A2 (Inpainting) and Pictorial Structure

CSC320: Introduction to Visual Computing - Winter 2014

Department of Computer Science

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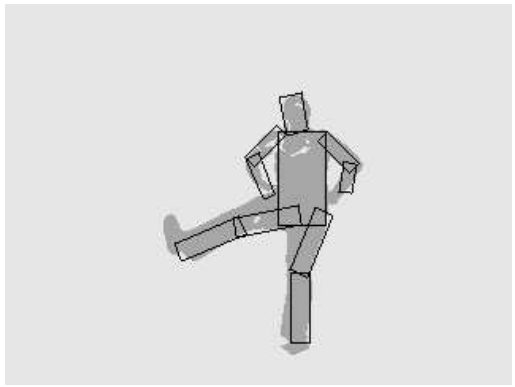
Assignment 2

- Tips:
  - Don't waste time on setting the required libraries on your own machine - use CDF!
    ssh -Y <CDF User Name>@cdf.toronto.edu
  - Again, code must work on CDF, so make sure it does.
  - Start early.
- Any questions?

Pictorial Structure - Overview

- A part-based modeling and recognition of objects.
- A seminal paper of 2D model recognition.



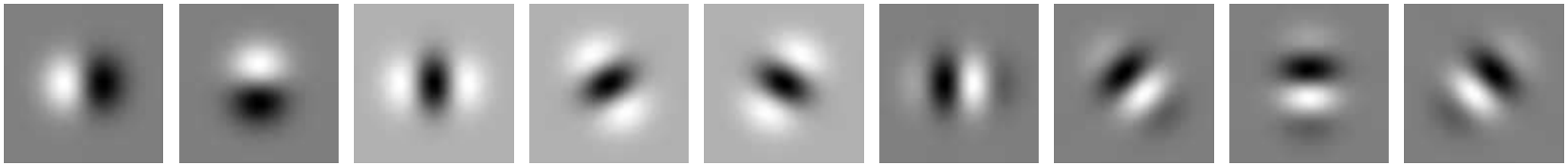



Formulation

$$L^* = \arg\min_L \left(\sum_{i=1}^{n} m_i(l_i) + \sum_{(v_i, v_j) \in E} d_{ij}(l_i, l_j) \right)$$

Mismatch Potential m_i

- $m_i(l_i)$ - the mismatch of part i in position l_i given an image.
- Felzenswab used iconic representation - response of Gaussian derivative filters of different orders, orientations and scales.



- $p(I|l_i, u_i) \propto \mathcal{N}(\alpha(l_i), \mu_i, \Sigma_i)$
- What other representation of parts can we use? (hint: from lecture)

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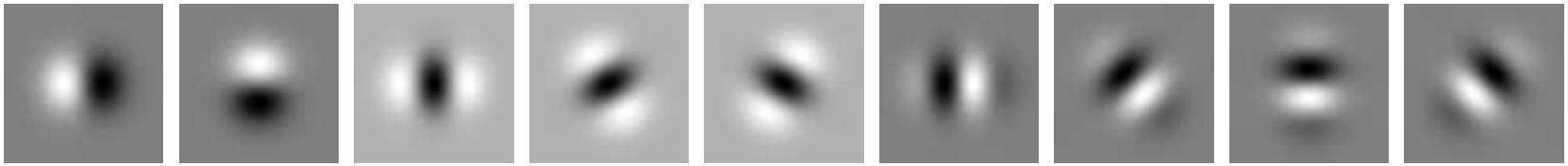

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    - HoG.

