

# CSE 152A: Computer Vision

Hao Su

## Lecture 0: Introduction



Credit: Manmohan Chandraker

# Defining computer vision



*Wall-E: Fact and Fiction (Minh Do, Princeton University)*

# Studying computer vision

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROJECT MAC

Artificial Intelligence Group  
Vision Memo. No. 100.

July 7, 1966

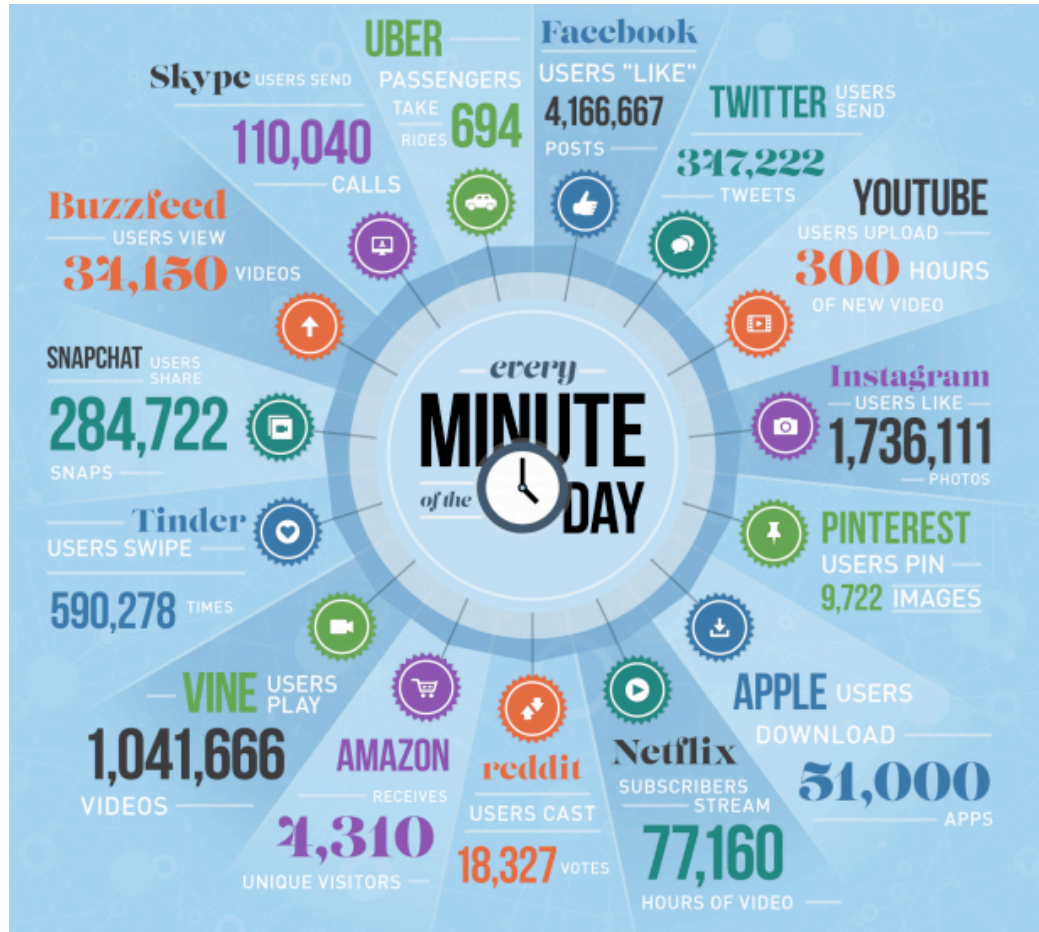
## THE SUMMER VISION PROJECT

Seymour Papert

The summer vision project is an attempt to use our summer workers effectively in the construction of a significant part of a visual system. The particular task was chosen partly because it can be segmented into sub-problems which will allow individuals to work independently and yet participate in the construction of a system complex enough to be a real landmark in the development of "pattern recognition".

