Image Mosaic and Stitching

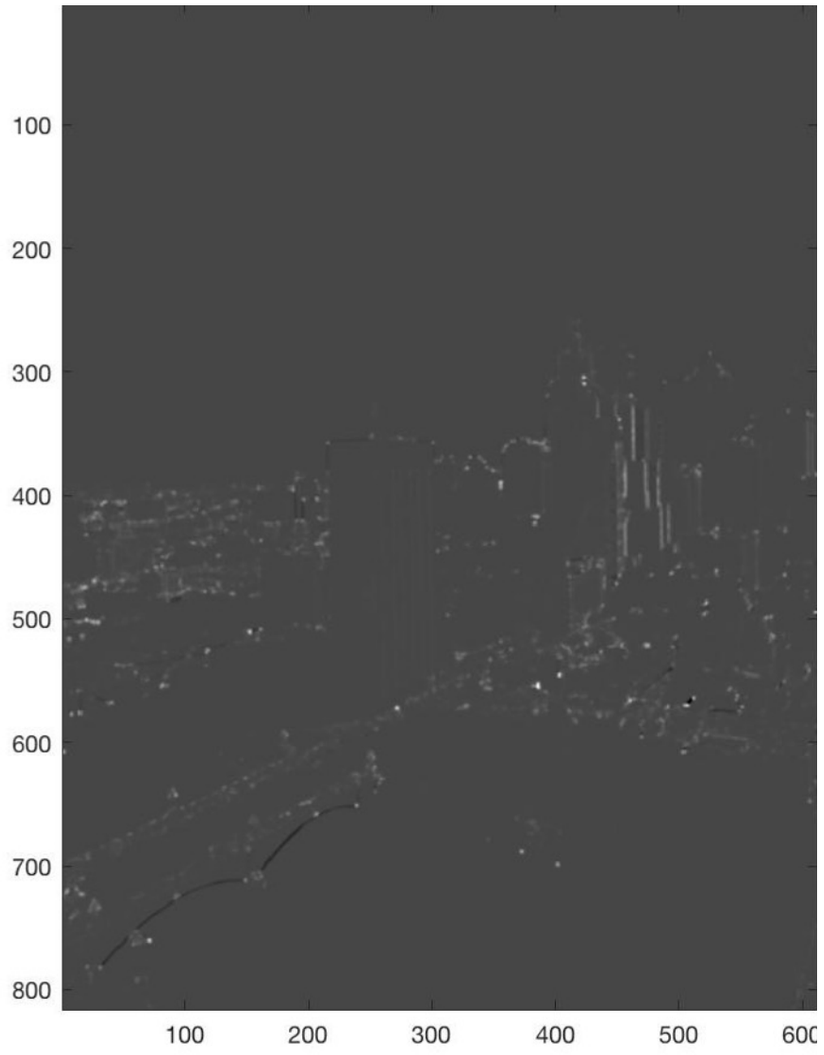
Yiren(Max) Lu – 11/29/2016

Image Mosaic Overview

1. Harris Corner Detection
2. Adaptive Non-Maximum Suppression (ANMS)
3. Feature Descriptors Extraction
4. Features Matching
5. Outliers Rejection (RANSAC)
6. Final Image Stitching (Homographic Trans.)

