# Syllabus Notes

- Next topics segmentation, grouping and fitting.
- We will do perhaps half each of §14, §15, and §16.

# Segmentation, Grouping, and Fitting

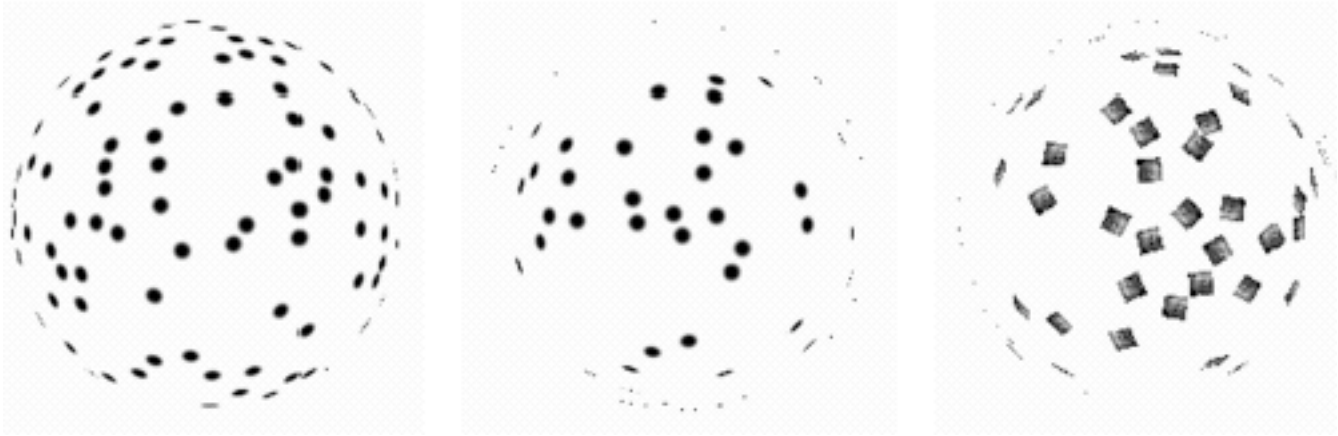
- Collect together tokens that belong together
- Gives a compact representation from an image/motion sequence/set of tokens that can be significantly easier to deal with
- What is the “right” group is often dependent on the application
- Broad theory is not known at present (and may not exist)
- These are general concepts--apply to many things, not just breaking images into regions of the same color.

# Segmentation, Grouping, and Fitting

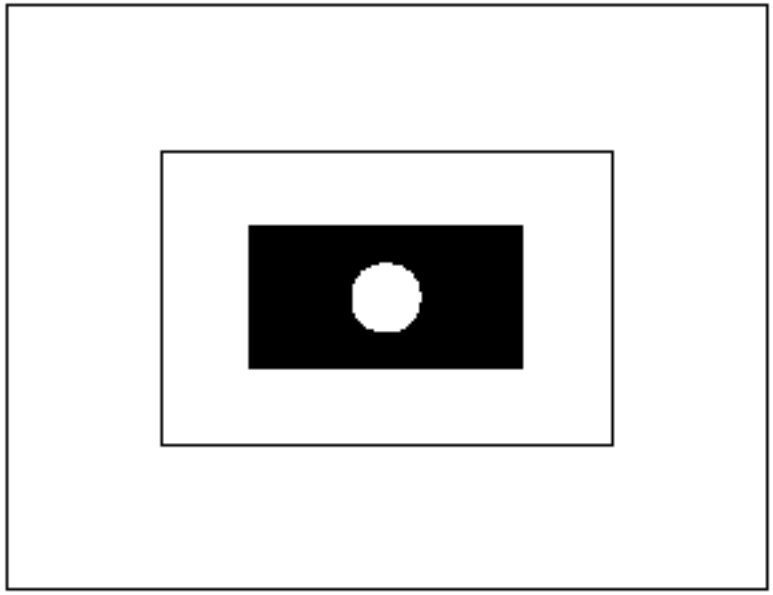
- Terminology varies and the usage and the meaning of segmentation, grouping, and fitting overlap. However somewhat common usage:
  - Grouping (or clustering) is quite general sometimes suggest a relatively high level (group the black and white halves of a penguin together)
  - Segmentation is suggestive of the grouping is done at a low level and is quite spatially (or temporally coherent) given regions in time or space
  - Fitting when the focus is on a model associated with tokens. Issues:
    - which model?
    - which token goes to which element in the model (correspondence)?
    - how many elements in the model (how complex should it be)?

