

# Detecting Corners

16-385 Computer Vision (Kris Kitani)

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# Why detect corners?

Image alignment (homography, fundamental matrix)

3D reconstruction

Motion tracking

Object recognition

Indexing and database retrieval

Robot navigation

# Planar object instance recognition

Database of planar objects



Instance recognition





# 3D object recognition

Database of 3D objects



3D objects recognition

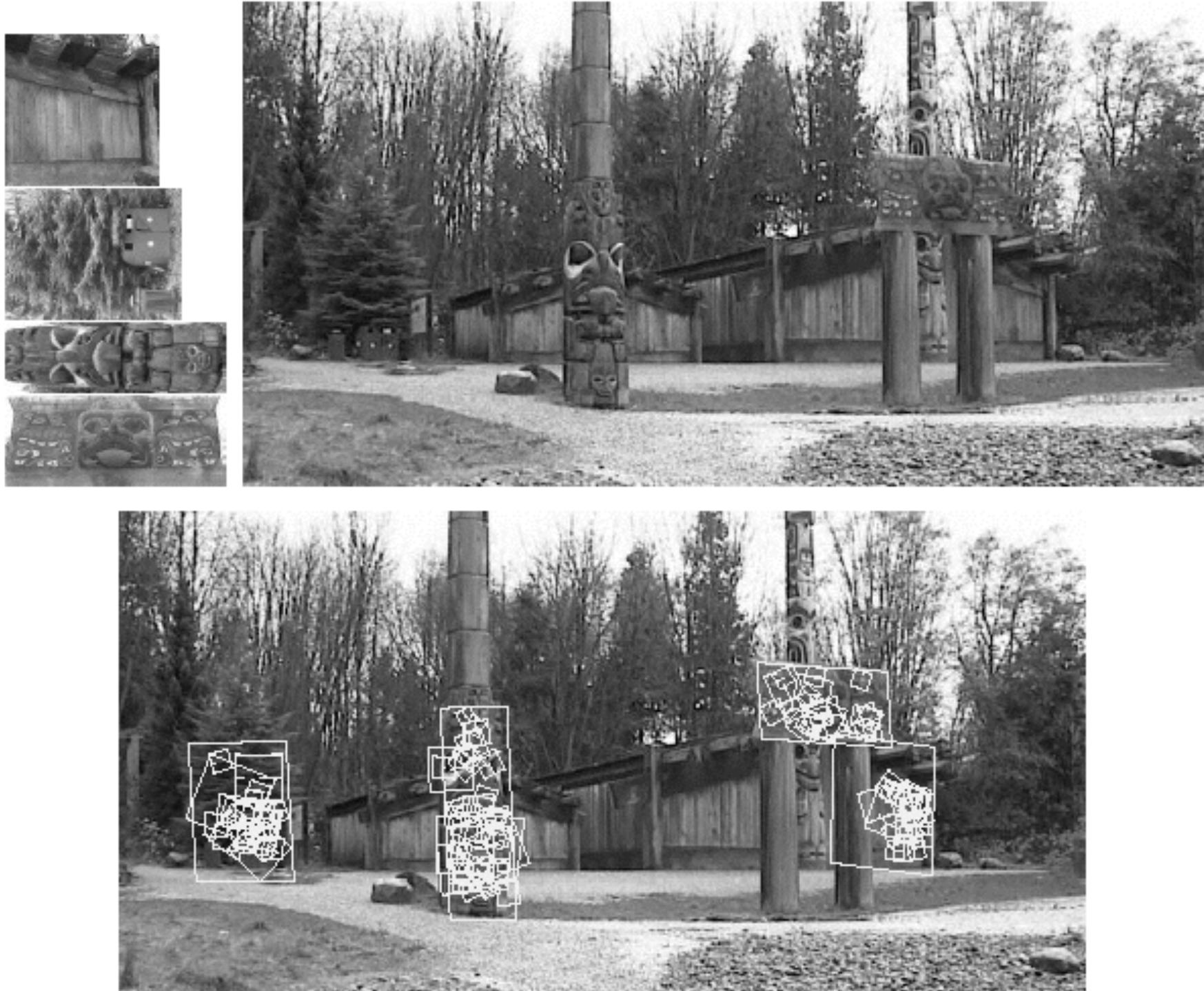




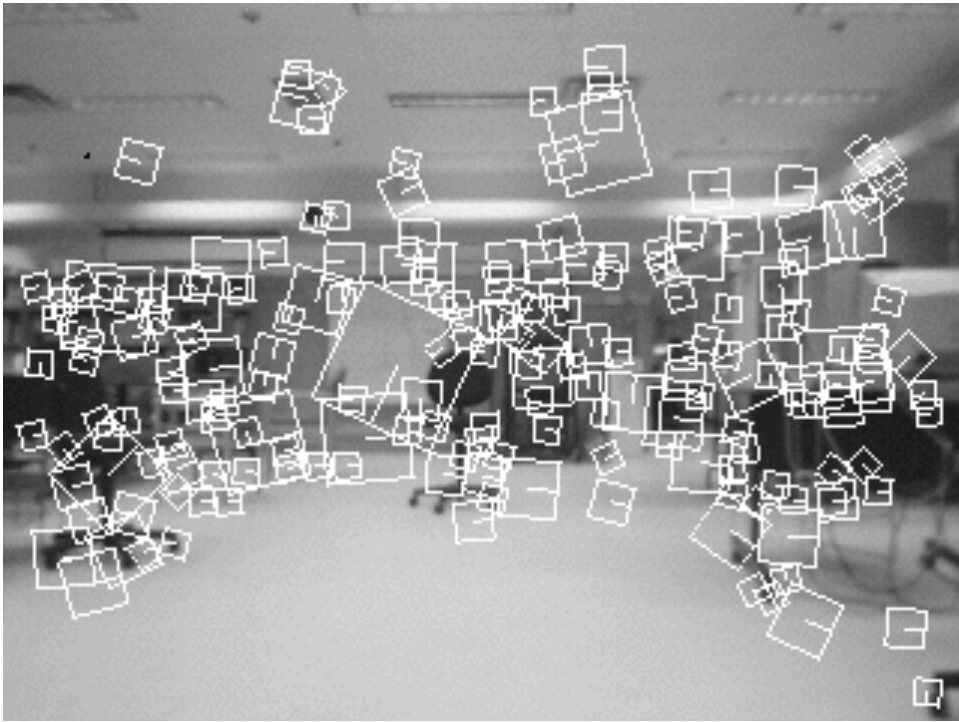


Recognition under occlusion

# Location Recognition

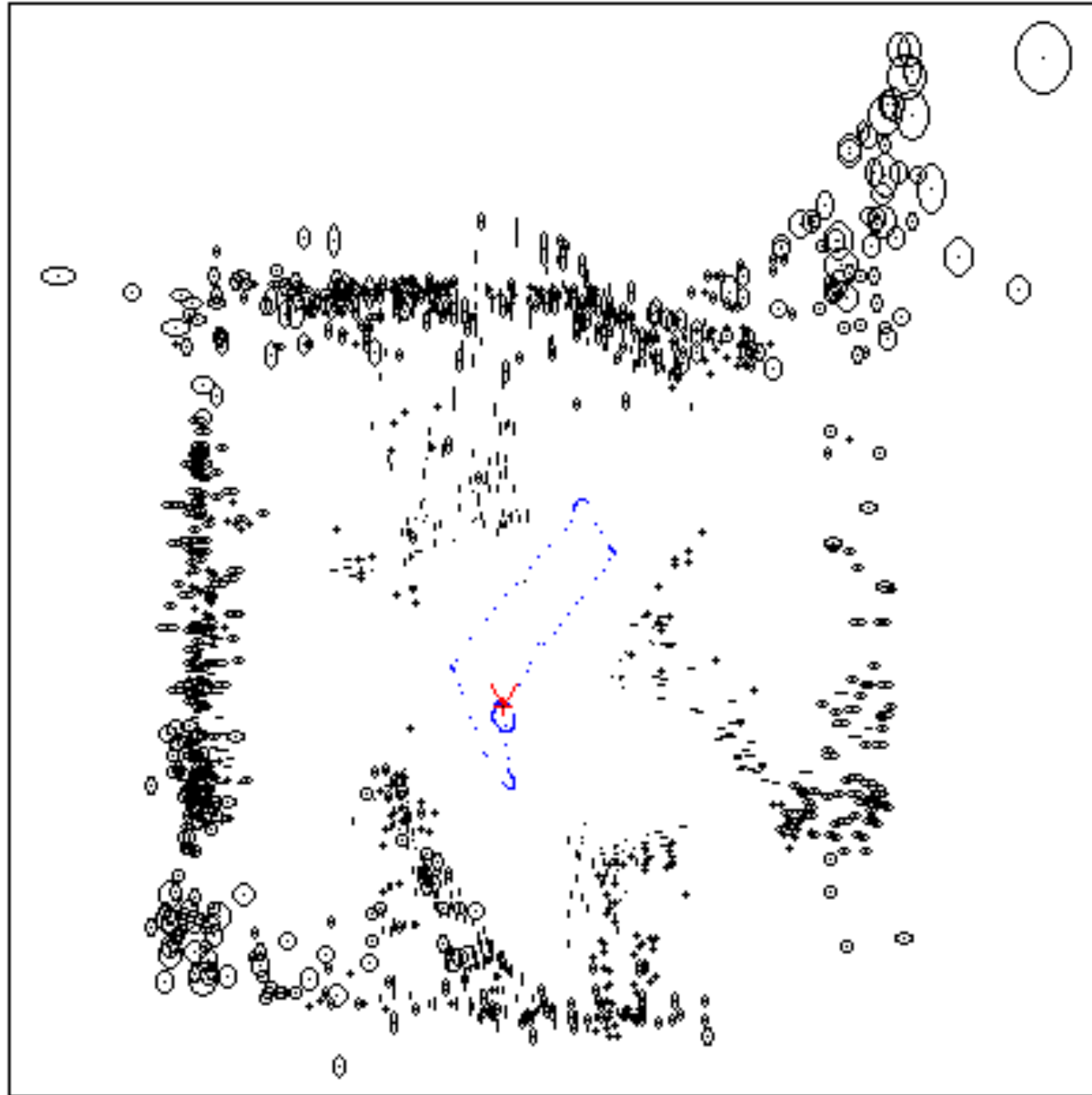


