INF555

2008

Fondements de la 3D

Projets

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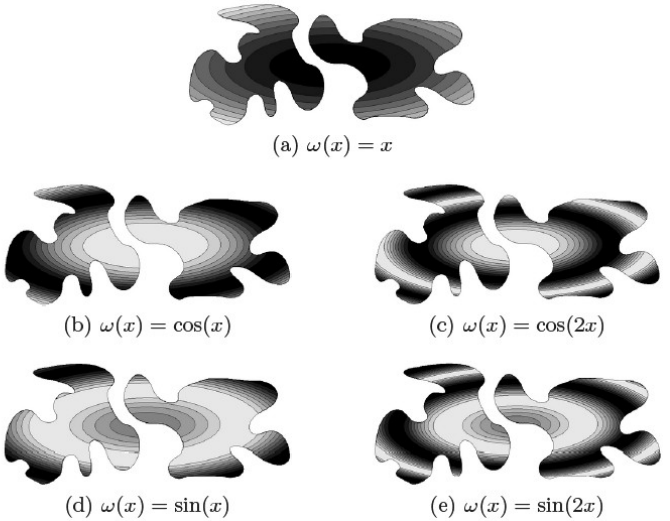
1. Image Registration without correspondences

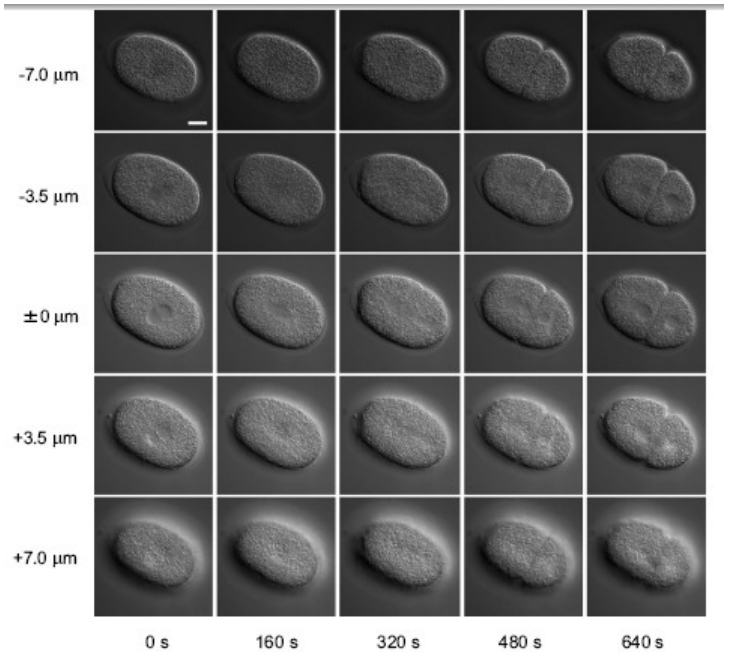


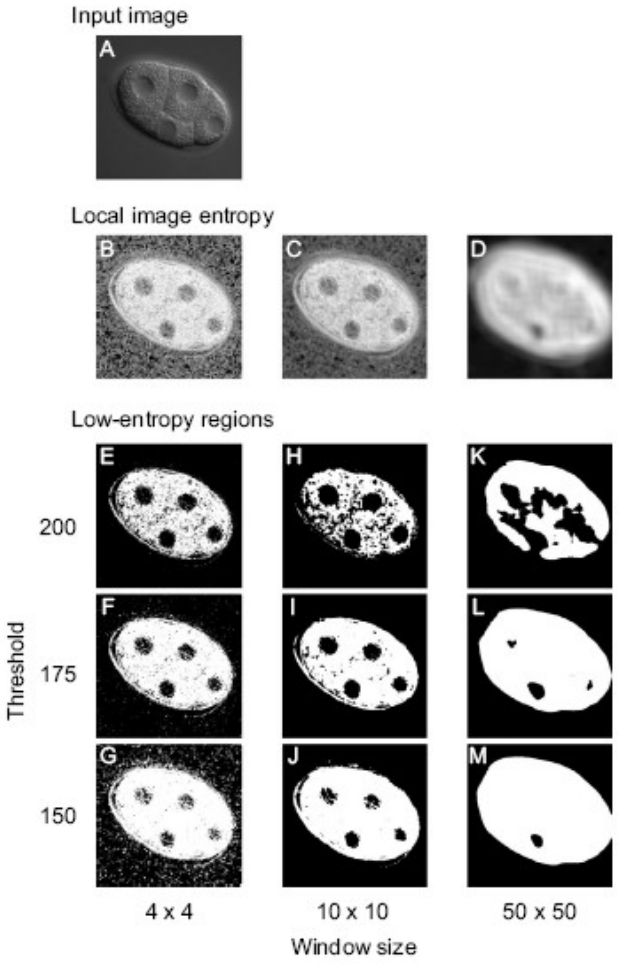
- Implement ICIAR 2008 paper
- Extend to other transformations (homography)
- Link with method of moments for parameter estimation (Statistics)
- Etc.