# General ideas

- Tokens
  - whatever we need to group (e.g. pixels, points, surface elements)
- Top down segmentation
  - tokens belong together because they lie on the same object
- Bottom up segmentation
  - tokens belong together because they are locally coherent
- These two are not mutually exclusive

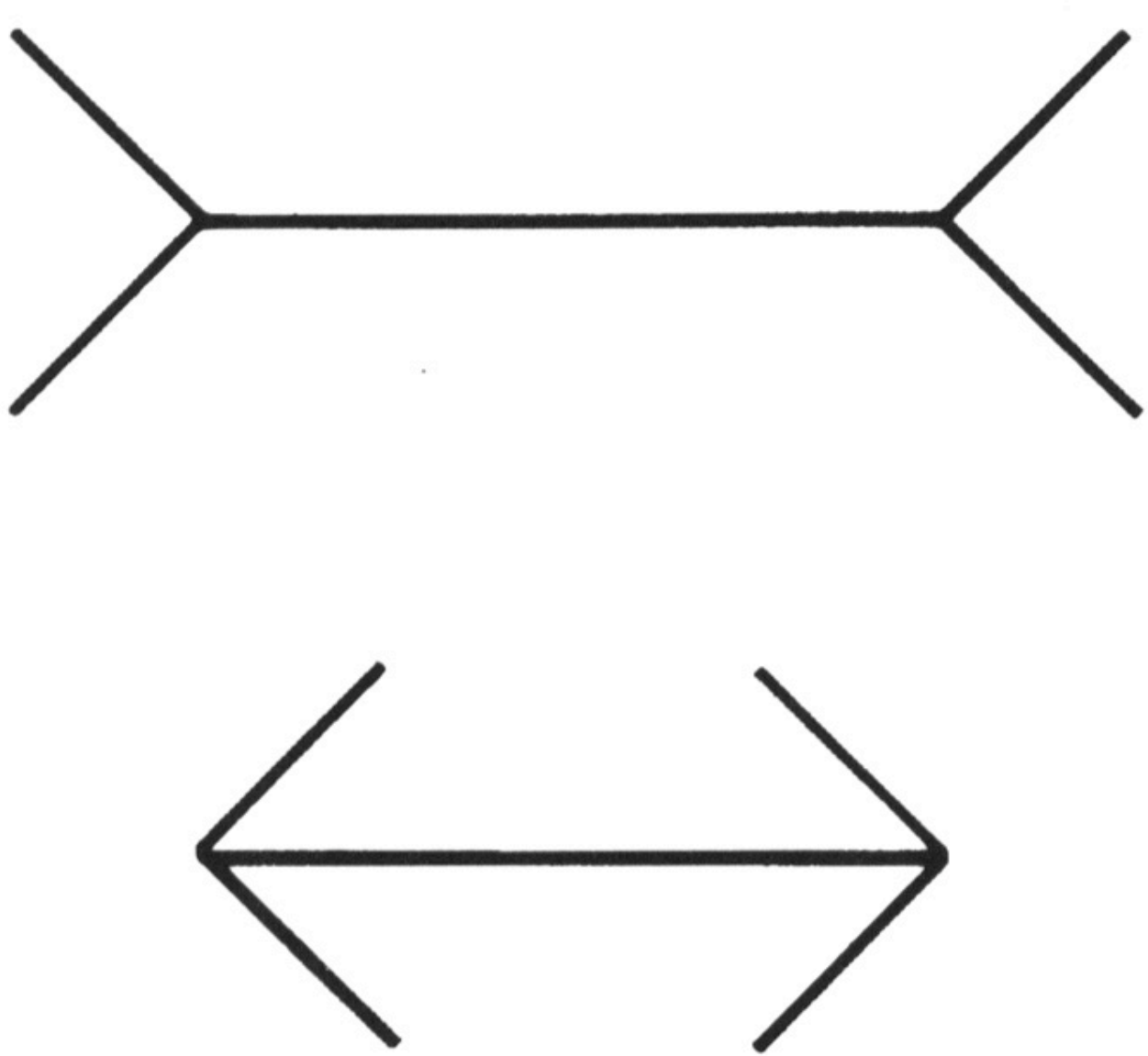


Why do these tokens belong together?