# Studying computer vision

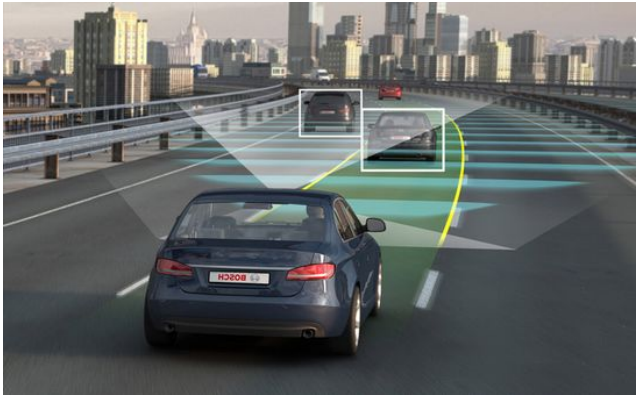
- Images are everywhere around us





# Studying computer vision

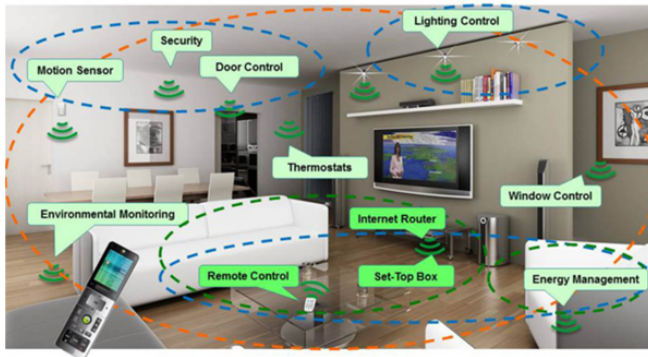
- Images are everywhere around us
- Rapidly emerging technologies



Autonomous driving



Gaming



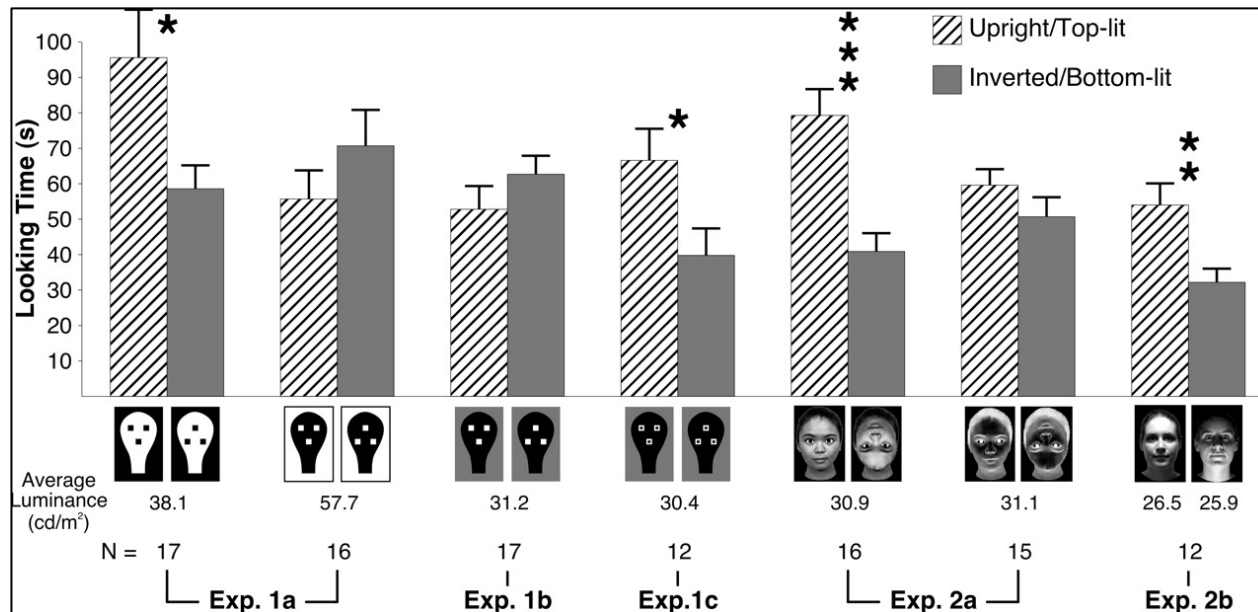
Smart homes



Factory automation

# Studying computer vision

- Images are everywhere around us
- Rapidly emerging technologies
- Deep and attractive scientific problems
  - How do we recognize objects?
  - Why do newborn babies respond to face-like shapes?
  - Beautiful marriage of math, physics, biology, CS, engineering