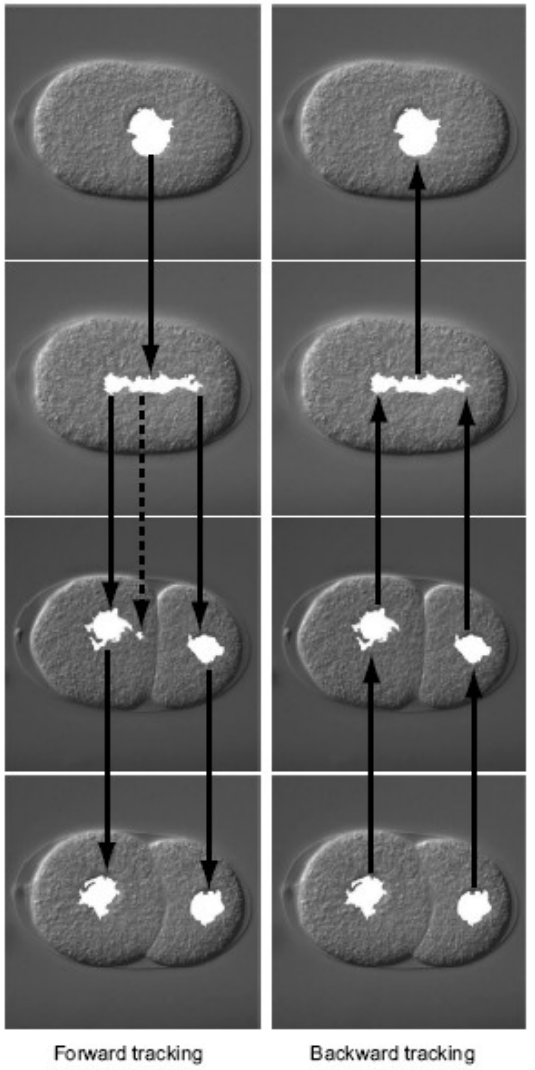
Csaba Domokos, Zoltan Kato:
Binary Image Registration Using Covariant Gaussian Densities.
ICIAR 2008: 455-464

