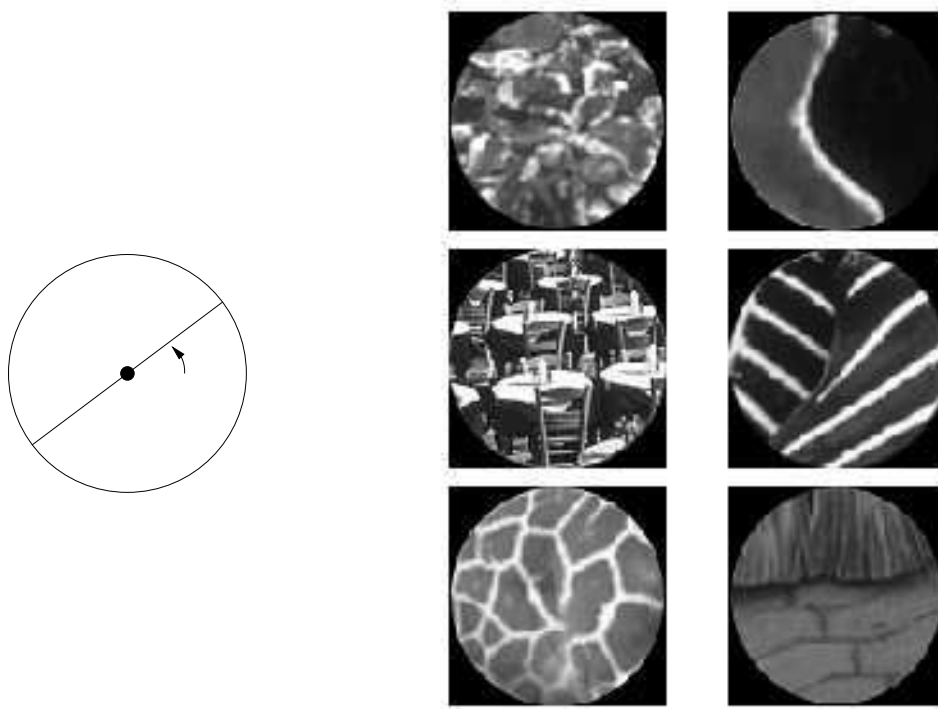


Boundaries versus Edges

An alternative goal is to detect (salient) region boundaries instead of brightness edges.

For example, at a pixel \vec{x} , decide if the neighbourhood is bisected by a region boundary (at some orientation θ and scale σ)



From <http://www.cs.berkeley.edu/~fowlkes/project/boundary>

The Canny edge operator determines edgels $(\vec{x}, \theta, \sigma)$ based essentially on the difference of mean brightness in these two half disks.

We could also try using other sources of information, such as texture or contours (see Martin et al, 2004).

Boundary Probability

Martin et al (2004) trained boundary detectors using gradients of brightness, colour, and texture.

Image



Canny



Boundary Prob.



Human



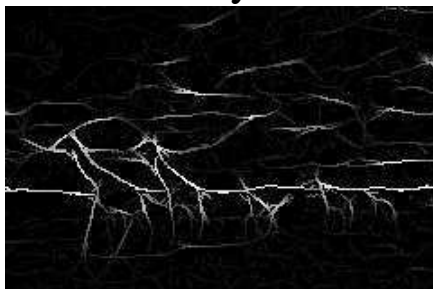
Image



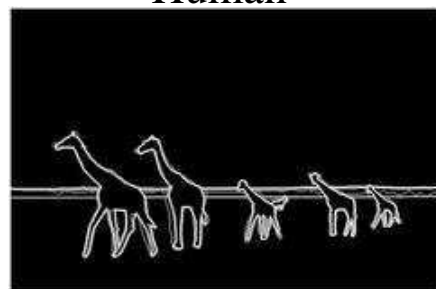
Canny



Boundary Prob.



Human



Further Readings

Castleman, K.R., **Digital Image Processing**, Prentice Hall, 1995

John Canny, "A computational approach to edge detection." *IEEE Transactions on PAMI*, 8(6):679–698, 1986.

James Elder and Richard Goldberg, "Image editing in the contour domain." *IEEE Transactions on PAMI*, 23(3):291–296, 2001.

Scott Konishi, Alan Yuille, James Coughlin, and Song Chun Zhu, "Statistical edge detection: Learning and evaluating edge cues." *IEEE Transactions on PAMI*, 25(1):57–74, 2003.

William Freeman and Edward Adelson, "The design and use of steerable filters." *IEEE Transactions on PAMI*, 13:891–906, 1991.

David Martin, Charless Fowlkes, and Jitendra Malik, "Learning to detect natural image boundaries using local brightness, color, and texture cues." *IEEE Transactions on PAMI*, 26(5):530–549, 2004.