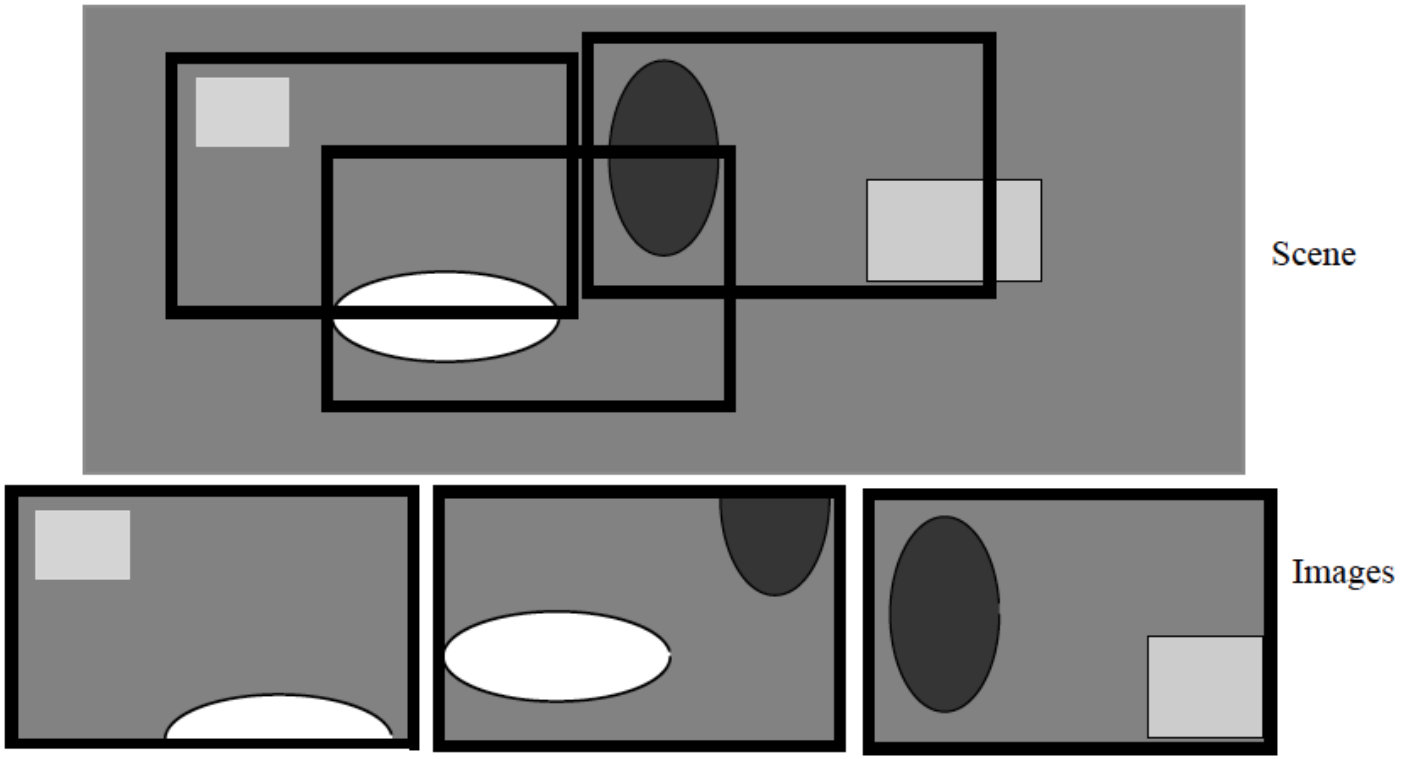
Simple mosaics

D.A. Forsyth

University of Illinois at Urbana Champaign

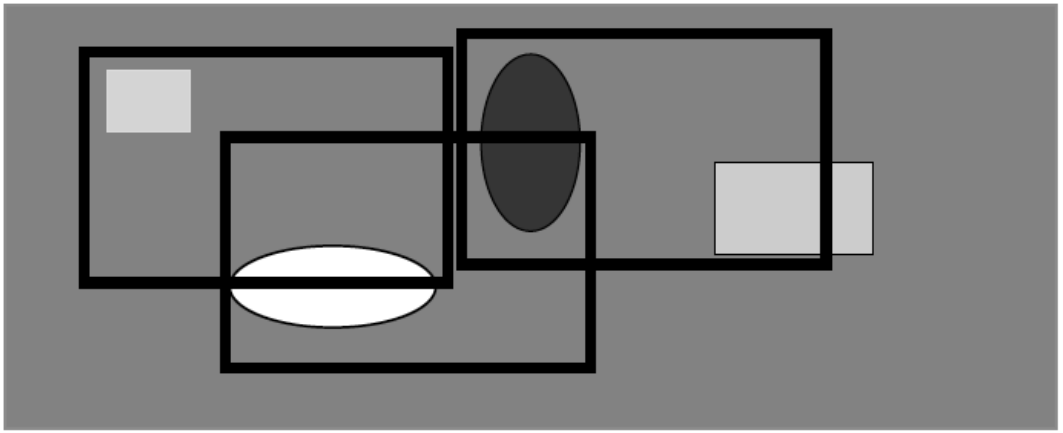
Forming Mosaics of Images

- Idea:
  - Given multiple images of a big thing, transform the images so matching bits lie on top of one another
  - Combine these images to a single image

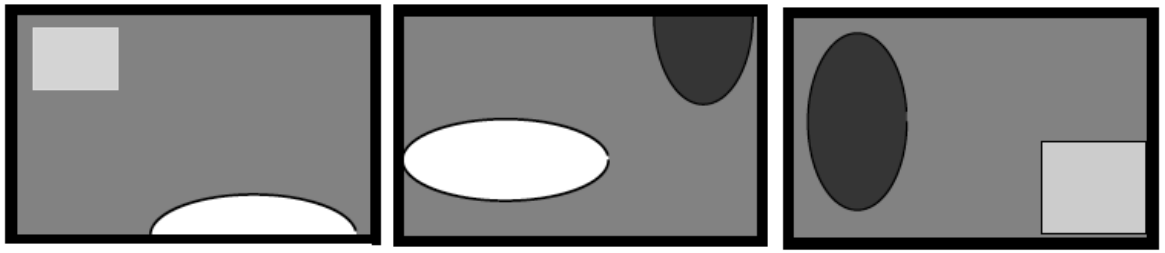


Currently

- We know how to translate
  - (eg color separation exercises)
  - later, other transformations