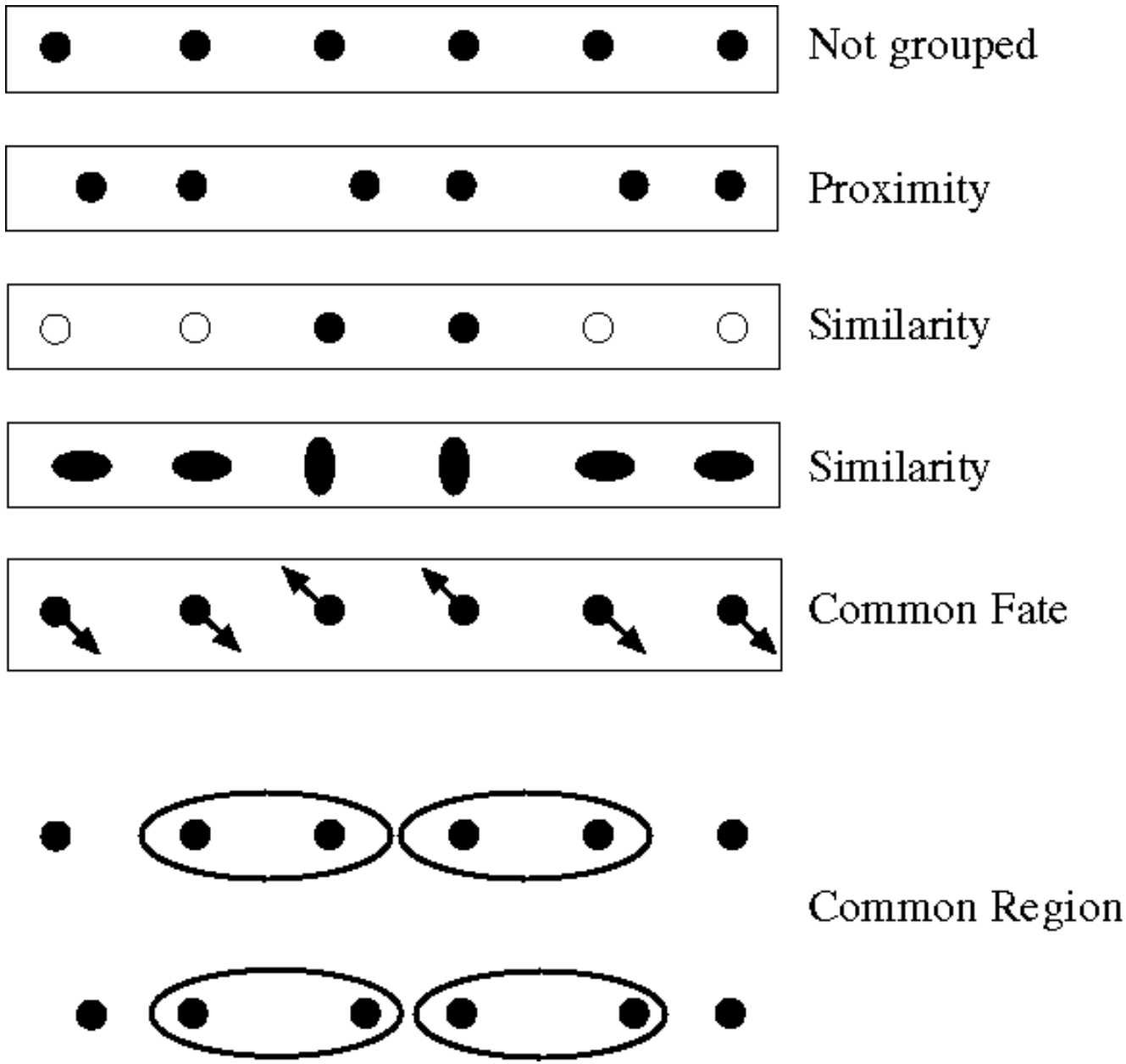


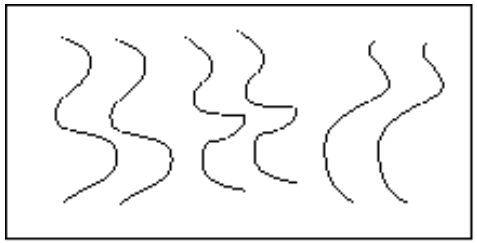
# Basic ideas of grouping in humans

- Figure-ground discrimination
  - grouping can be seen in terms of allocating some elements to a figure, some to ground
  - impoverished theory
- Gestalt properties
  - Elements in a collection of elements can have properties that result from relationships (e.g. Muller-Lyer effect)
  - A series of factors affect whether elements should be grouped together
    - Gestalt factors