http://www.inf.u-szeged.hu/~kato/

2. Entropic segmentation of C. Elegans





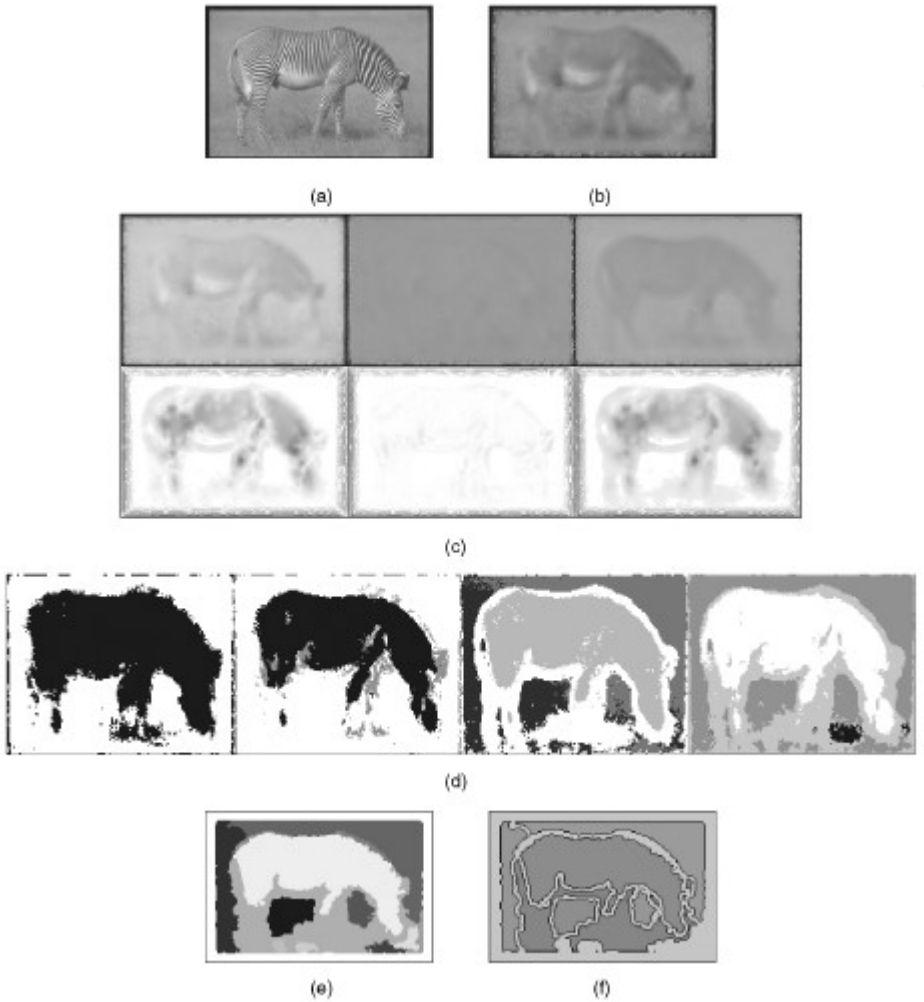


Cell Division Pattern

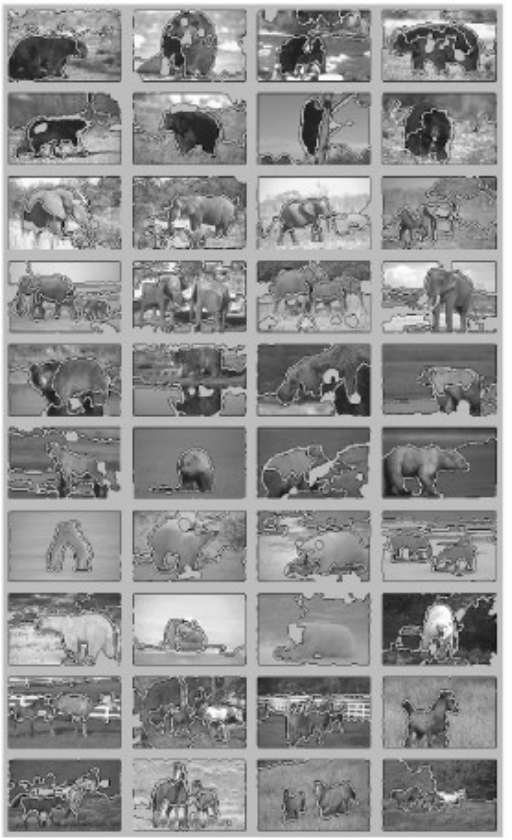
Hamahashi, S., Onami, S., and Kitano, H. (2005).
Detection of nuclei in 4D Nomarski DIC microscope images of early Caenorhabditis elegans embryos using local image entropy and object tracking.
BMC Bioinformatics, 6, 235

http://so.gsc.riken.jp/nuclear_detection/

3. Image segmentation using Gaussian mixtures



Mixture of gaussians (MoG)
Gaussian mixture model (GMM)