Penn

Harris Corner Detection

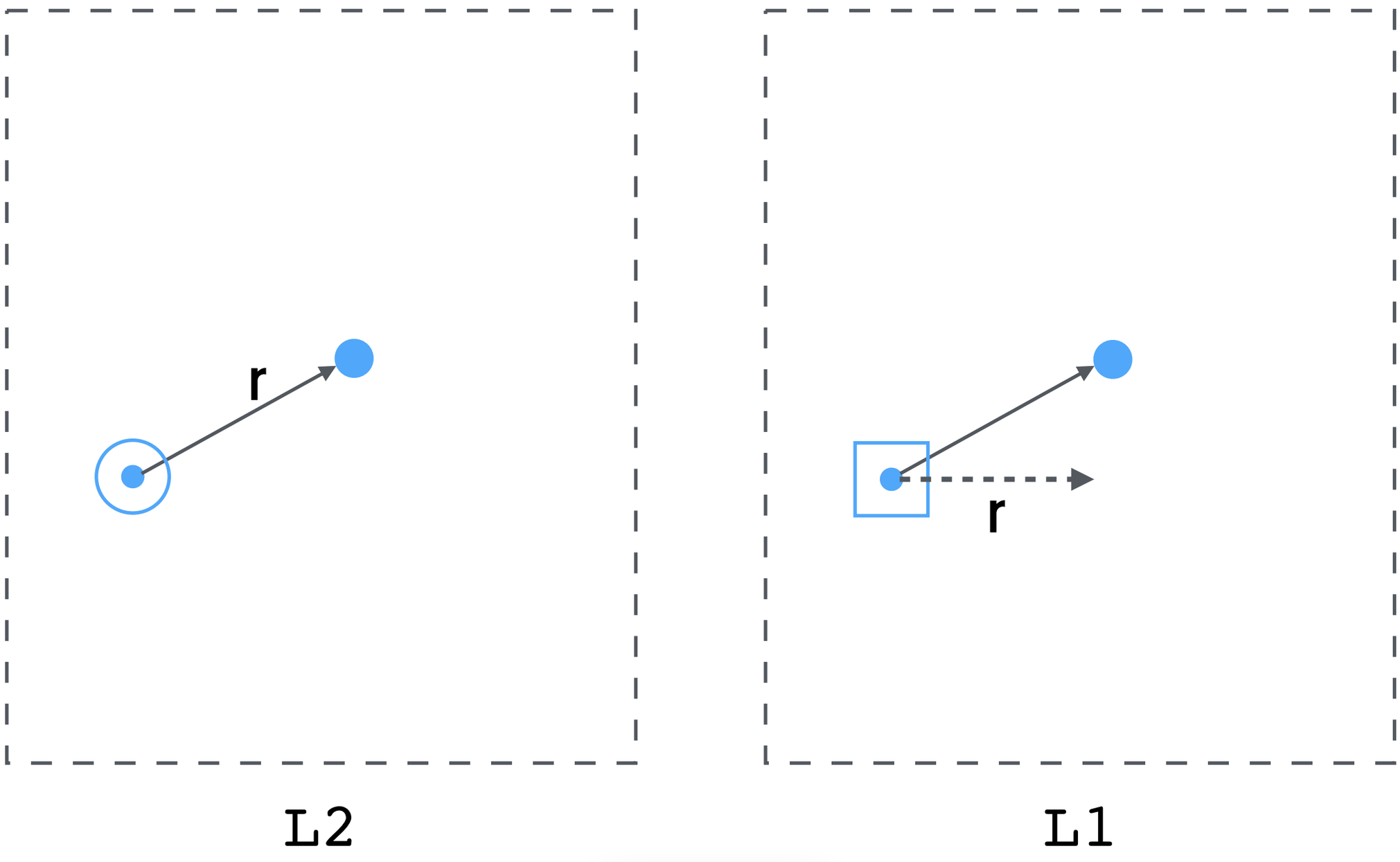



```
cimg = cornermetric(img, 'Harris');
```

Penn

Adaptive Non-Maximum Suppression (ANMS)

Breath-First Search



Penn

Adaptive Non-Maximum Suppression (ANMS)

Vectorization

```
for i = 1:H
for j = 1:W
    for r = 1:min(H,W)
        if cimg(i, j) == 0
            r_mat(i, j) = 1;
            break;
        end
        if  any(cimg(max(1,i-r):min(H,i+r), max(1,j-r)) > cimg(i,j)) > 0 | ...
            any(cimg(max(1,i-r):min(H,i+r), min(W,j+r)) > cimg(i,j)) > 0 | ...
            any(cimg(max(1,i-r), max(1,j-r):min(W,j+r)) > cimg(i,j)) > 0 | ...
            any(cimg(min(H,i+r), max(1,j-r):min(W,j+r)) > cimg(i,j)) > 0
            r_mat(i, j) = r;
            break;
        end
    end
end
en
```