# Robot Localization





# Map built over time



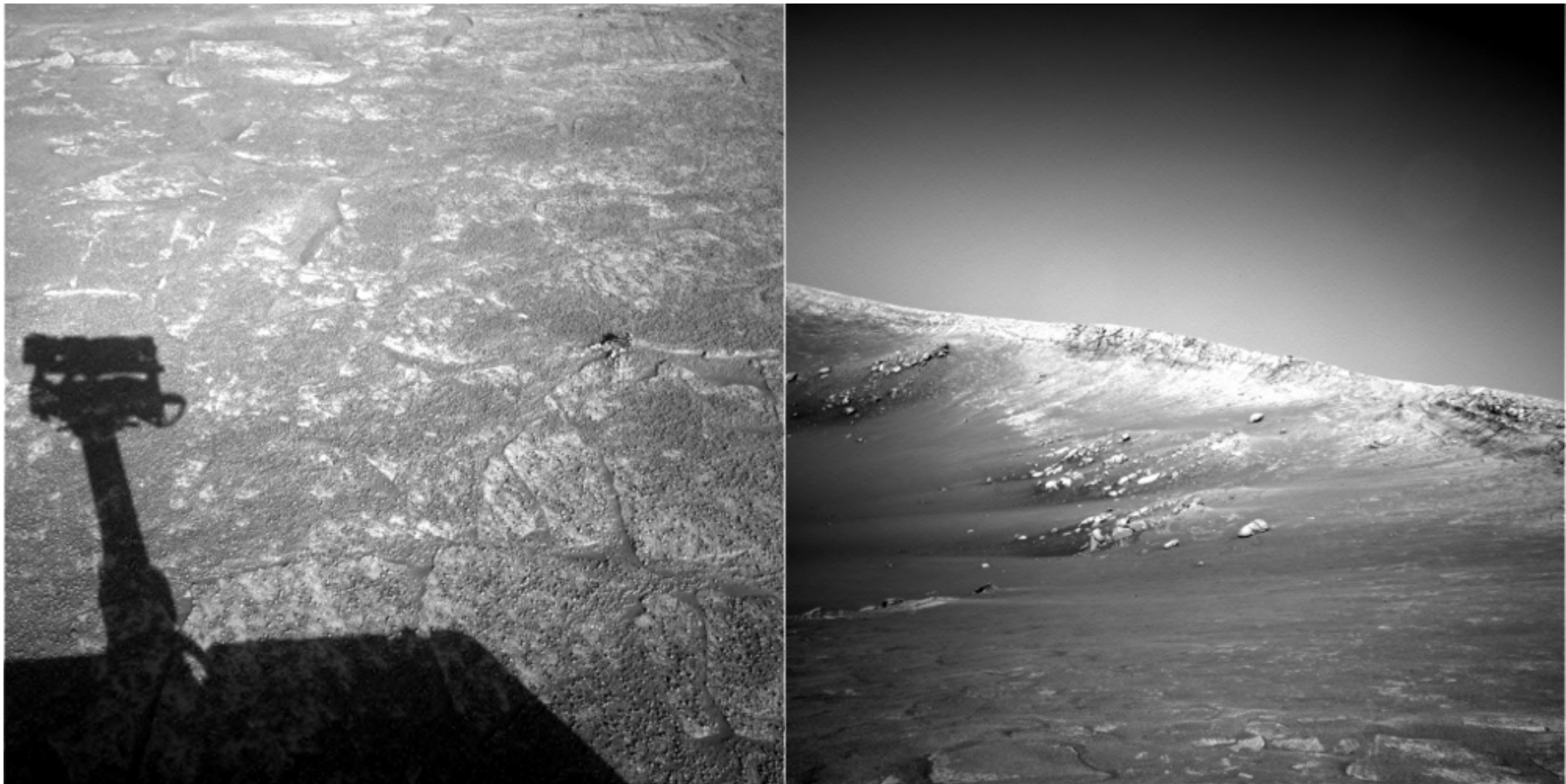


## Example: Image Matching



*How would you find corresponding points?*

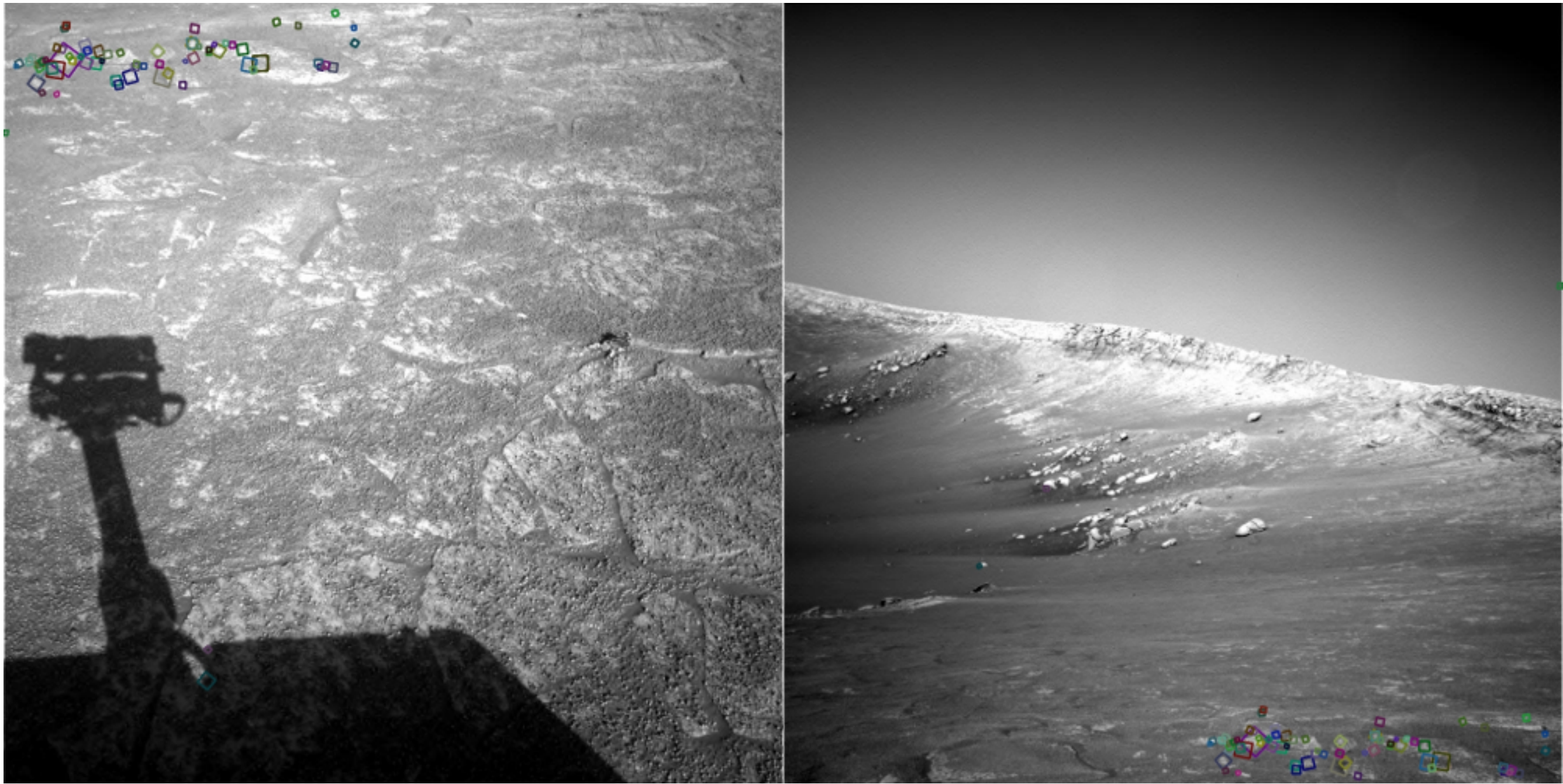




NASA Mars Rover images

