background
Knowing facial 3D pose
Knowing facial 3D pose (in Microsoft LifeCam)
Knowing facial expression

- Chatting room
  - Hang out with friends before & after playing games
- Live meeting
- Facebook, Youtube
  - Funny greetings, avatar comments
Knowing facial expression

Input Image

2D Points from AAM Tracker

Face State Analysis

- **Frown State**
  - Frown
  - Normal
- **Mouth Shape State**
  - Pouty
  - Stretched
  - Others
- **Mouth Emotion State**
  - Happy
  - Neutral
  - Unhappy

Action Units

Avatar Key Frames
Knowing facial expression
Knowing identities
Knowing identities - *face recognition*

- Recognition feature is learned from data

Zhimin Cao, Qi Yin, Xiaoou Tang, and Jian Sun. Face Recognition with Learning based Descriptor. CVPR 2010.
Try it out

Windows Live Photo Gallery 2011

Photos made fun
Import photos from your camera, organize them into albums, and edit them so they look their best. Use powerful photo tools to create stunning panoramas, movies, slide shows, and more. When you're ready to share, publish your photos and videos to your favorite websites like Facebook and Flickr directly from Photo Gallery.

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Find the photos you're looking for
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Make photos look great
Make your photos really stand out with powerful and easy-to-use editing tools that you can use to edit dozens of photos simultaneously. Clean up photos, remove blemishes, fix red eye, and more. Learn more
Xbox Kinect

- Body skeleton tracking using a depth camera
Kinect Identity

• A skeleton $\leftrightarrow$ a game character / a player profile
• But, when player leaves/back or tracking fails/resumes
  – New player or an existing payer? Who is who?
Summary

- Interacting with face is unique
- **Face understanding** is the key