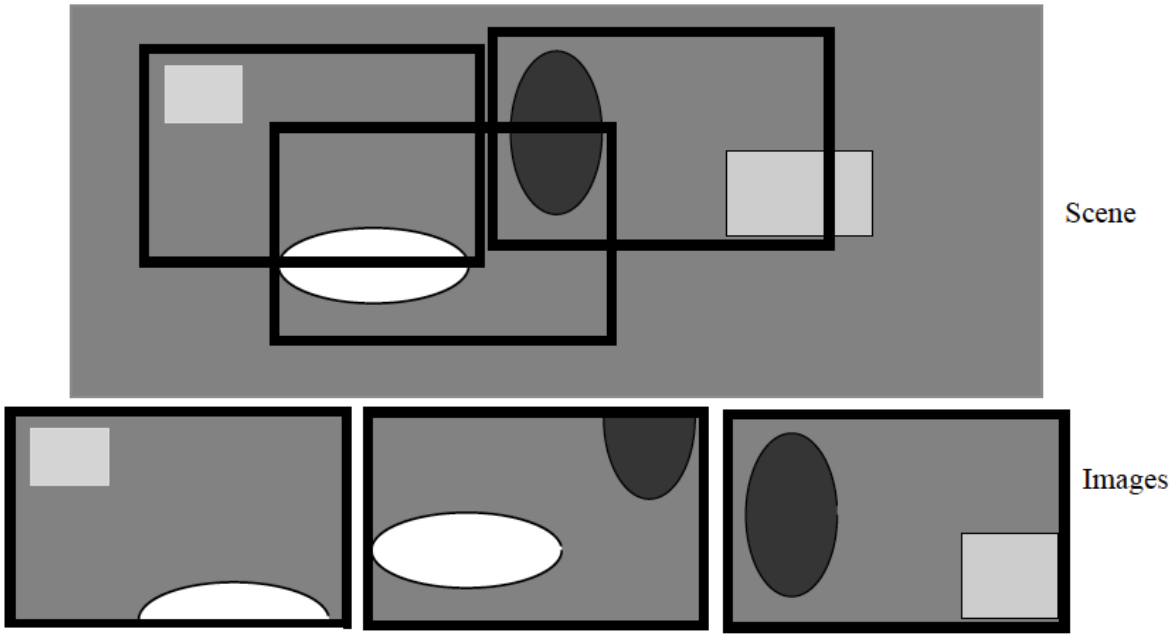
Forming Mosaics of Images

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

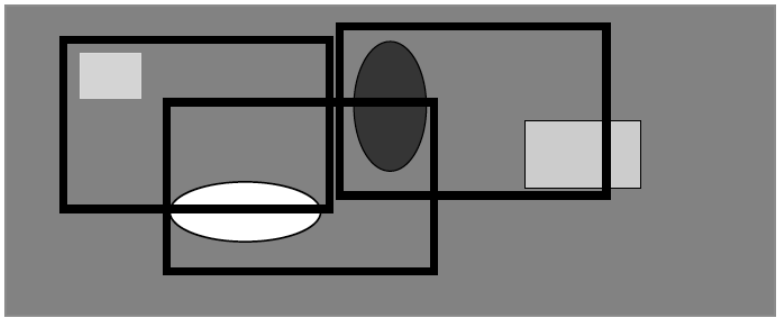


Currently

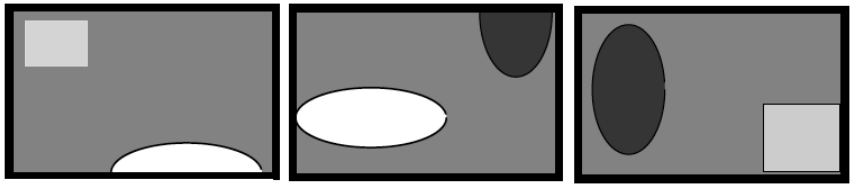
We know how to translate

(eg color separation exercises)