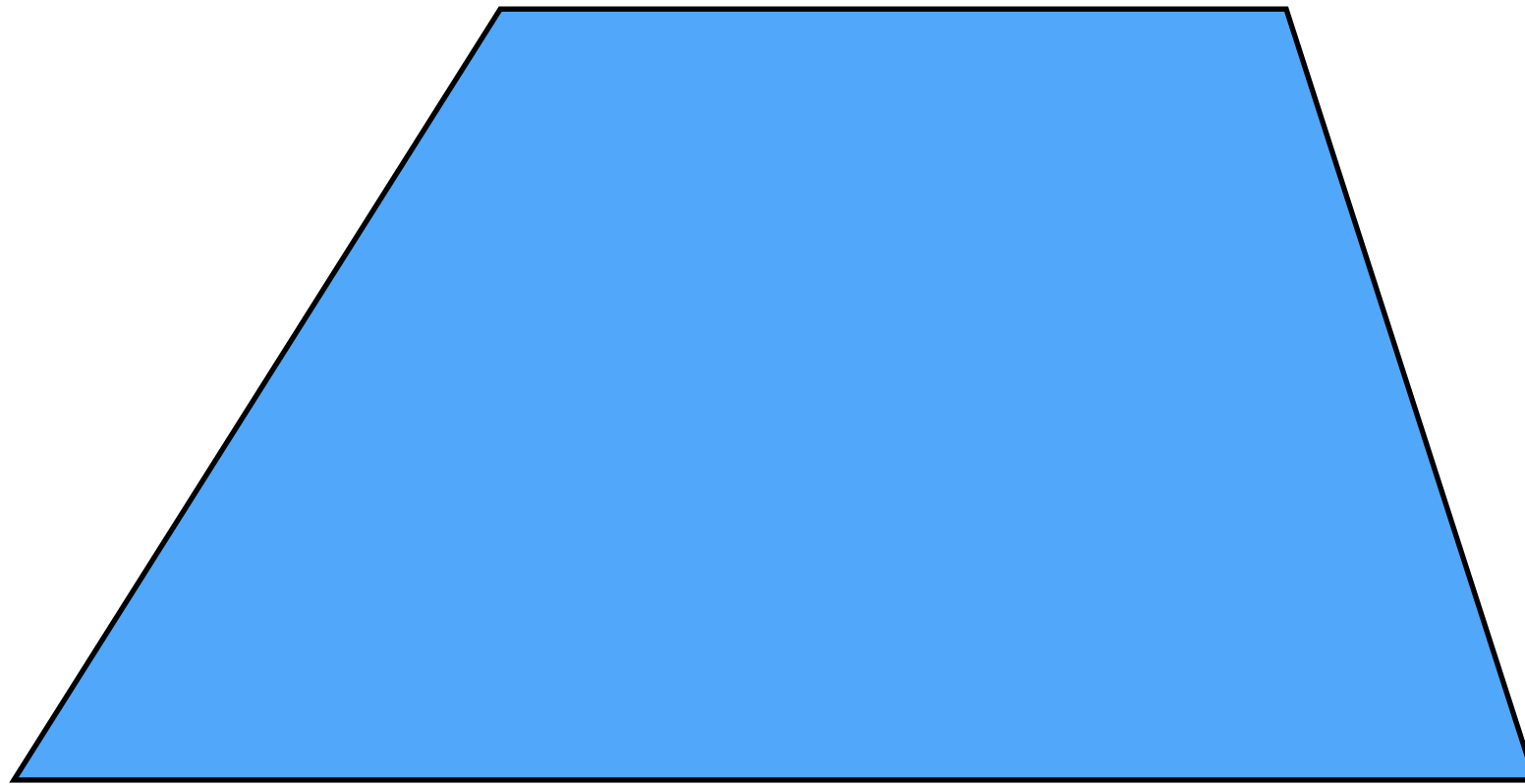
*Where are the corresponding points?*





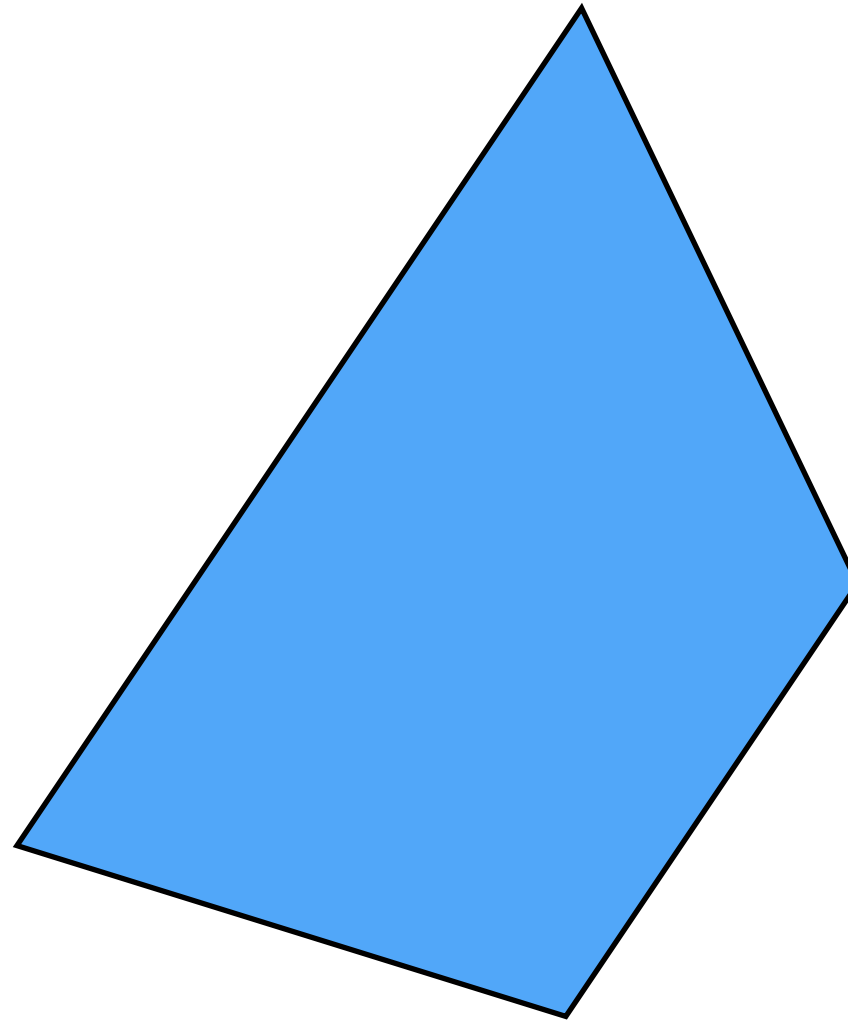
*What type of features were you trying to match?  
Explain to me your thought process.*