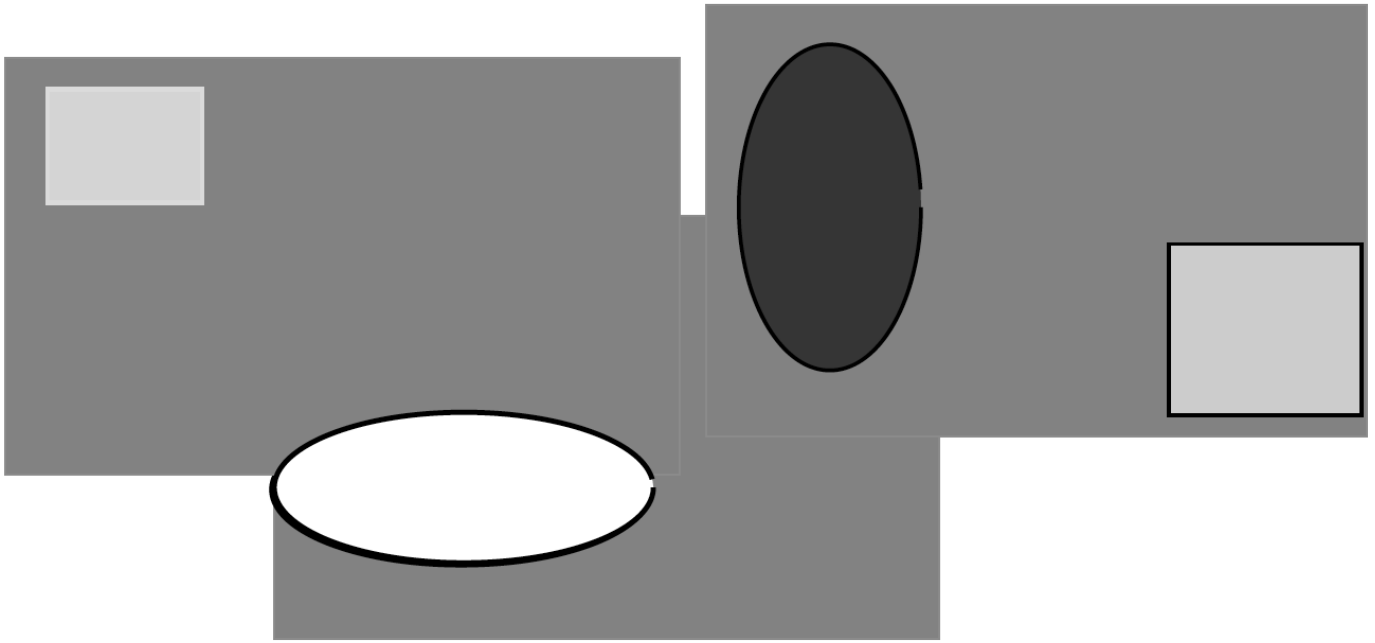


Scene



Images

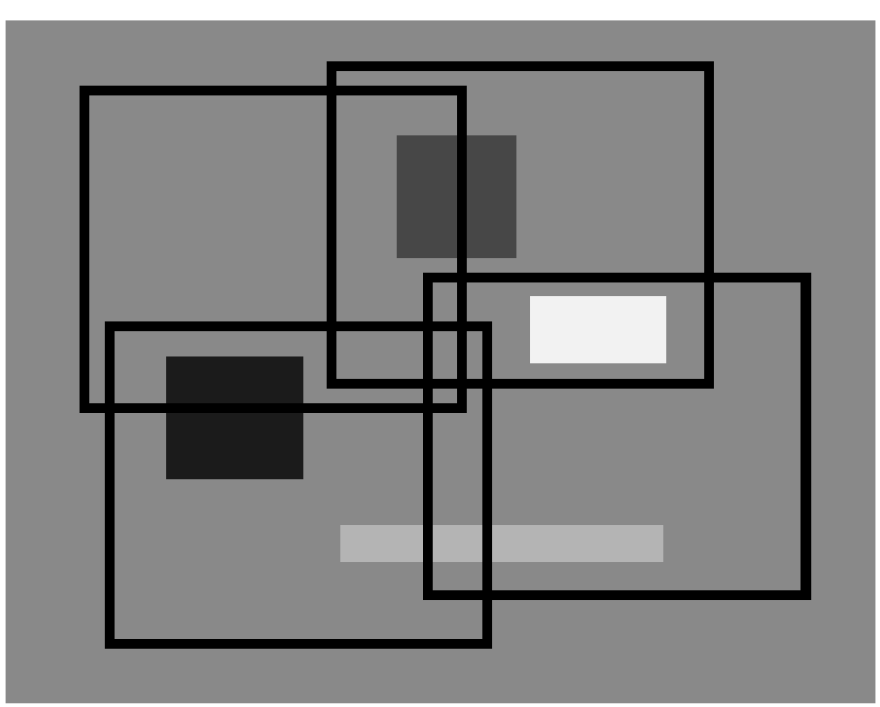
Mosaic



Procedure

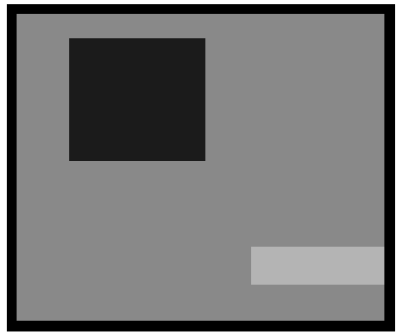
- Start:
  - Choose a root image (it isn't translated)
    - and set mosaic to contain root only
  - All others get offset of zero
- Iterate:
  - Choose image that overlaps images already in the mosaic
  - Search for offset with best overlap
  - Insert into mosaic at that offset

