



Shadow detection

Input

[Finlayson et al. '04]



Observation: photometric methods do not work well on consumer images.

Hypothesis: appearances of shadows on the ground are less varied than shadows in general, and can be learned from labelled images.



Detecting Ground Shadows in Outdoor Consumer Photographs Jean-François Lalonde, Alexei A. Efros, and Srinivasa G. Narasimhan Carnegie Mellon University

http://graphics.cs.cmu.edu/projects/shadow

Learning shadow appearance

Ours

T-junctions

Input



CRF



Incorporating scene layout Shadows Input





Evaluation

135 8-bit, JPG-compressed images LabelMe [Russell et al., '08], Flickr, [Zhu et al., '10]

	Shadows	Non-shadows	Со
Grayscale only	68.1%	71.2%	
Local classifier	78.3%	81.0%	
CRF	78.7%	82.3%	
CRF + ground	73.1%	96.4%	8

Oversegmentation (watershed)

Strong boundaries (Canny)





P(ground) [Hoiem et al., '07]

Ground shadows



penalize shadow assignment

trust local classifier



Results

rode & dats

available online

Application: shadow removal