640x480 img: 52s -> 1s

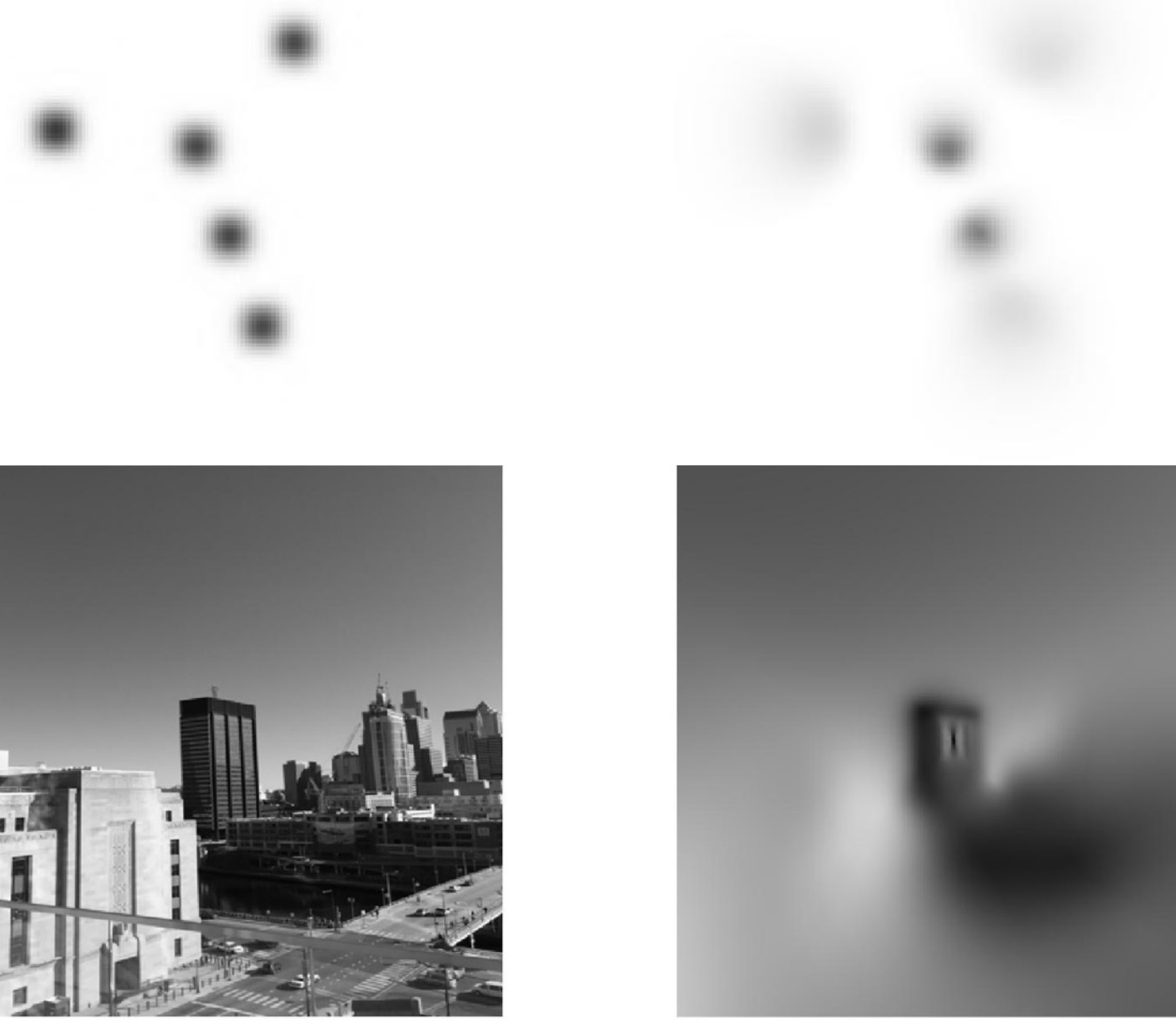
Adaptive Non-Maximum Suppression (ANMS)