[Farroni et al., 2005]

# Organizing Computer Vision

# Broad classes of vision applications

Sense

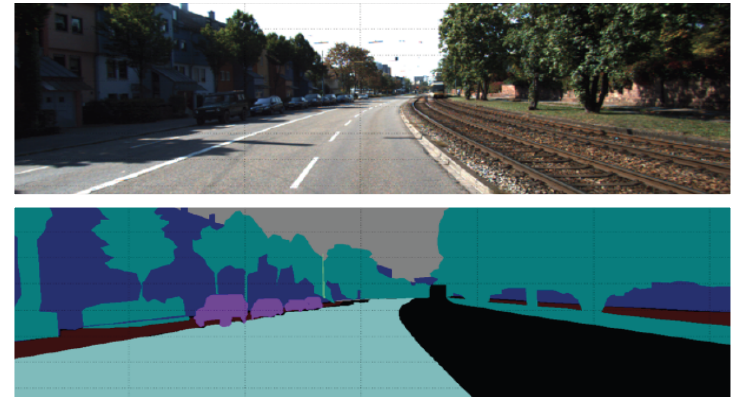
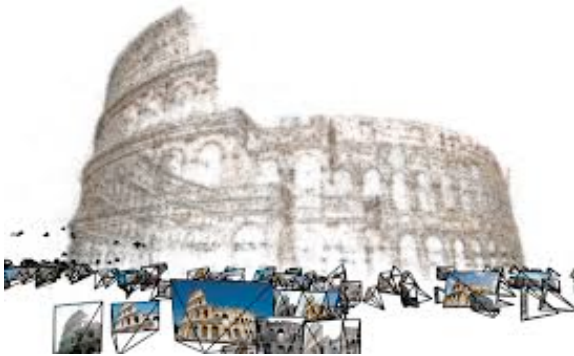
Understand

