

# Computer Vision

**Goal:** Inferring the properties of the world from one or more images

- Photographs
- Video Sequences
- Medical images
- Microscopy data

→ **Image Understanding**



# Challenges

Vision involves dealing with:

- Noisy images
- Many-to-one mapping
- Aperture problem

→ Requires:

- Assumptions about the world
- Statistical and physics-based models
- Training data

True image understanding seems to require a great deal of thinking. We are not quite there yet.

# We Still See the Dog!



# Opportunities

**C**ameras are becoming ever more prevalent and Deep networks have immensely boosted the performance of Computer Vision algorithms:

- Tremendous potential for applications.
  - A window on the way the mind works.
  - But limited understanding of why things work.
- ➔ Still much work to be done !!!!
- ➔ Lots of jobs in Switzerland and elsewhere.

# Course Outline

## Introduction:

- Definition
- Human vision
- Image formation

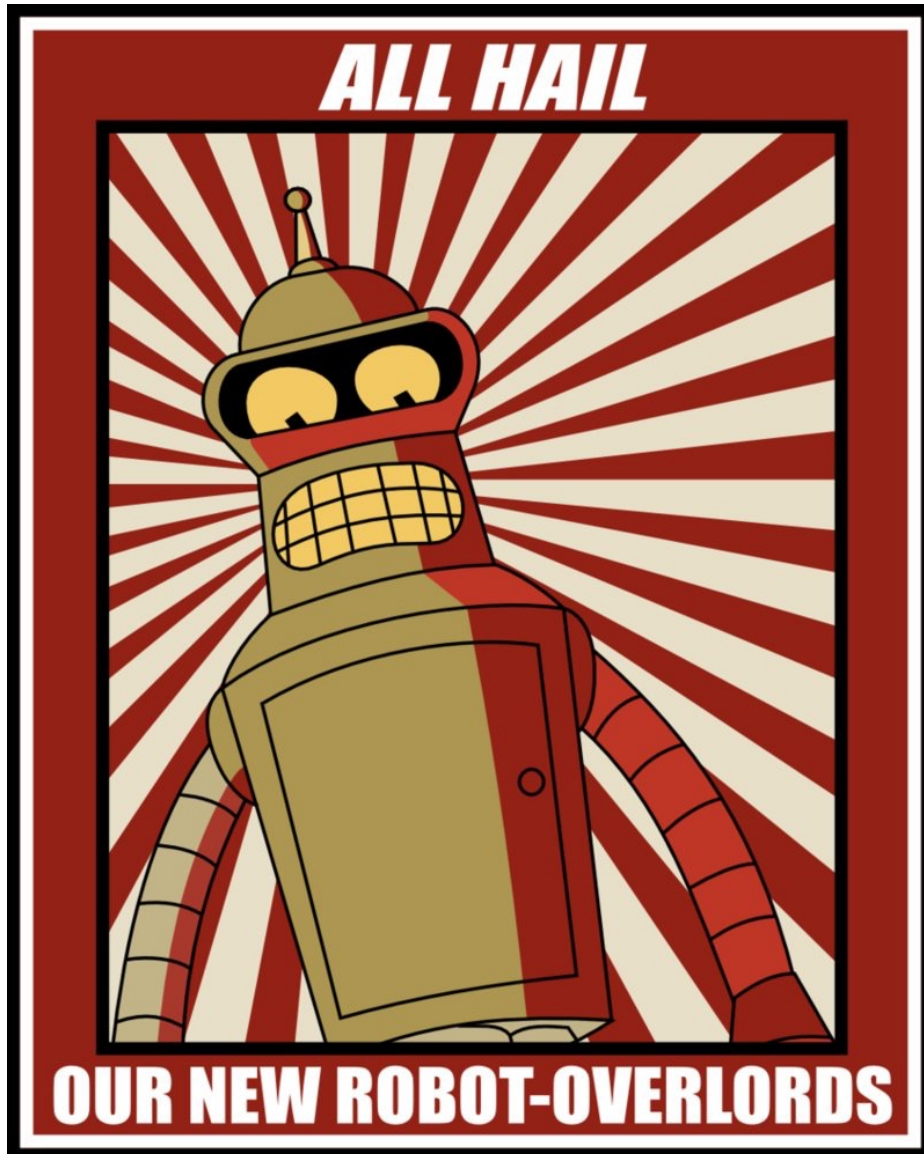
## Extracting features:

- Contours
- Texture
- Regions

## Shape recovery:

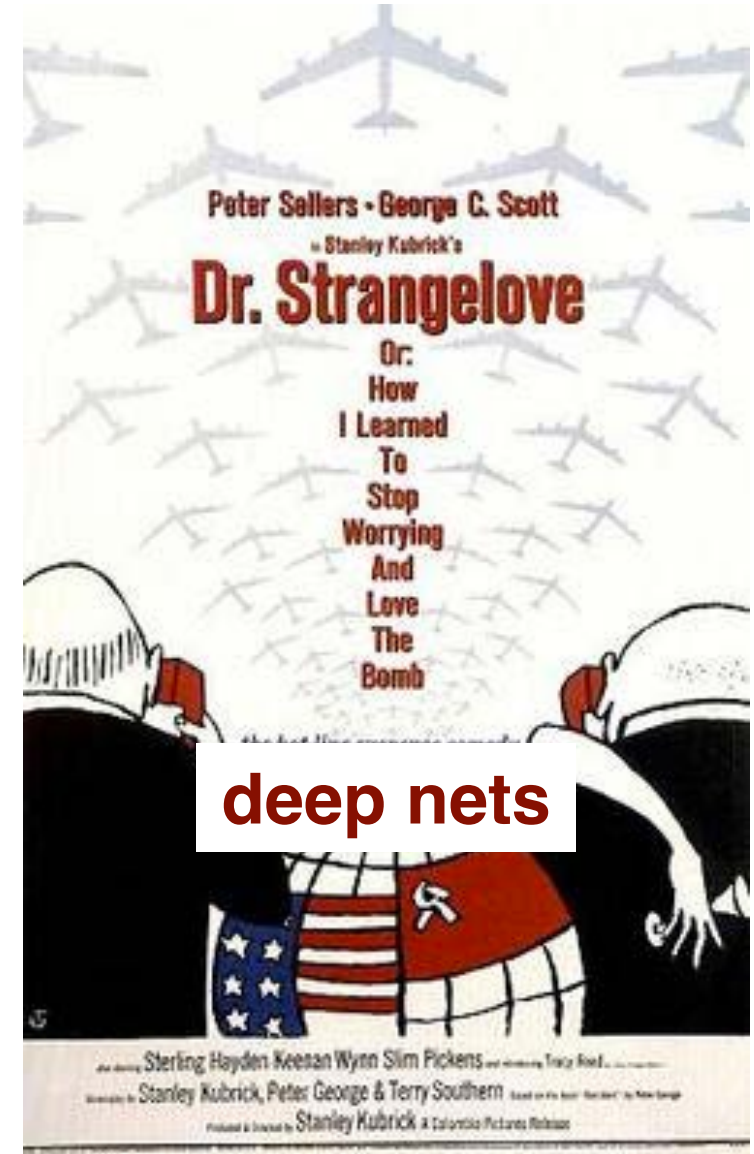
- From one image
- Using additional images

# Deep Learning Revolution



or

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# Final Exam

Tuesday 02.07.2024 from 09h15 to 10h45 (CE3, CE4, CE6)

- One sheet of **hand-written** notes is allowed.
- No other documents or electronic devices.

# Slide Codes

Training vs Testing

**Normal slide:** It is part of the course and I may ask exam questions about it.

Training vs Testing

**Reminder slide:** We have already covered this earlier in the class. Go back to the appropriate lecture if you do not remember.

Reminder

Training vs Testing

**Optional slide:** This is additional material for people interested in more details. I will not ask direct exam questions on this.

Optional Bishop, xxx

Reference to book or paper for even more details.



# What you Should Revise

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## ✓ Segmentation

Partitioning images into separate regions of interest.



Segmentation



Computer Vision: Algorithms and Applications. Chapter 7.5.



Transformers in Natural Language Processing (NLP)