left: 100 key points, right: 300 key points

Penn

Feature Descriptors

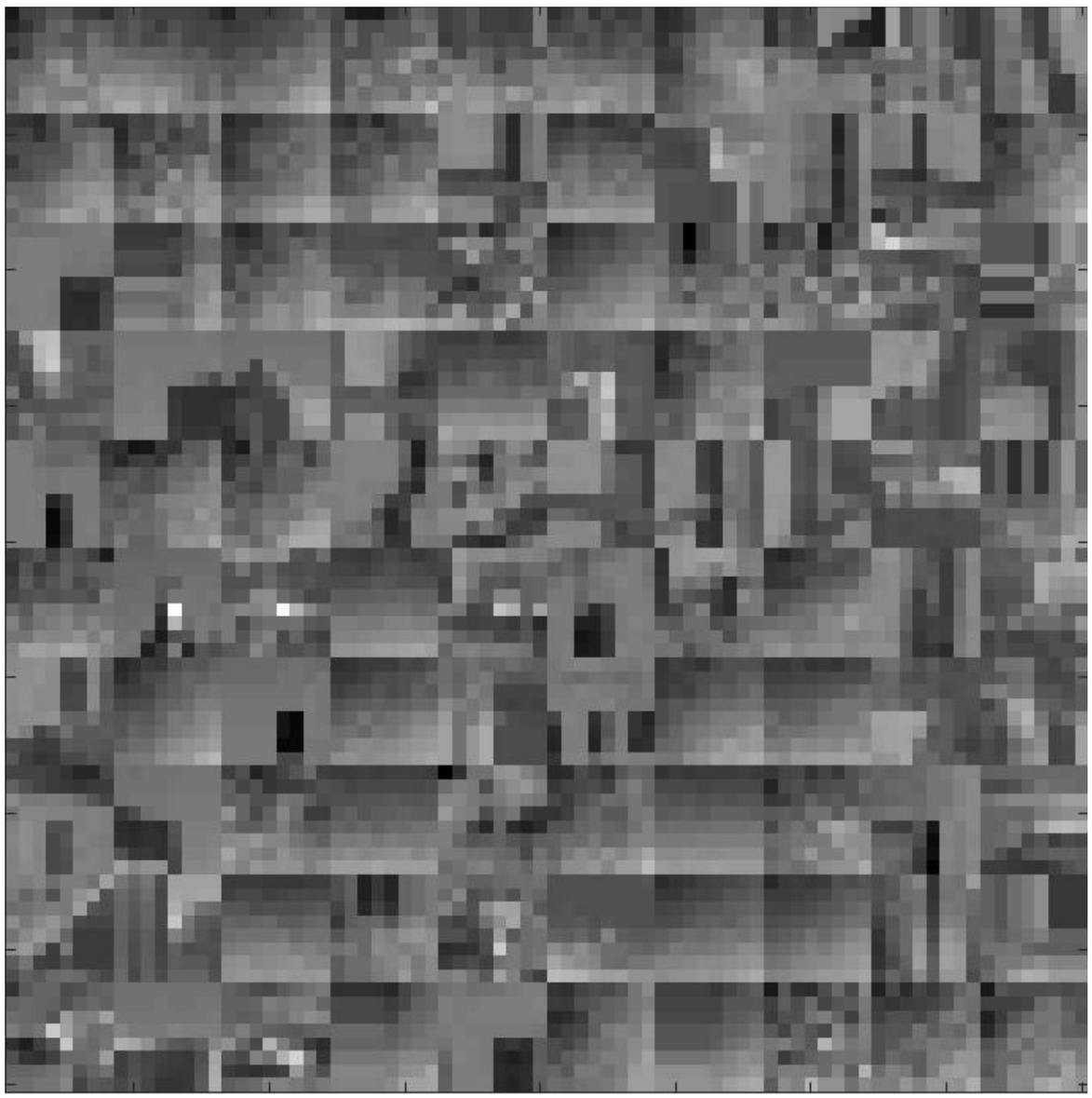
Geometric Blur



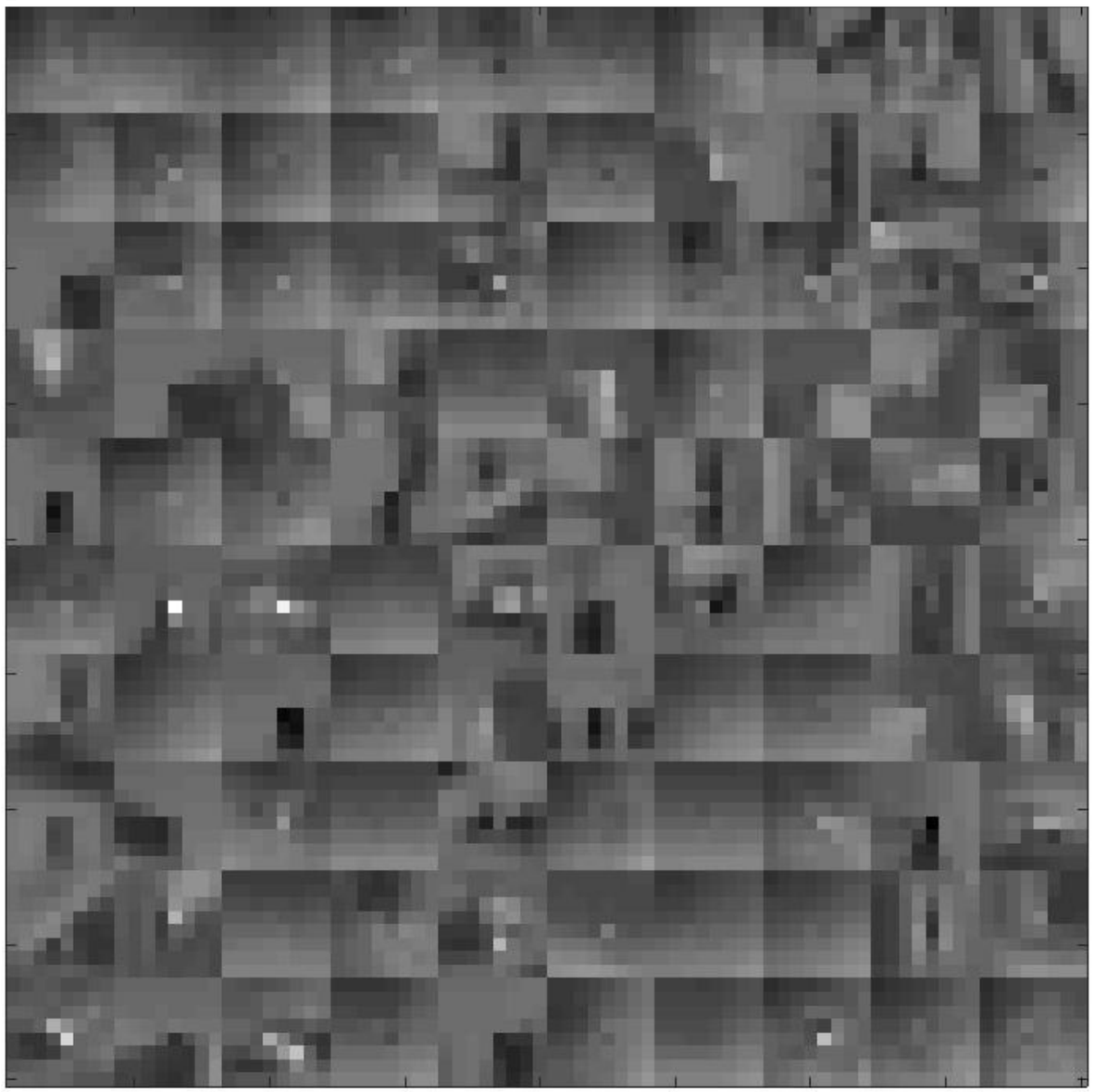
Penn

Feature Descriptors

Descriptors



non-geo blur



geometric blur

Penn

Features Points Matching

K-D tree

```
[idx D] = knnsearch(kdtree, desc', 'K', 2);
```

1-NN/2-NN < 0.6

Features Points Matching (RANSAC)

