What do we mean by “object recognition”?

Next 15 slides adapted from Li, Fergus, & Torralba’s excellent short course on category and object recognition.
Verification: is that a lamp?

Detection: are there people?
Identification: is that Potala Palace?

Object categorization

- mountain
- tree
- banner
- building
- street lamp
- vendor
- people
Scene and context categorization

- outdoor
- city
- ...

Object recognition
Is it really so hard?

Find the chair in this image
Output of normalized correlation

This is a chair
Object recognition
Is it really so hard?

Find the chair in this image

Pretty much garbage
Simple template matching is not going to make it

A “popular method is that of template matching, by point to point correlation of a model pattern with the image pattern. These techniques are inadequate for three-dimensional scene analysis for many reasons, such as occlusion, changes in viewing angle, and articulation of parts.” Nivatia & Binford, 1977.
Why not use SIFT matching for everything?

• Works well for object *instances*

• Not great for generic object *categories*

Applications: Computational photography

(Face priority AE) When a bright part of the face is too bright
Applications: Assisted driving

Pedestrian and car detection

Lane detection

- Collision warning systems with adaptive cruise control,
- Lane departure warning systems,
- Rear object detection systems,
How do human do recognition?

• We don’t completely know yet
• But we have some experimental observations.

Observation 1

• We can recognize familiar faces even in low-resolution images
Observation 2:

Jim Carrey
Kevin Costner

* High frequency information is not enough

What is the single most important facial features for recognition?
Observation 4:

• Image Warping is OK

The list goes on

Face Recognition by Humans: Nineteen Results All Computer Vision Researchers Should Know About

Questions?