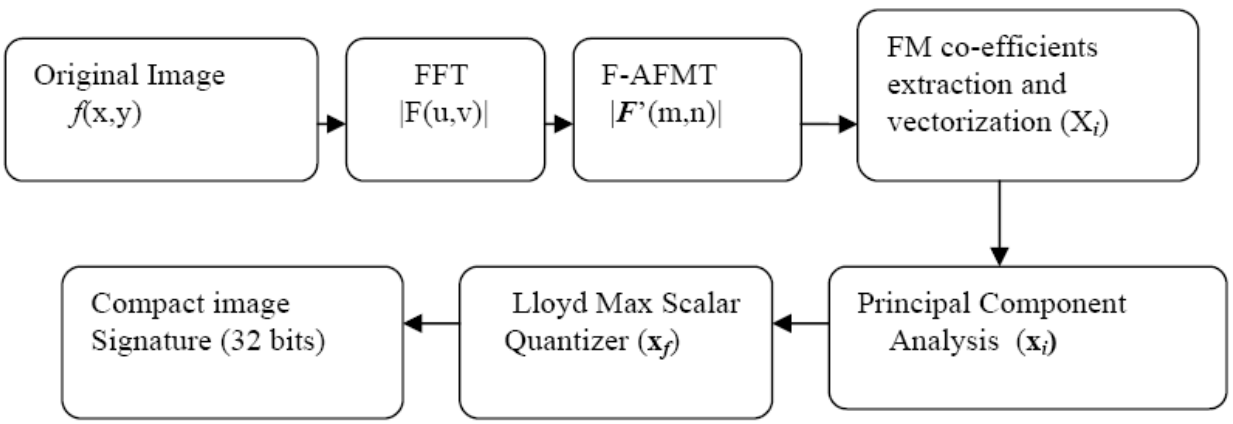
Blobworld: Image Segmentation Using Expectation-Maximization and Its Application to Image Querying

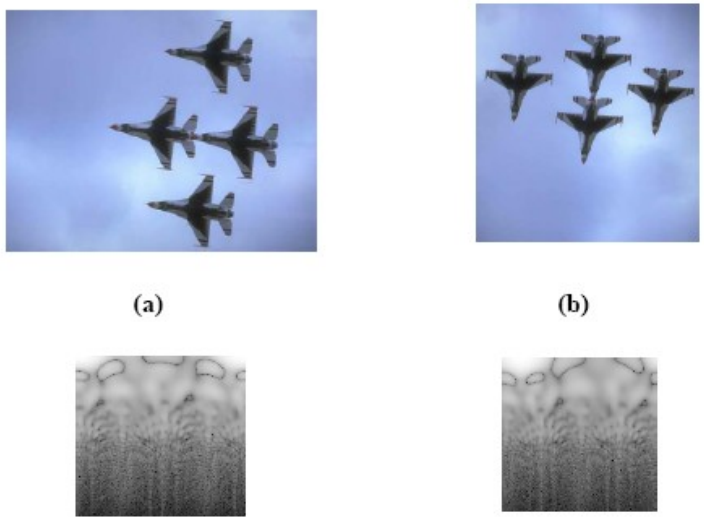
Chad Carson, Serge Belongie, Hayit Greenspan, Jitendra Malik

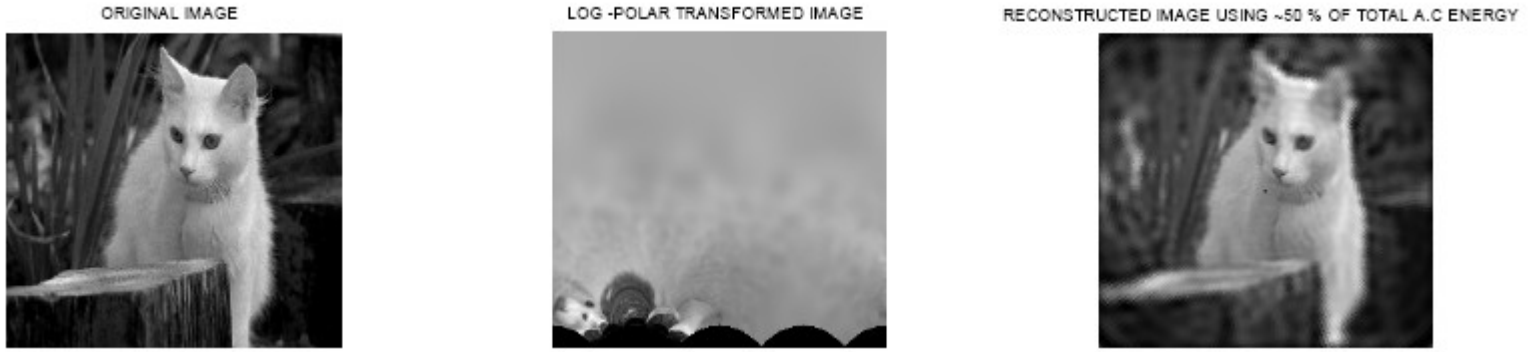
IEEE Transactions on Pattern Analysis and Machine Intelligence, 2002