1000 iterations
300 features points
SSD threshold: 10

Final Image Stitching

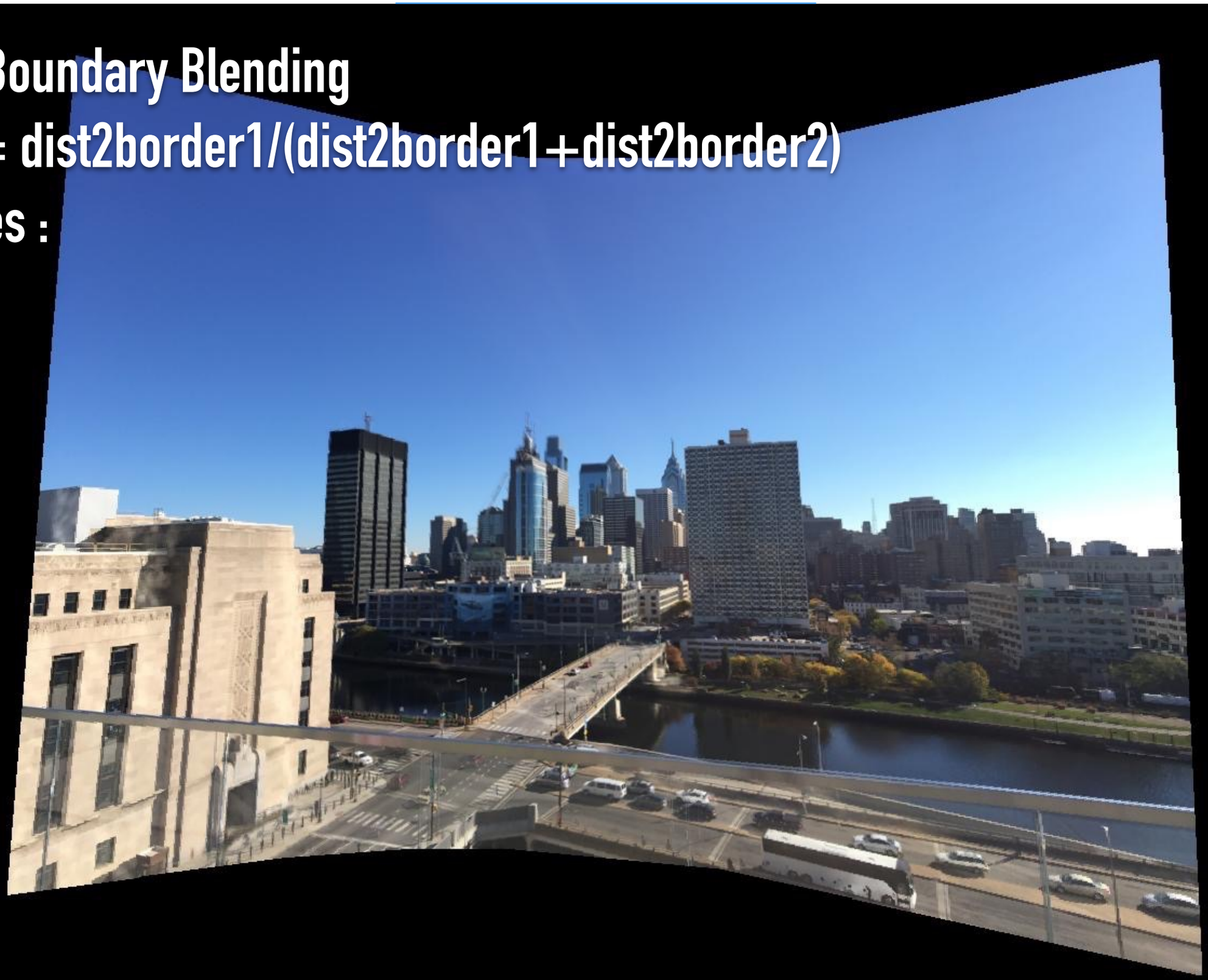
Non-Blending
5s per image,
640x480

Final Image Stitching (blending)

Dist. 2 Boundary Blending

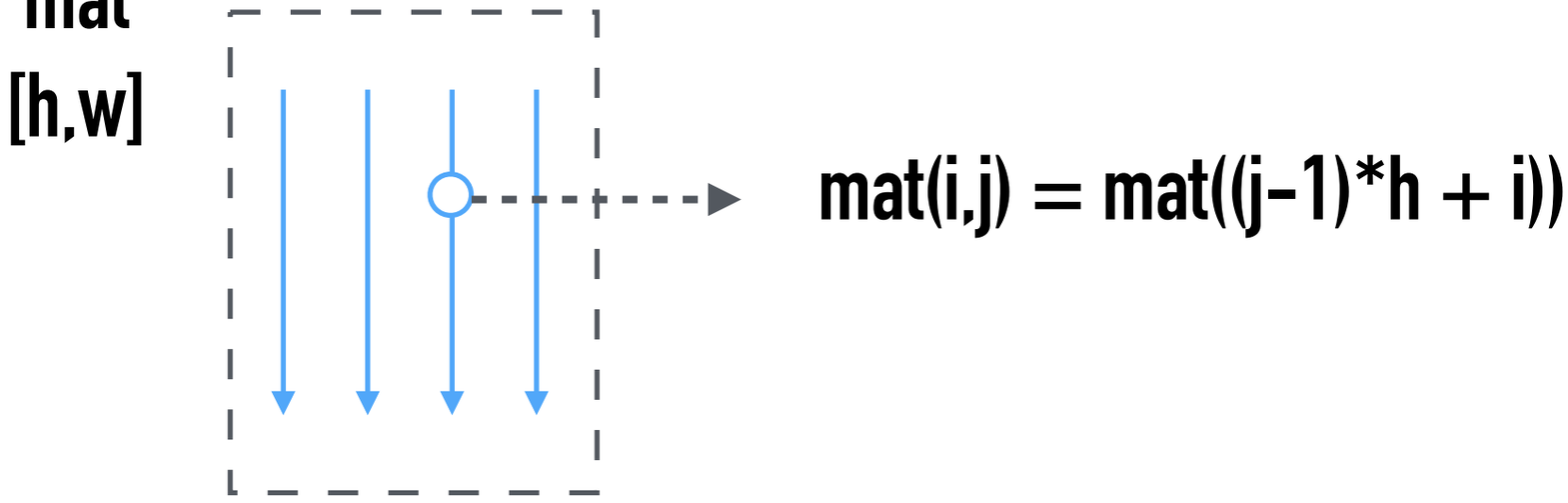
Alpha = dist2border1/(dist2border1+dist2border2)

5 images :



Vectorization

Vectorization = Treat Everything as a Vector!