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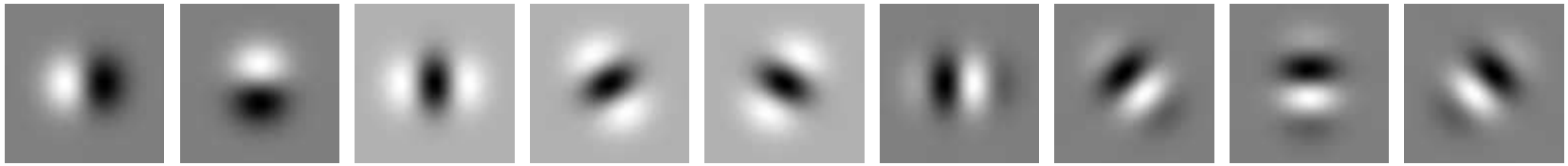

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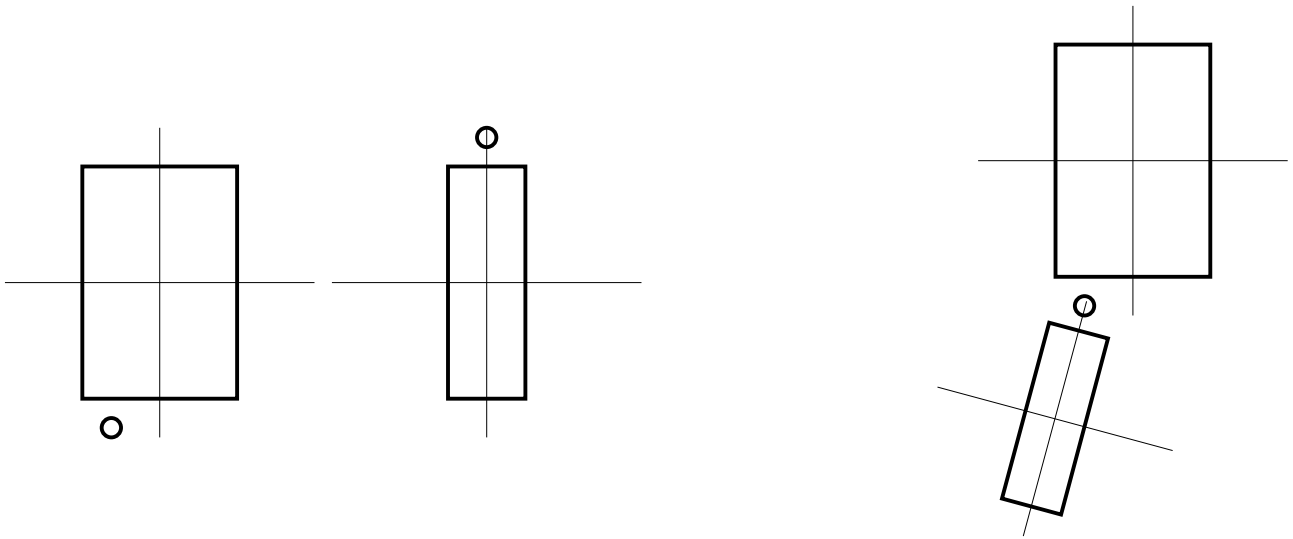
- What other representation of parts can we use? (hint: from lecture)
  - HoG.
  - Also SIFT, SURF, etc.

Deformation Potential $d_{ij}(l_i, l_j)$

- $d_{ij}(l_i, l_j)$ - the deformation distance between current part position and model part position.
- Felzenswab wants to allow deformation of the model by using a Gaussian distribution over model position.
- $p(l_i, l_j | c_{ij}) = \mathcal{N}(l_i - l_j, s_{ij}, \Sigma_{ij})$



a b

Inference

- Matching a pictorial structure model to an image does not involve making any initial decisions about locations of individual parts, but rather an overall decision is made based on both the part match costs and the deformation costs together.

References

- Felzenszwalb, Pedro F and Huttenlocher, Daniel P, "Pictorial structures for object recognition", International Journal of Computer Vision (2005), 55–79.
- Criminisi, Antonio and Perez, Patrick and Toyama, Kentaro, "Object removal by exemplar-based inpainting" (2003), II–721.