4. Near Duplicate Image Detection (Image Retrieval)

Copy detection/copyrights (YouTube, etc.)







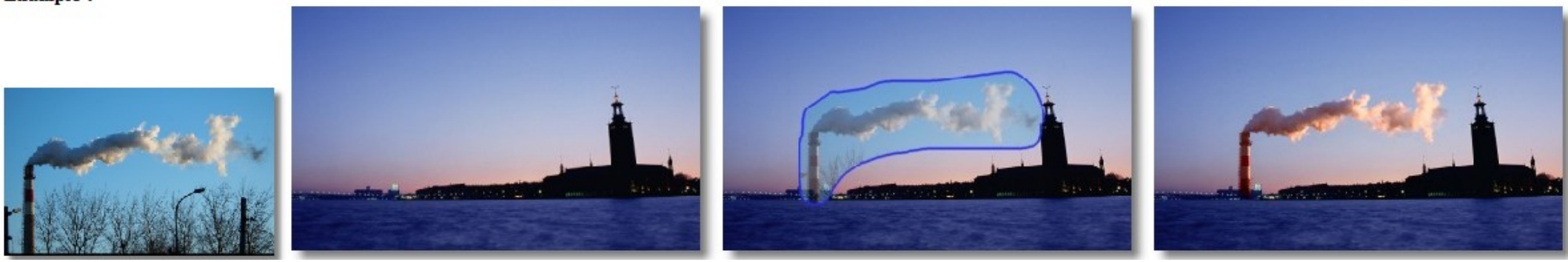
Pratim Ghosh, B.S. Manjunath and K.R. Ramakrishnan,
"A compact image signature for RTS-invariant image retrieval"
Proc. IEE International Conference on Visual Information Engineering (VIE 2006
Bangalore, India, Sep. 2006.

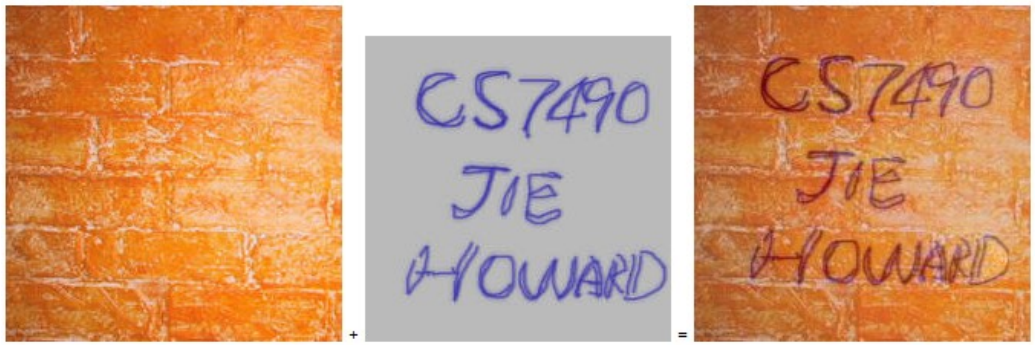
http://vision.ece.ucsb.edu/multimedia/cortina.shtml