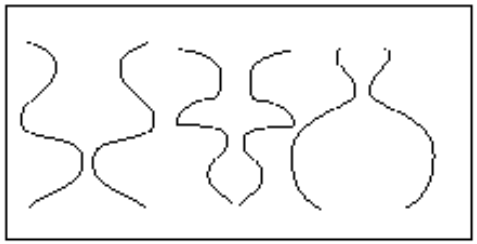


The Muller-Lyer illusion; the horizontal bar has properties that come only from its membership in a group

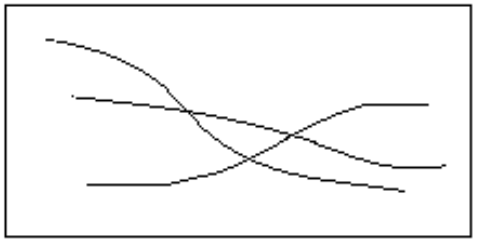

Not grouped
Proximity
Similarity
Similarity
Common Fate
Common Region



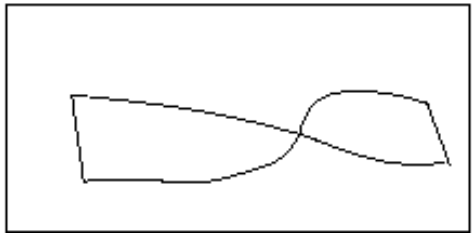
Parallelism



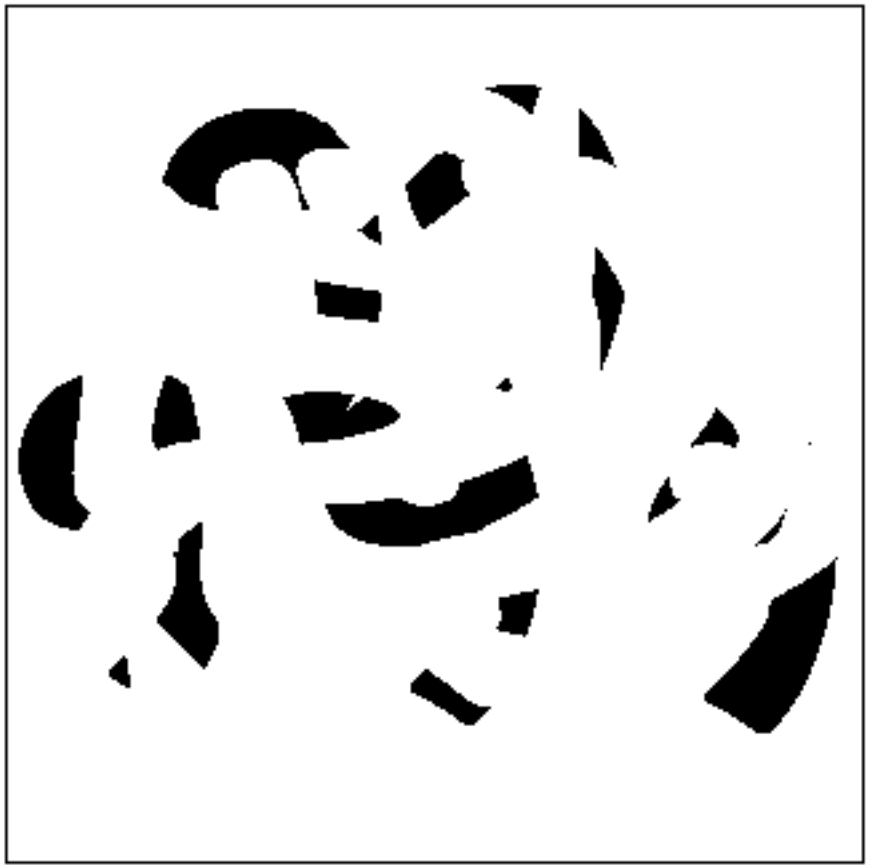
Symmetry

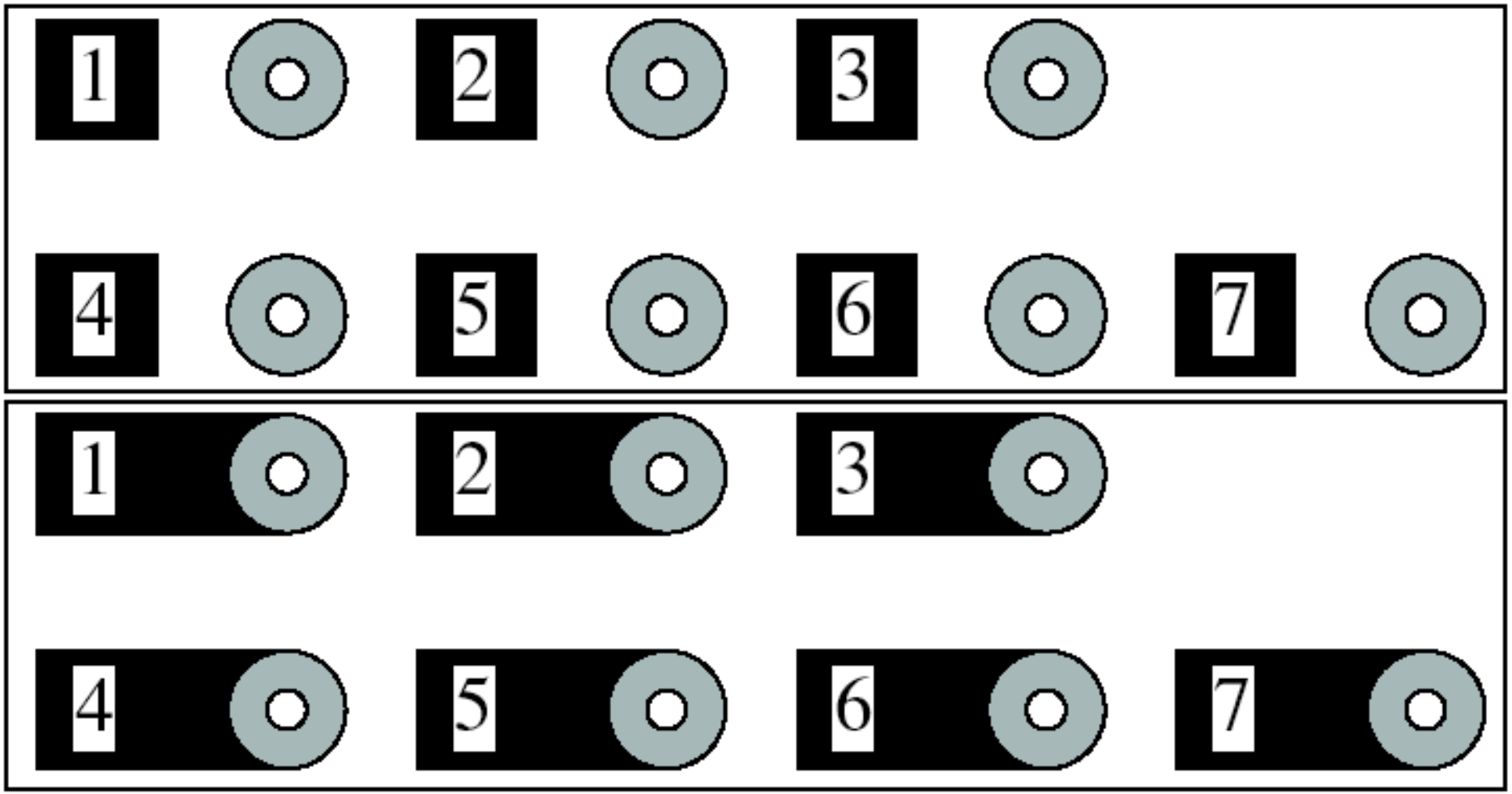


Continuity



Closure




1
2
3
4
5
6
7
1
2
3
4
5
6
7

# Technique: Shot Boundary Detection

- Find the shots in a sequence of video
  - shot boundaries usually result in big differences between succeeding frames
- Strategy:
  - compute interframe distances
  - declare a boundary where these are big
- Possible distances
  - frame differences
  - histogram differences
  - block comparisons
  - edge differences
- Applications:
  - representation for movies, or video sequences
    - find shot boundaries
    - obtain “most representative” frame
  - supports search