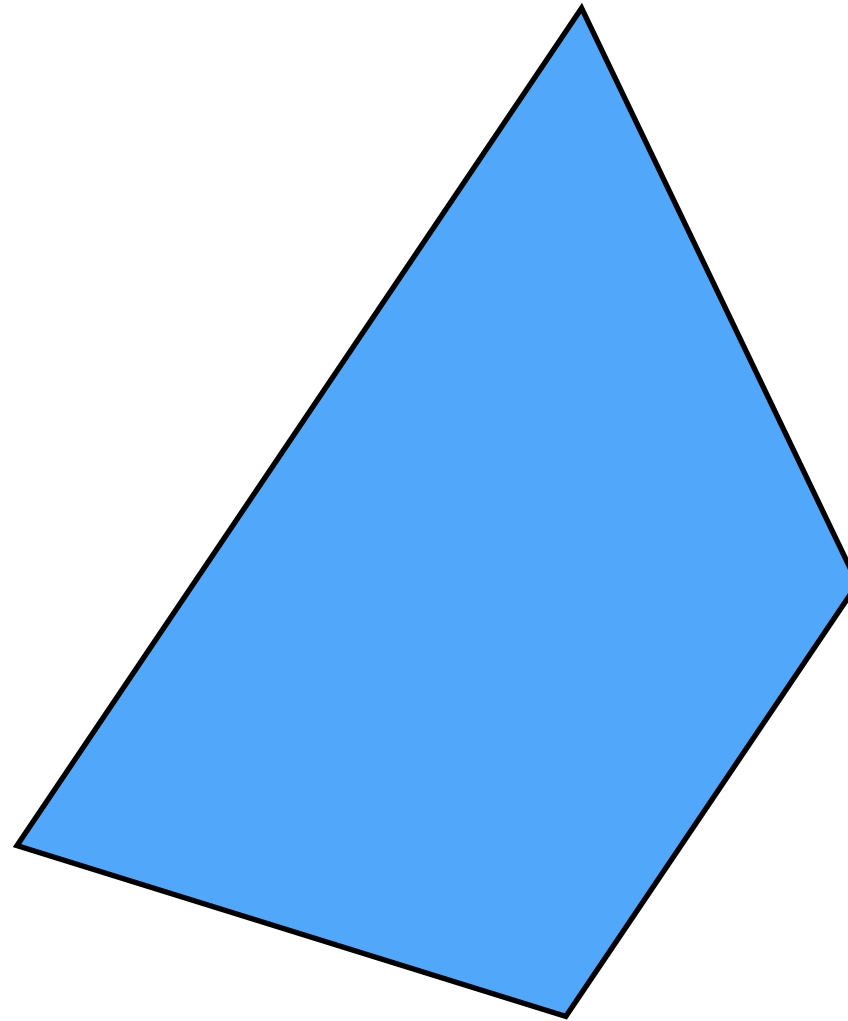
Pick a point in the image.  
Find it again in the next image.

*What type of feature would you select?*



Pick a point in the image.  
Find it again in the next image.

*What type of feature would you select?*



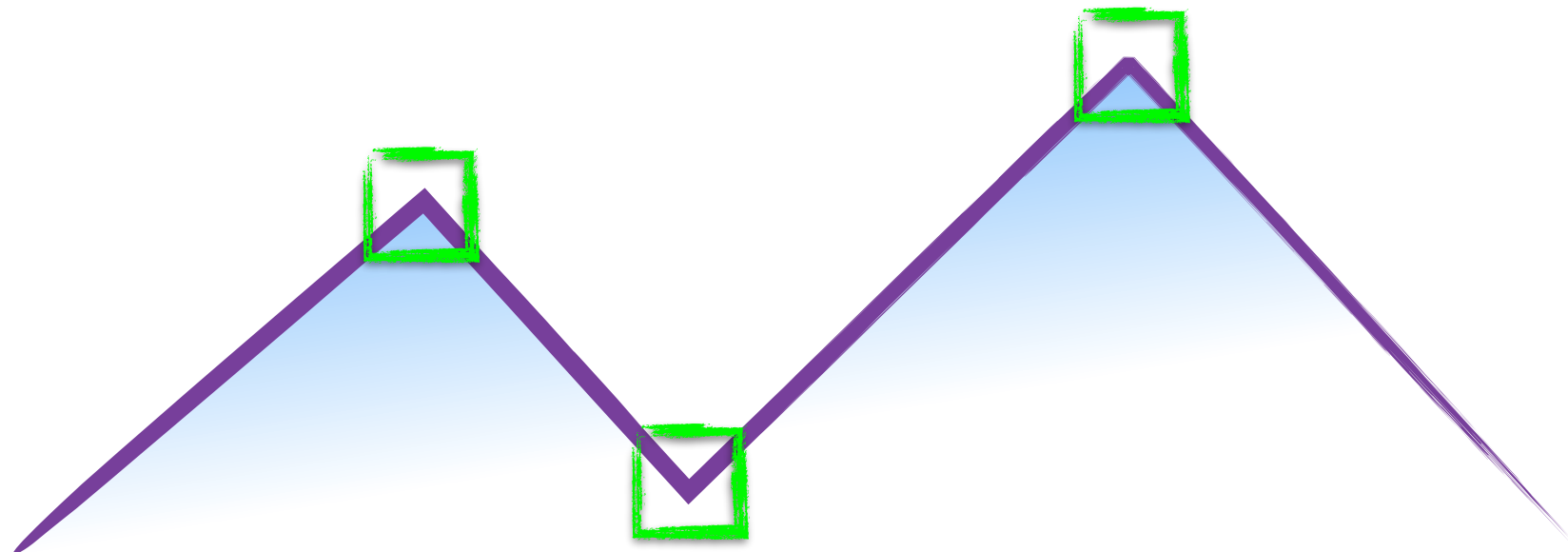
Pick a point in the image.  
Find it again in the next image.