later, other transformations

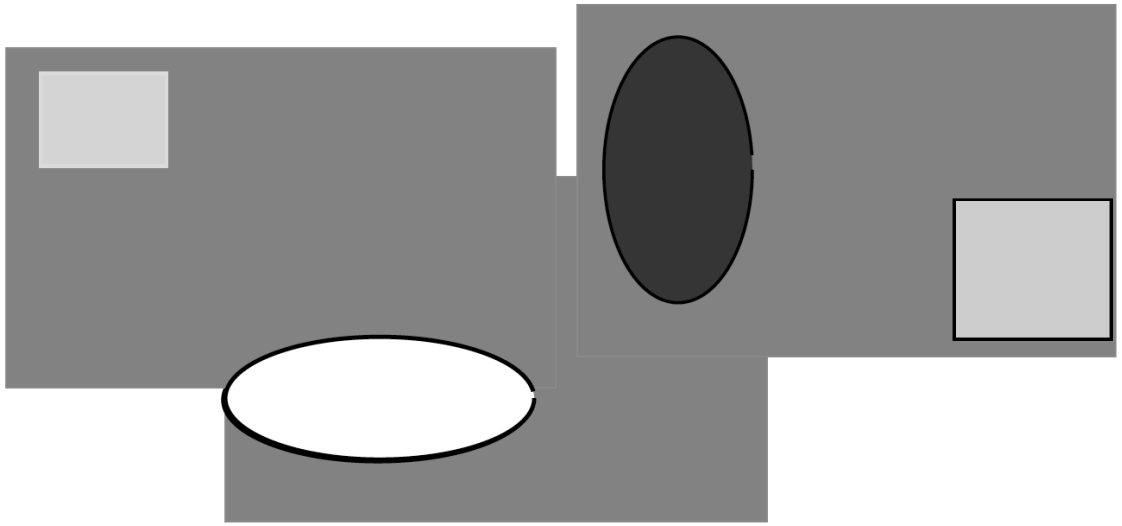


Scene



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

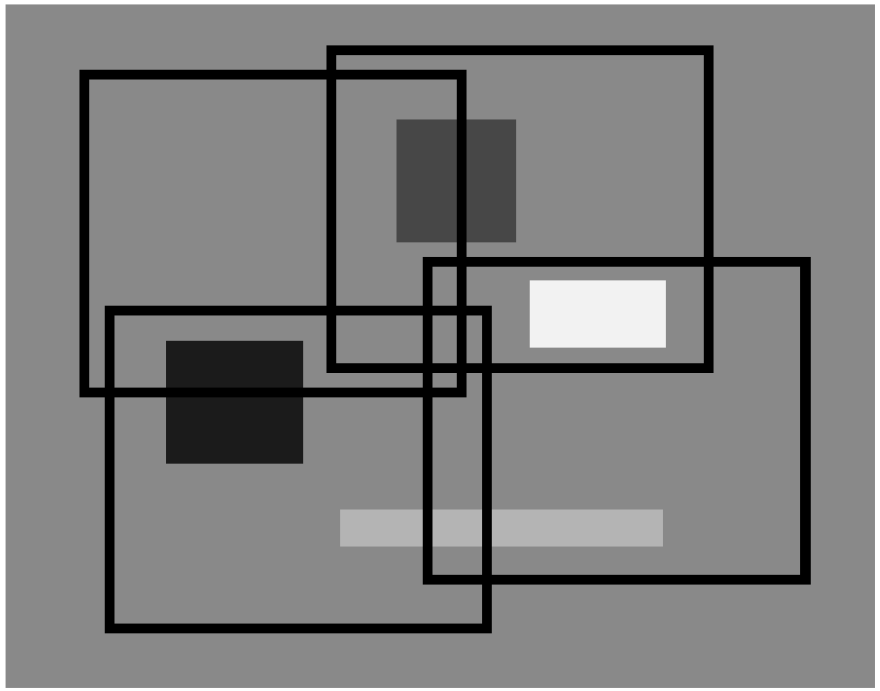
Iterate:

Choose an image that has an overlap with images already in the mosaic

Search for offset with best overlap between that image and mosaic

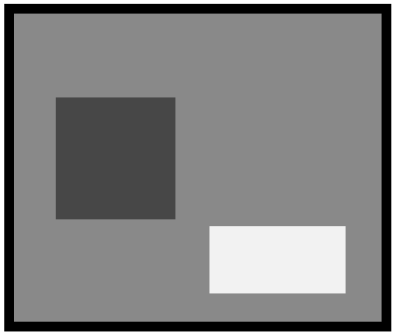
Insert into mosaic at that offset

Summarize registered images into a single image

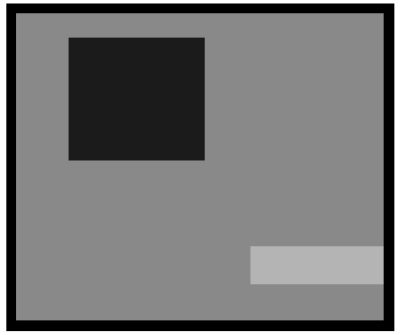


1

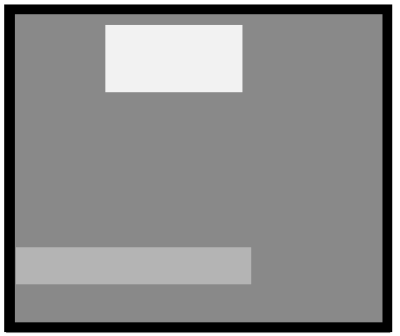
3

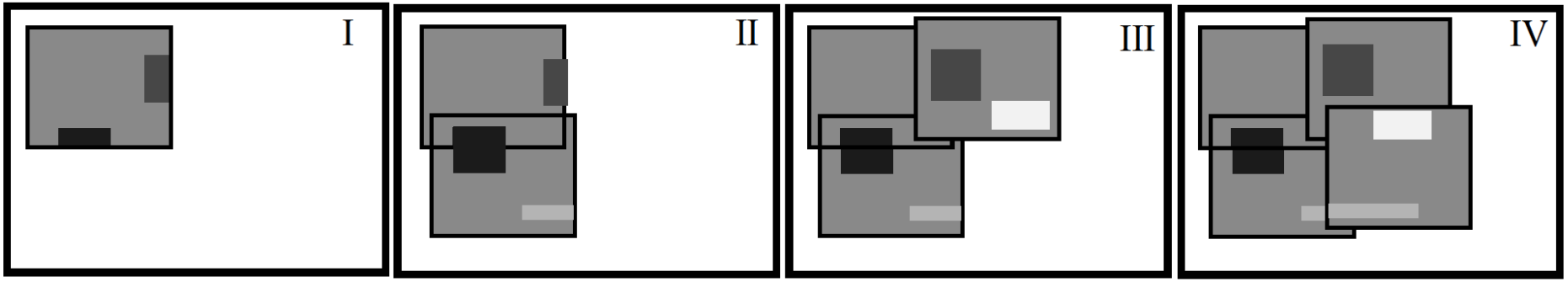


