


- Today: introduction to object recognition: template matching
 - Sunset detector due
 - **Saturday** night: literature review due
 - Questions?
- 

Template matching (Sonka, 6.4)

- Idea: you are looking for an exact match of an object (described by a sub-image, a *template*) in an image
- Ideal world: it matches exactly



Template matching (Sonka, 6.4)

- Algorithm:
 - Evaluate a match criterion at every image location (and size, reflection, and rotation, if those variations are expected)
 - A “match” is a local maximum of the criterion above a threshold



Correlation

- Just the dot product between the template and a neighborhood in the image.
- Idea: high correlation when the template matches.
- Problem: **always** high correlation when matching with bright region

image_T

0	0	0	0	0	0	0	0	7
0	4	4	4	4	4	4	0	10
0	0	4	6	6	4	0	0	9
0	0	0	4	6	4	0	0	10
0	0	0	0	4	4	0	0	8
0	0	0	0	0	4	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Correlation

- Just the dot product between the template and a neighborhood in the image.
- Idea: high correlation when the template matches.
- Problem: **always** high correlation when matching with bright region
- Solution: Normalize the template and each region by subtracting each's mean from itself **before** taking dot product

image_T

0	0	0	0	0	0	0	0	7
0	4	4	4	4	4	4	0	10
0	0	4	6	6	4	0	0	9
0	0	0	4	6	4	0	0	10
0	0	0	0	4	4	0	0	8
0	0	0	0	0	4	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Other matching algorithms

- Chamfering (Hausdorff distance):
- <http://www.cs.cornell.edu/~dph/hausdorff/hausdorff1.html>
- Springs and templates (Crandall and Huttenlocher)
- http://www.cs.cornell.edu/~dph/papers/cvp_r07.pdf