Interface

Reconstruct

Recognize

Reorganize



# Broad classes of vision applications

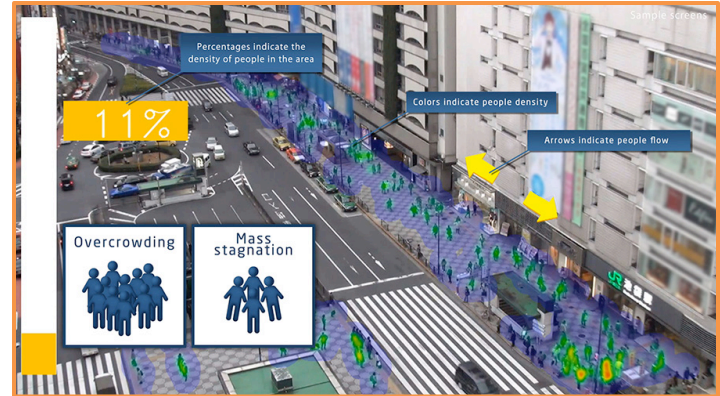
Sense

Understand

Interface

Scenes

People





# Broad classes of vision applications

Sense

Understand

Interface

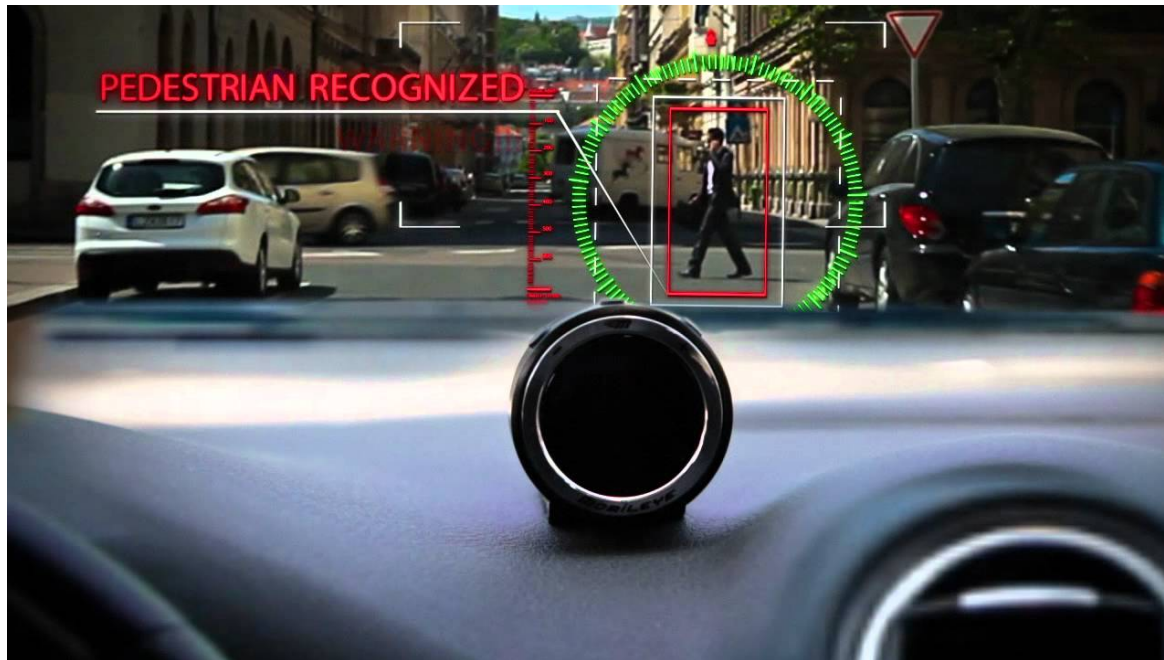
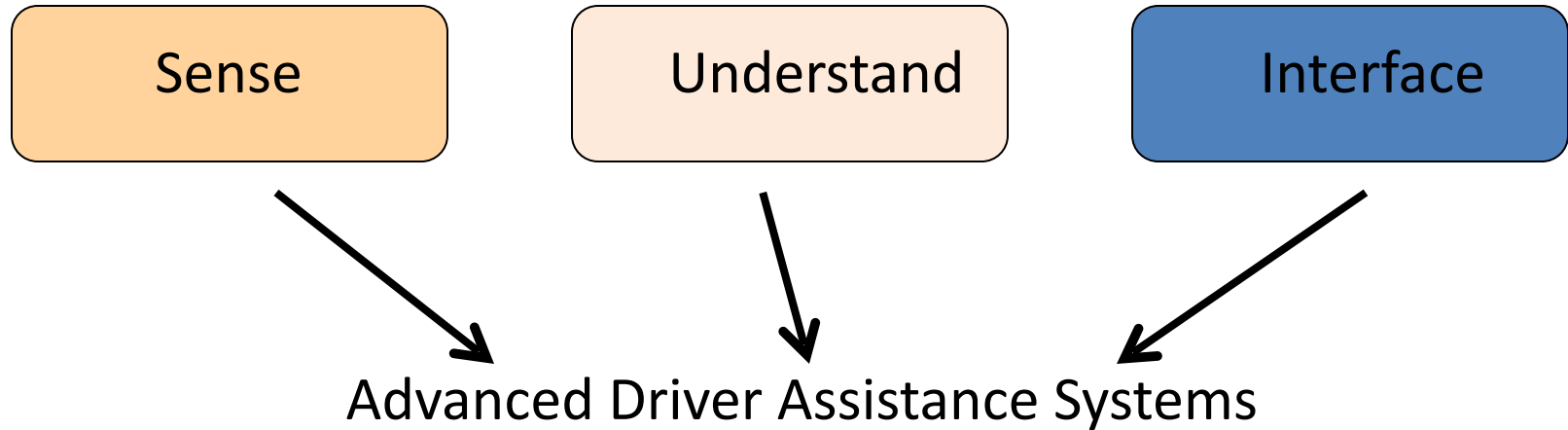
Human-Human