- Summarize registered images into a single image

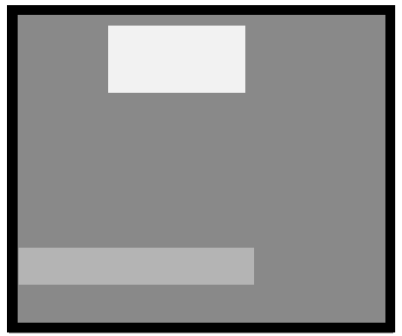


1

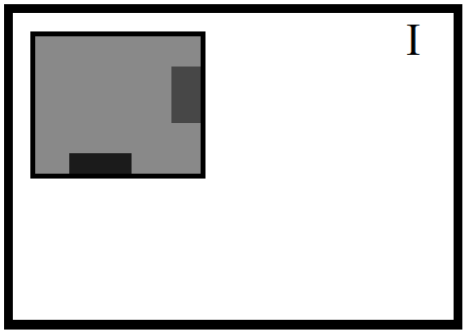
3

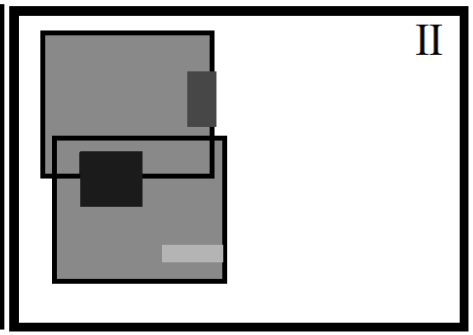


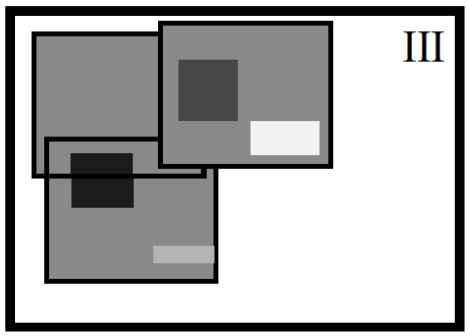
2

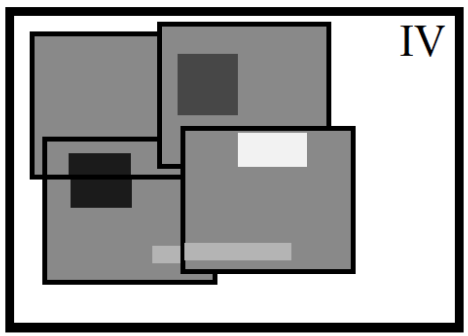


4

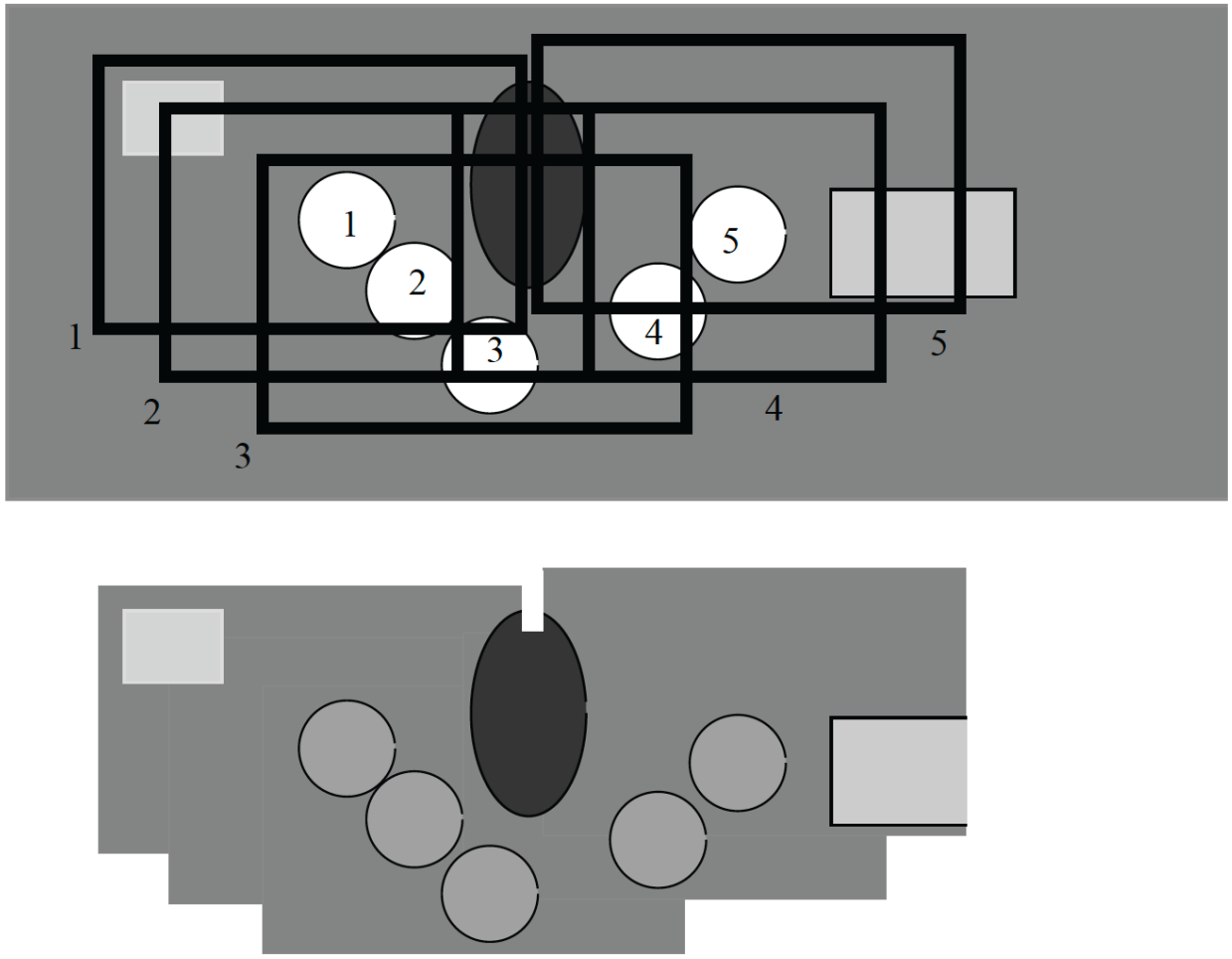




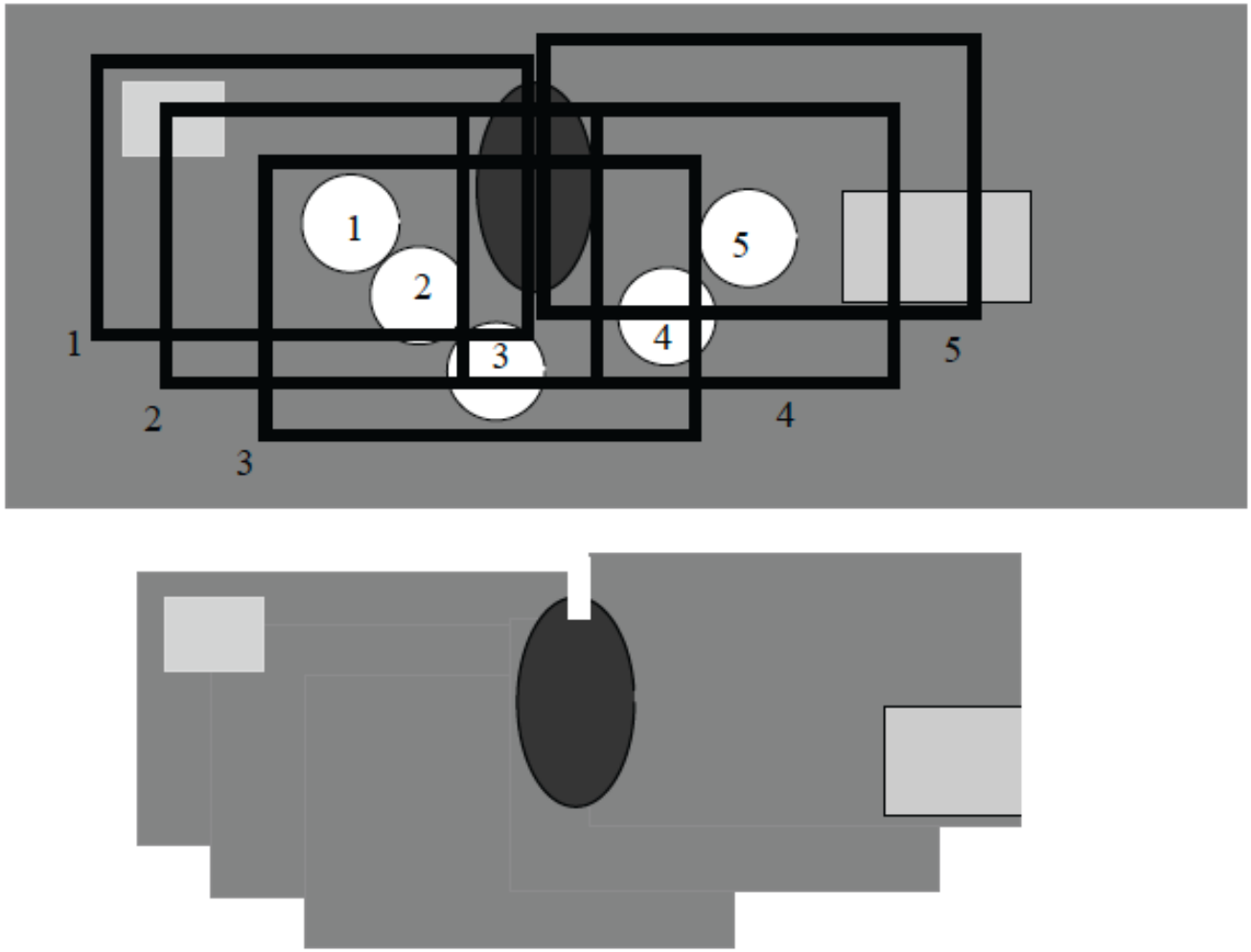




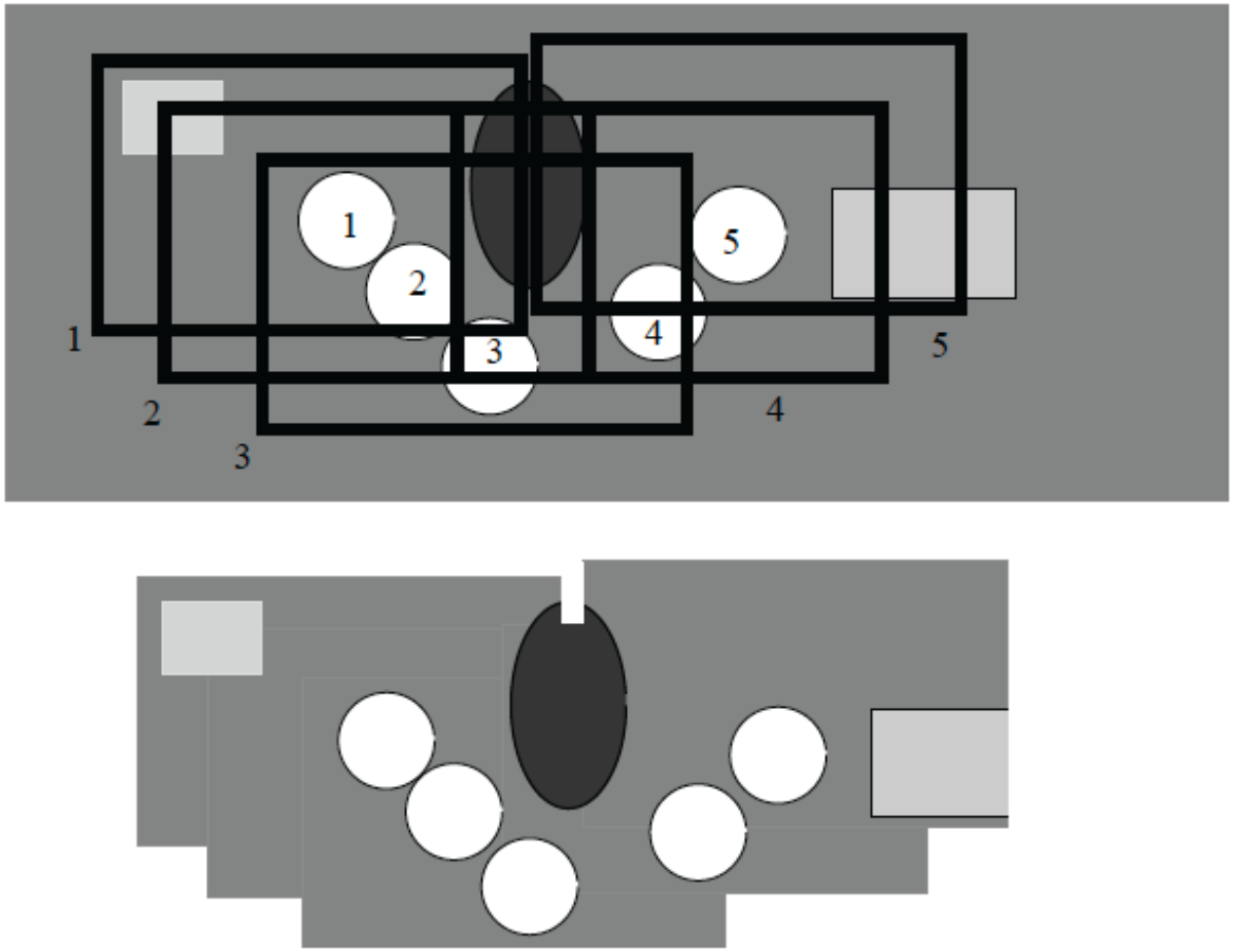