*What type of feature would you select?*

a corner

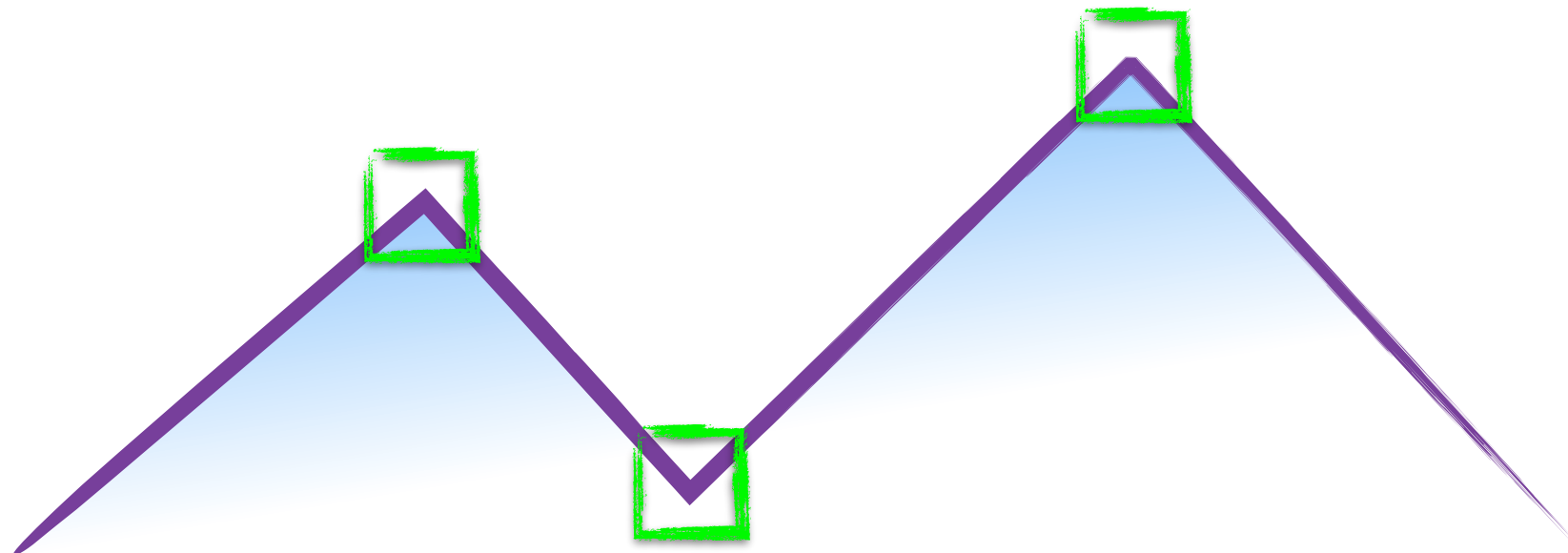


# How do you find a corner?



# How do you find a corner?

[Moravec 1980]

