Automatic Joiners

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15-463 Computational Photography
Fall 2007

Stitching Images

- Panoramas

  - Uses images taken from a single view point
  - What if the images are taken from different view points?

Multi-views

Pictures taken 5 steps apart.

Multi-views

Joiners

- David Hockney
  Layered of photographs taken from multiple viewpoints

http://en.wikipedia.org/wiki/David_Hockney

Joiners

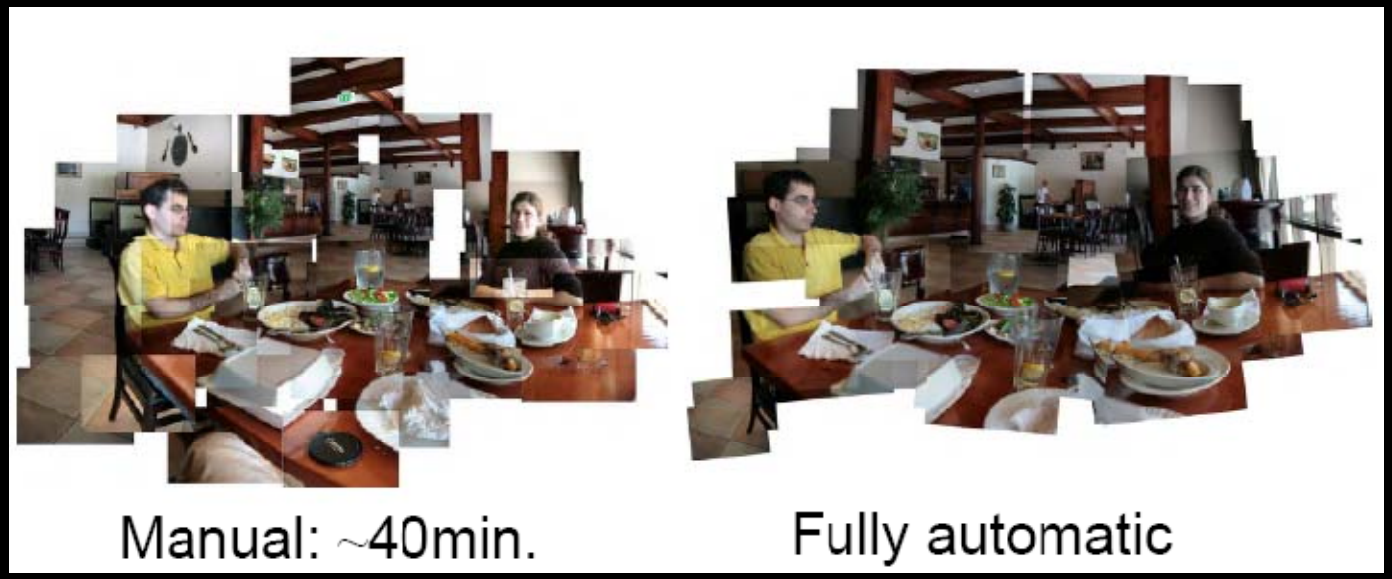
Takes around an hour to do manual alignment.

http://www.flickr.com/photos/qtr/27676970

Automatic Joiners

Solution to the lazy artists

- Zelnik-Manor and Perona, “Automating joiners”

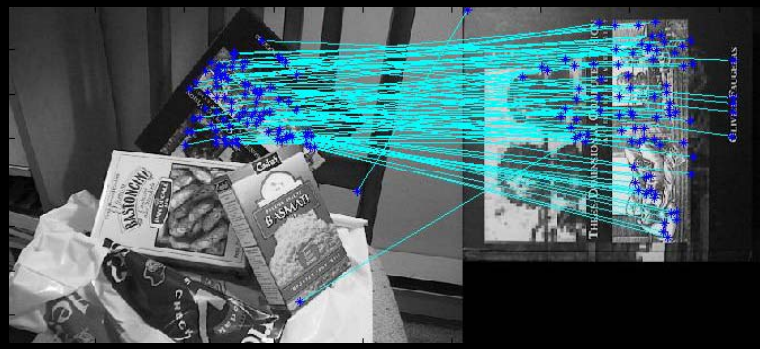


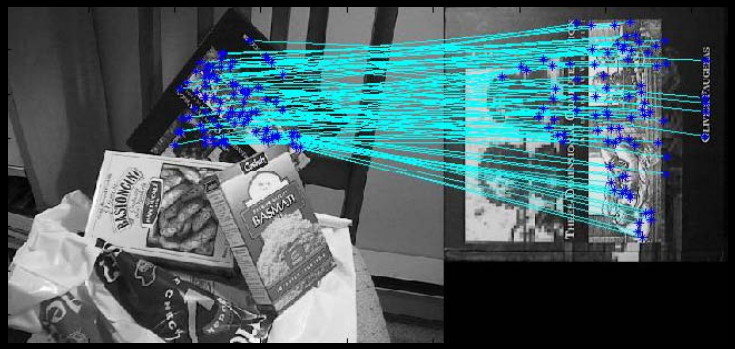
Overall Framework

- Find correspondences
- Find global alignment between images
- Find the best ordering of the images
- Readjustment

1. Feature Correspondence

- Use Scale-Invariant Feature Transform (SIFT) to extract features from the image pool
- Use RANSAC to eliminate outliers





2. Find Global Alignment

- Use similarity transform to align the images.
- Similarity transform is a combination of scale (c), rotation (R), and transition (t)
  - $Y = cRX + t$
    where X and Y are the sets of matched features