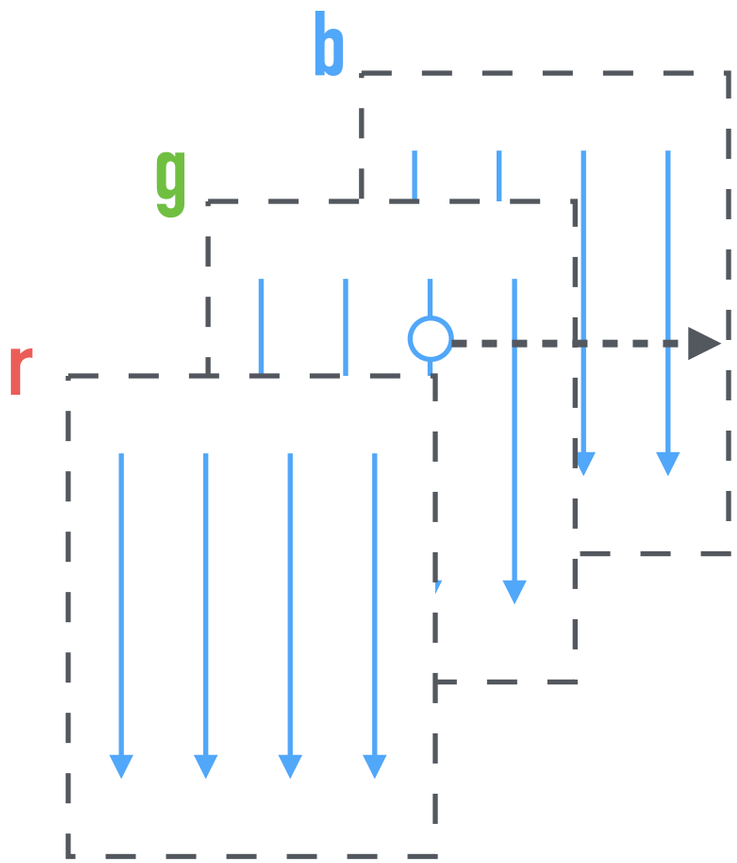


Penn

Vectorization

Vectorization = Treat Everything as a Vector!

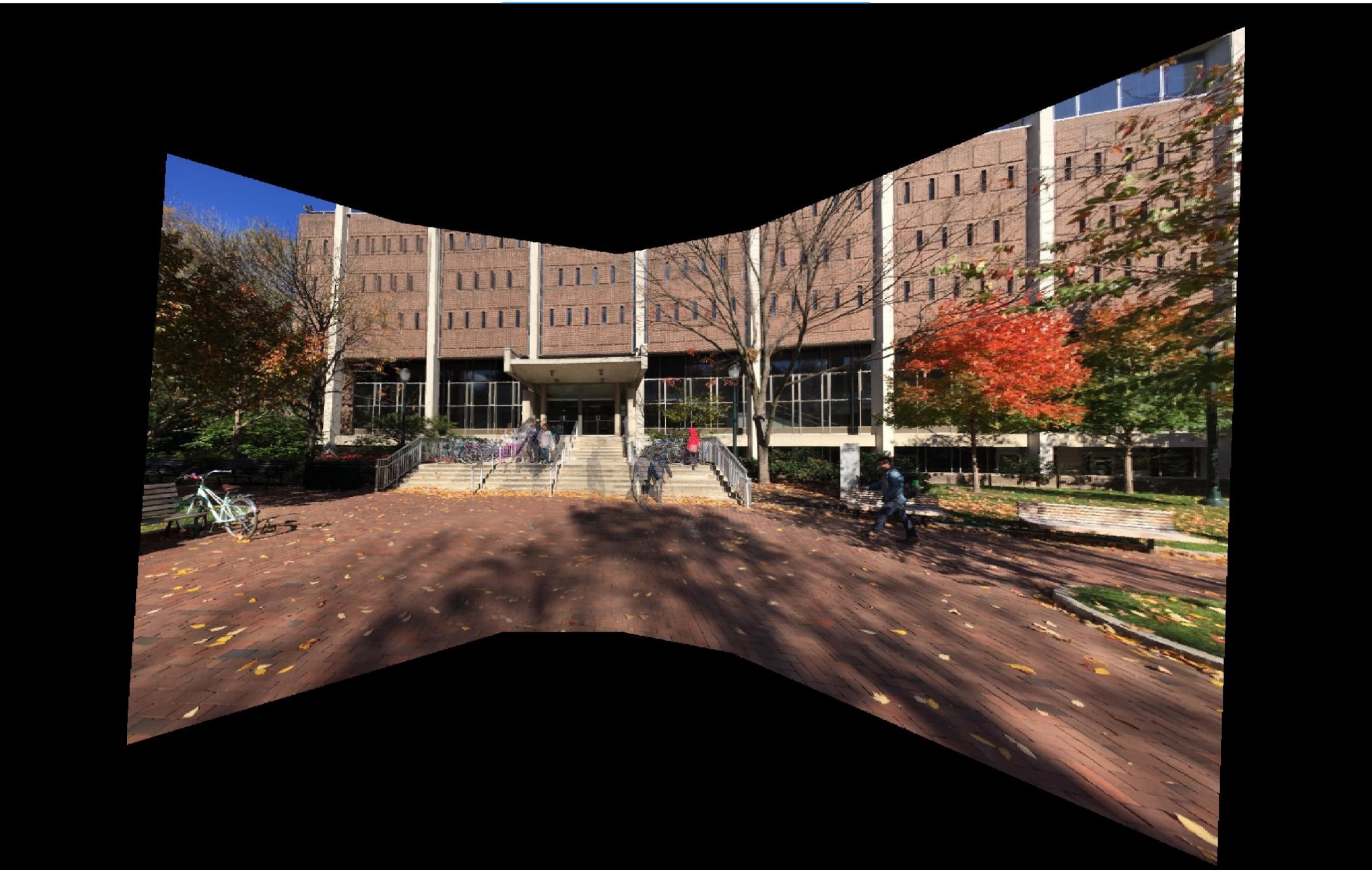
mat
[h,w,3]