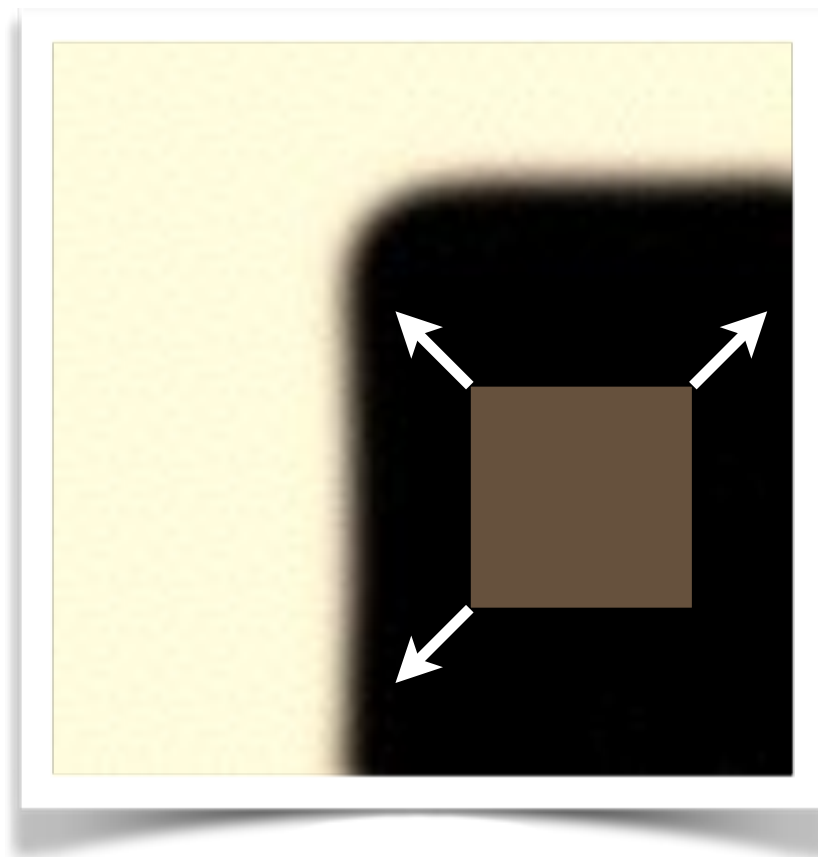


Easily recognized by looking through a small window

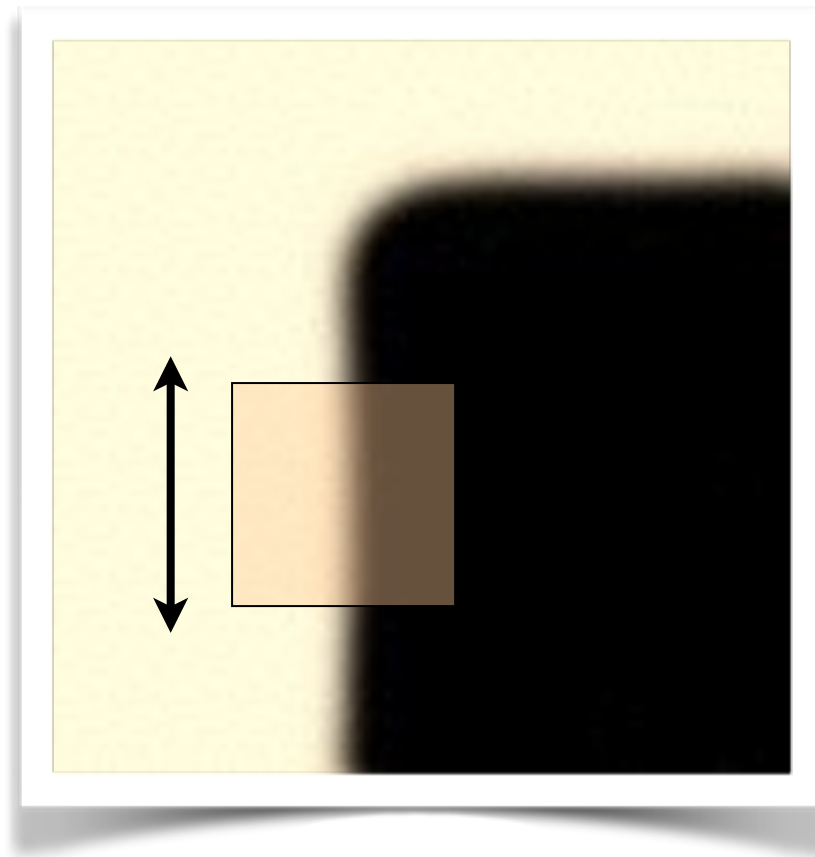
Shifting the window should give large change in intensity

Easily recognized by looking through a small window

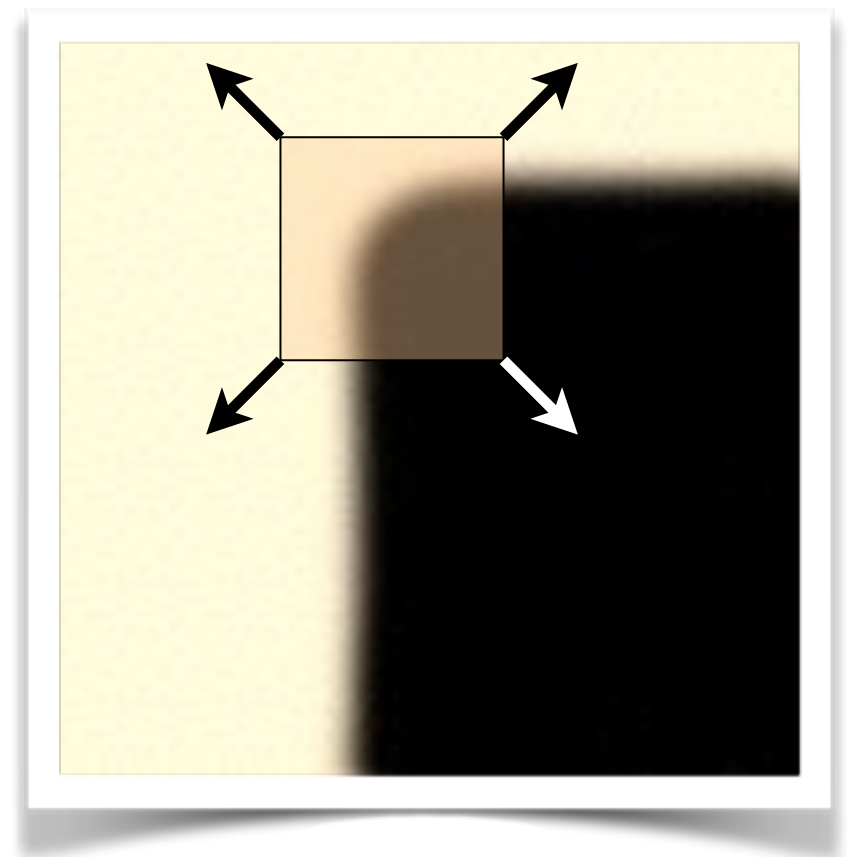
Shifting the window should give large change in intensity



“flat” region:  
no change in all  
directions



“edge”:  
no change along the edge  
direction



“corner”:  
significant change in all  
directions