2

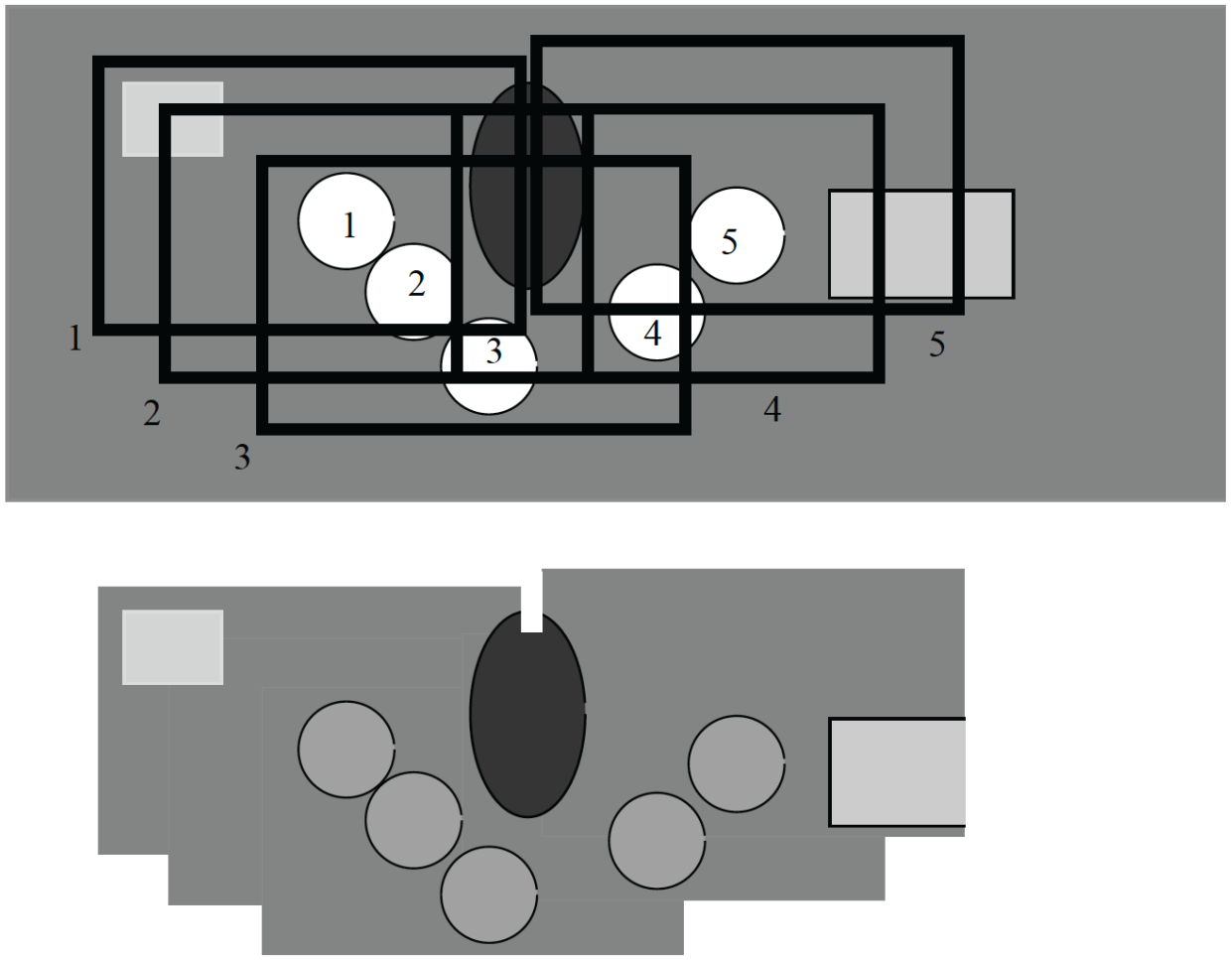


4

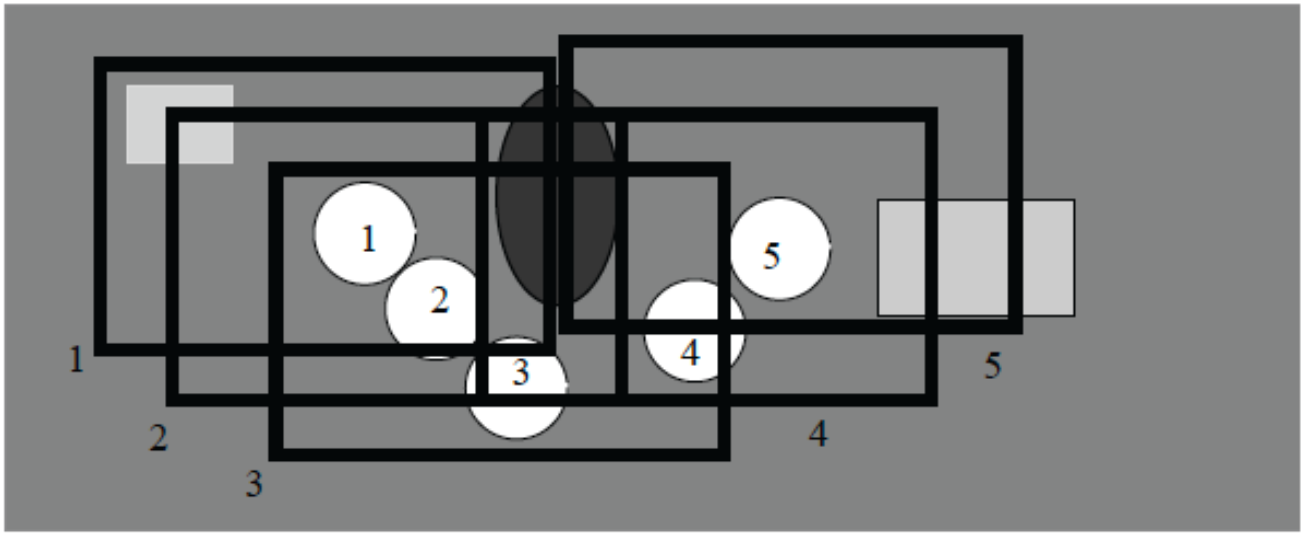




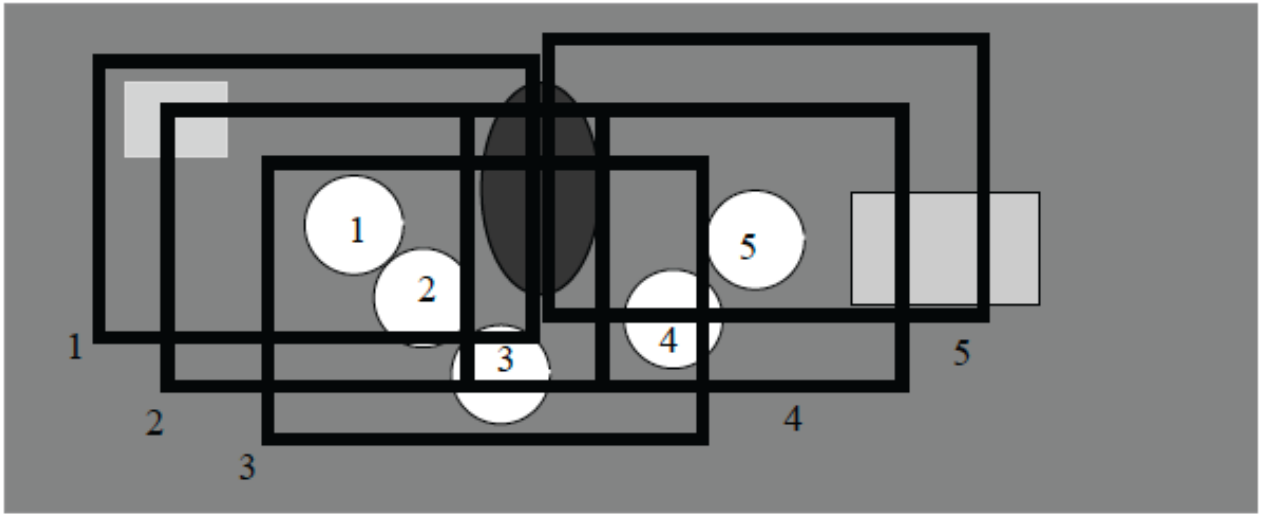
Using a mean gives ghostly trails on moving objects

