Image Matching

is this thing... the same as this thing?
Applications: Panorama Stitching

Stitching multiple images into a seamless panorama
(Project 2)
Applications: Panorama Stitching

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Applications: Panorama Stitching

Stitching multiple image into a seamless panorama
(Project 2)
Applications: Tracking

- Motion analysis
  https://youtu.be/1rZNb-affQg
- Augmented reality
- Segmentation
- Robot navigation

https://youtu.be/5I5pbSs-yrU
Running motivating example: Panorama Stitching
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1. **Detect** corner features
Running motivating example: Panorama Stitching

2. Compute feature descriptors
3. **Match** features based on their descriptors.
Running motivating example: Panorama Stitching

4. **Warp** images into alignment
5. **Blend** images to eliminate seams
Panorama Stitching: Steps

1. Detect features
2. Compute feature descriptors
3. Match features based on their descriptors
4. Warp images into alignment
5. Blend images to eliminate seams

feature matching

gameometric transformations

photometric transformations
Image features

• Can be *global* or *local*

• Global features "distill" the whole image. examples:
  
  • average brightness

  • histogram of image intensity values

  • a tiny version of the image itself?

  • a vector ("embedding") produced by a neural network
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Image features

- Local features identify salient / distinctive / useful points in the image. Examples:

Edges  Blobs  Corners
Image features

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  Edges

  Blobs

  (our focus) Corners
Features - Overview

1. Detect

2. Describe

\[ \mathbf{x}_2 = [x_1^{(2)}, \ldots, x_d^{(2)}] \]

3. Match
Next time:
What makes a good feature?
Two desirable properties:

- **Uniqueness**: features *shouldn't* match if they're from different points in the scene.

- **Invariance**: features *should* match if they do come from the same point in the scene.