A mean gives ghostly trails



A median removes moving objects



Most different from median shows moving objects

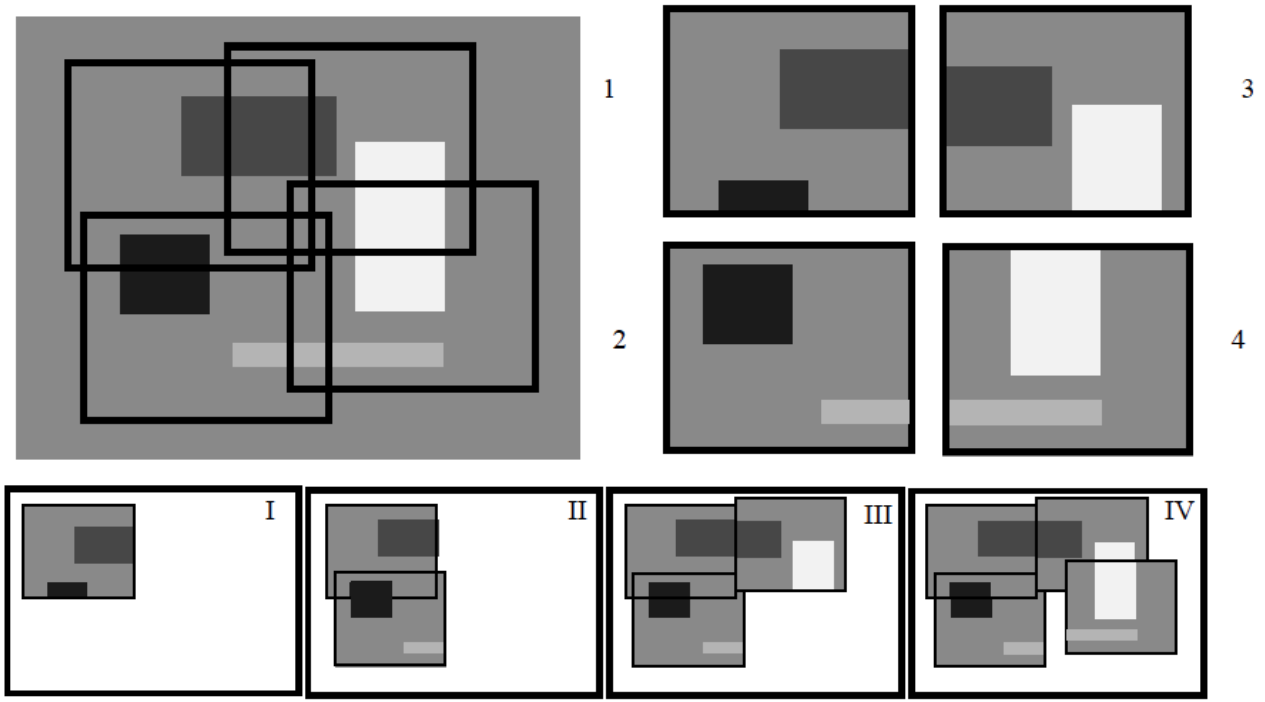


Important variants

- If you interpolate the cost function, you could register with sub-pixel accuracy (bilinear won't work)
- Wider range of transforr
- but how to estimat

Bundle adjustment

- Example: Register II to I, III to II, IV to III
  - and discover IV doesn't register well with II
- Loop does not close



Why is there a problem?

- Error = Cost(I, II)+Cost(I, III)+Cost(I, IV)+Cost(II, III)+Cost(II, IV)+Cost(III, IV)
- Procedure DOESN’T deal with Cost(I, IV) or Cost(II, IV)
- Idea:
  - Build mosaic
  - Now adjust one image at a time to improve
- Not ideal, more complex strategies may be needed.

Think about this...

15.1. Section 15.1.1 has: "Notice that there is no point in translating both images (**exercises**)." Explain.

15.2. Procedure 15.1 produces a tree. Explain.

15.3. Why would Procedure 15.1 not produce a forest? Does a forest make sense?

15.4. Sketch the tree of Figure 15.2.

15.5. Section 15.1.1 has: "You could test this, for example, by comparing very heavily downsampled versions of the images." How would this work?