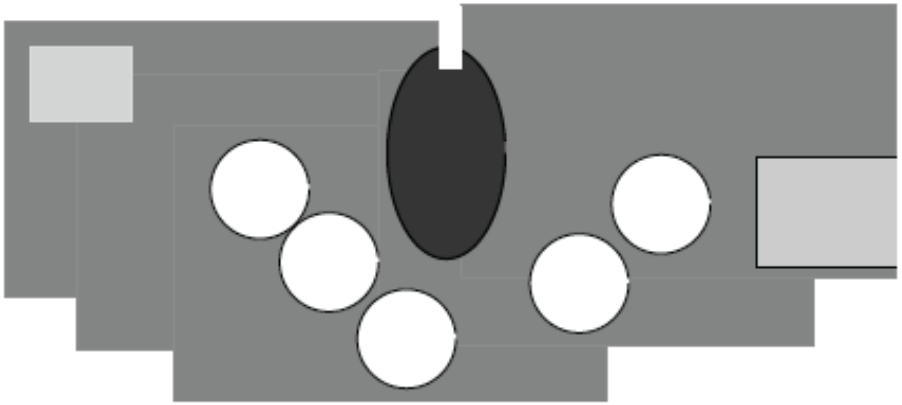


Using a median removes moving objects



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 transformations

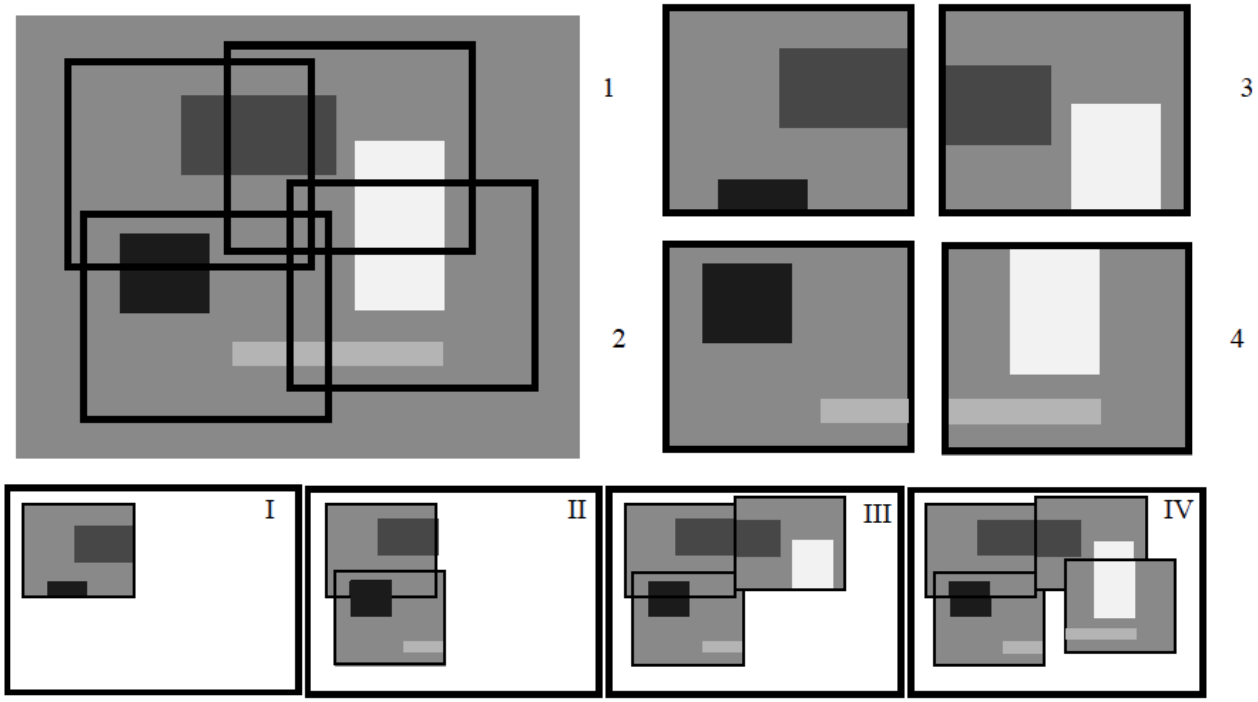
but how to estimate tx?

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.