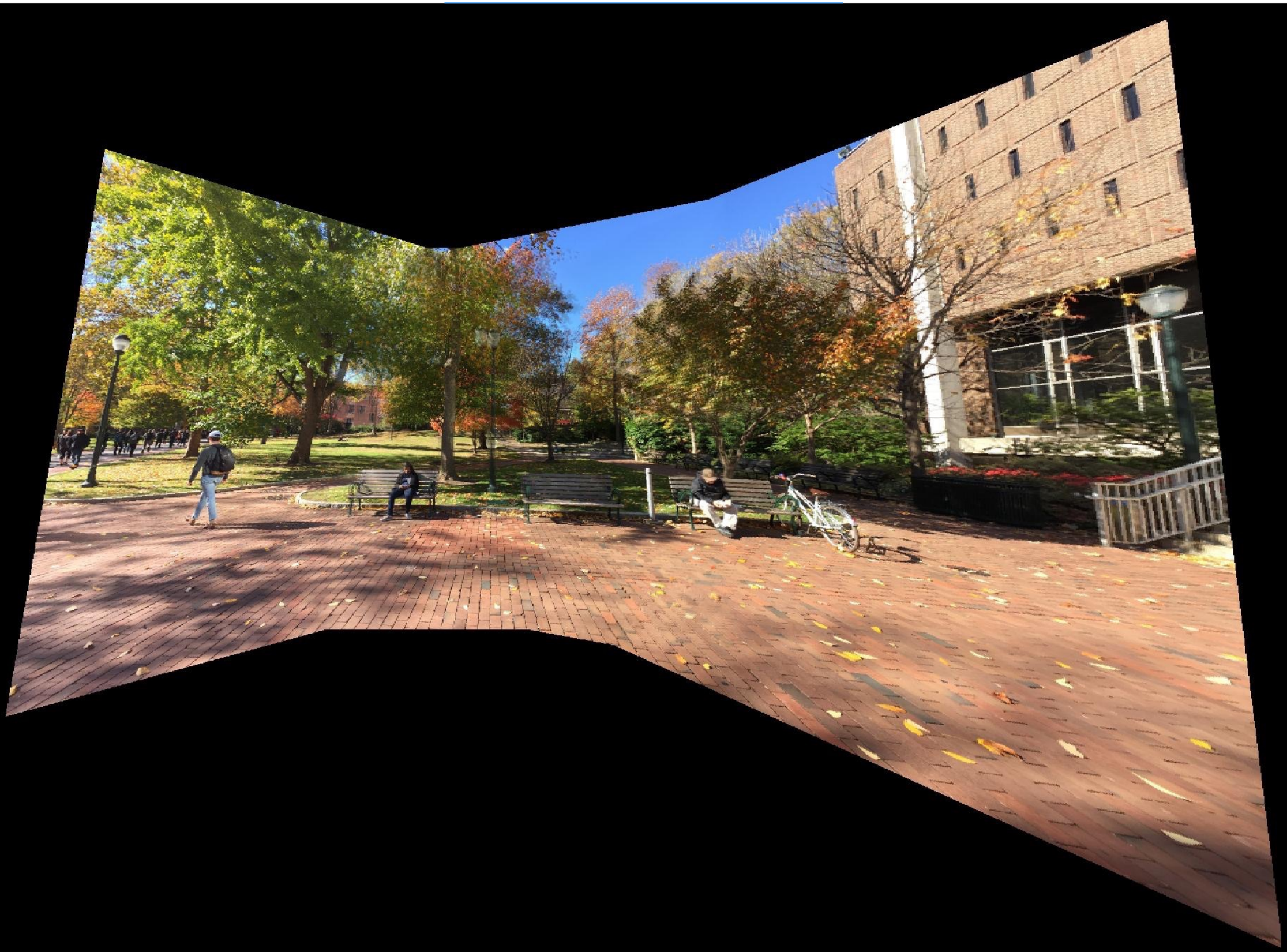
mat(i,j,k) =mat((k-1)*h*w + (j-1)*h + i))

Final Image Stitching (more results)

Final Image Stitching (more results)



Final Image Stitching (more results)



Thank you!

Max Lu – 11/29/2016