Human-Machine

Machine-Machine



# Significant progress in recent years



# A Few Topics That We Will Study

- Cameras and image formation
- Feature detection and matching
- Structure from Motion
- Multiview stereo
- Optical flow
- Image classification
- Object recognition
- Object detection
- Semantic segmentation
- Support Vector Machines
- Deep Neural Networks

# Take-home message

- Computer vision is a key branch of AI
- Enables several modern applications around us
- A lot of highly visible and high-impact activity
- Huge industry interest
- This is a great time to study computer vision!

# CSE Courses on CV

- CSE152A Fall, Winter (intro-level)
- CSE152B Spring (advanced)
- CSE252A Fall (intro-level)
- CSE252B Winter (3d focused)
- CSE252C Spring (research oriented)



# Course Details

# Course details

- Homework assignments
  - Easy problems based directly on class discussions
  - Harder problems may require additional reading
  - Programming in Python might be required
  - Submit PDF to Gradescope before deadline
- Mid-term
- Final exam
- Participation
  - Ask questions, answer questions, engage in discussions

# Course details

- Class webpage:
  - <https://ucsd-cse-152.github.io/>
- Instructor email:
  - [haosu@eng.ucsd.edu](mailto:haosu@eng.ucsd.edu)
- Grading
  - 40% final exam
  - 40% homework assignments (4)
  - 20% mid-term
- Aim is to learn together, discuss and have fun!

# Course details

- TAs:



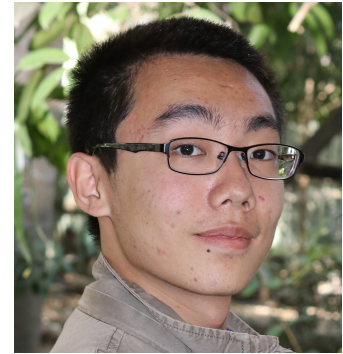
Zhiwei Jia



Rishikanth  
Chandrasekaran



Stephen Guerin



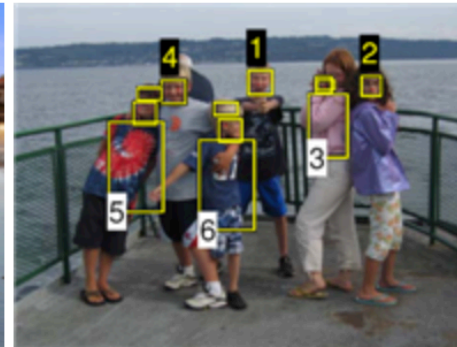
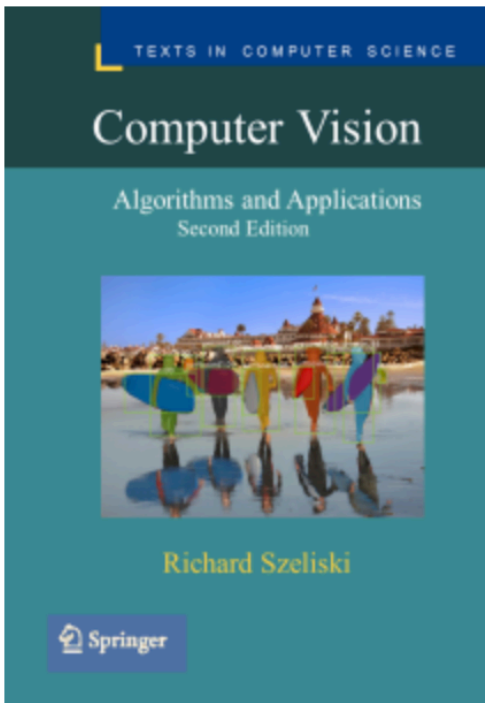
Zhenyu Bi

- TA office hours (class webpage)
- Piazza for questions and discussions (class webpage)

# Book

## Computer Vision: Algorithms and Applications, 2nd ed.

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# Test of Background