Global alignments

- Input

3. Reorder

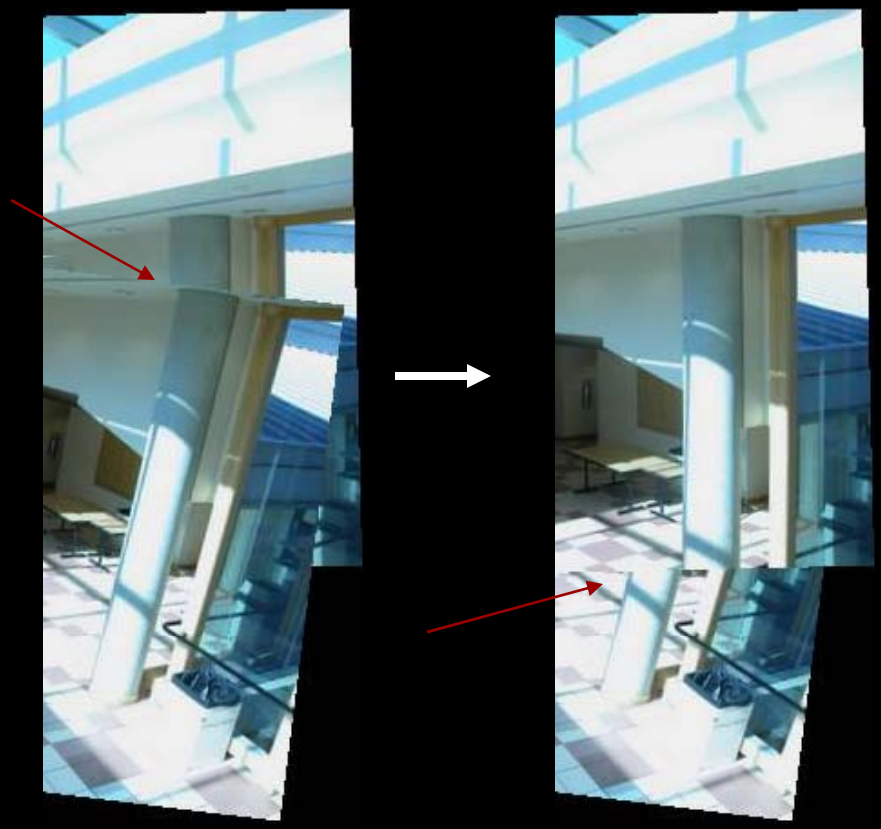
- Find the order of the images such that the gradient across the boundaries are minimized.

Before Reordering

After Ordering

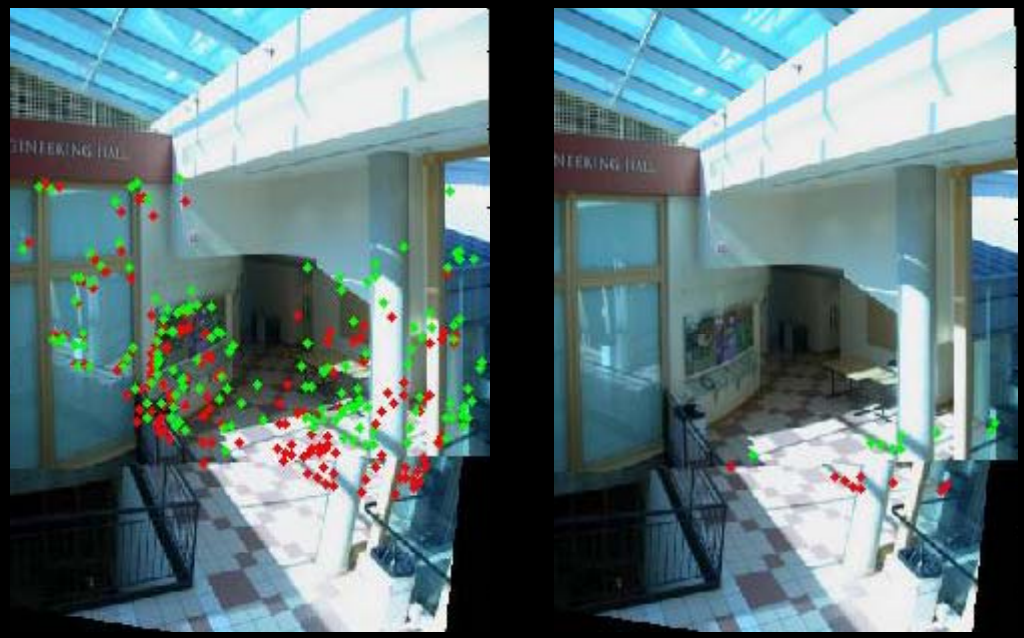
Some observations

- Points that are hidden behind other images are not as important as the one that can be seen.
- Points closer to the borders are more important.



4. Readjustment

- Realign the images according to the ordering information.
- Use 10 points closest to the border.



Before Realignment

After Realignment

Wean










Align

Order

Realign

Walking to the Sky

Everyone’s favorite coke machine


580L turbo
GROFF

References

- Zelnik-Manor, Lihi and Perona, Pietro. “Automating Joiners.” http://www.vision.caltech.edu/lihi/Demos/AutoJoiners.html
- Umeyama, Shinji. “Least-Squares Estimation of Transformation Parameters Between Two Point Patterns.” IEEE Transactions on Pattern Analysis and Machine Intelligence. Vol. 13. No 4. April 1991
- Brown, M. “Recognising Panoramas.” http://research.microsoft.com/~brown/papers/iccv2003.pdf
- Lowe, David. “SIFT Keypoint Detector.” http://www.cs.ubc.ca/~lowe/keypoints/

The End

Questions?