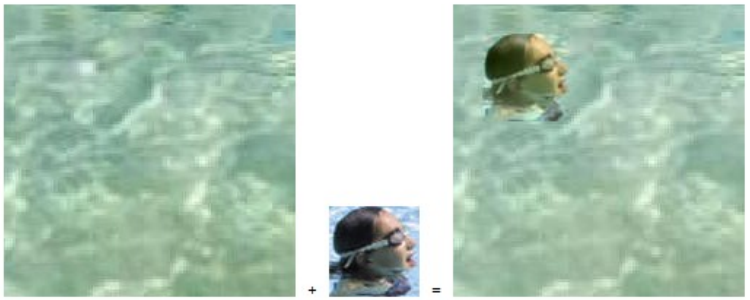
5. Poisson image editing

Use Java Math library like JAMA

Example :



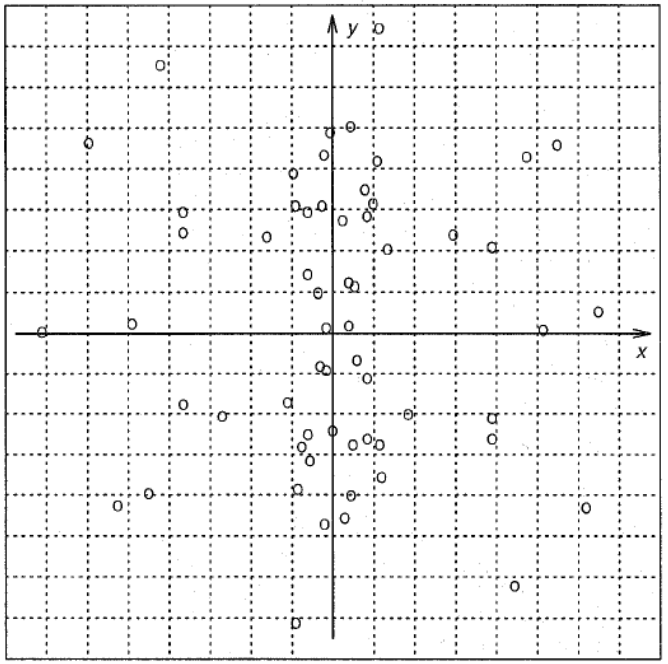


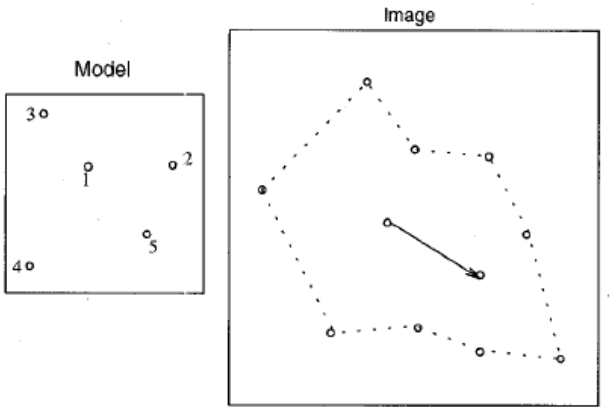


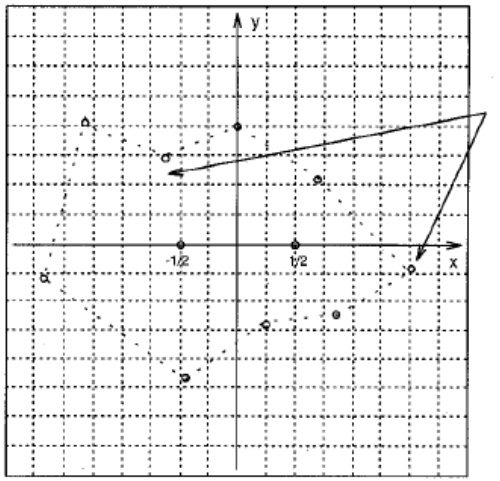
PEREZ P. GANGNET M., BLAKE A.: *Poisson image editing*. In Proc. of SIGGRAPH (2003), 313-3
Jiaya .J, Jian. S et.al Drag-and-Drop Pasting SIGGRAPH 2006.

http://www.cs.tau.ac.il/~tommer/adv-graphics/ex1.htm
http://www.howardzzh.com/research/poissonImageEditing/index.htm

6. Geometric Hashing





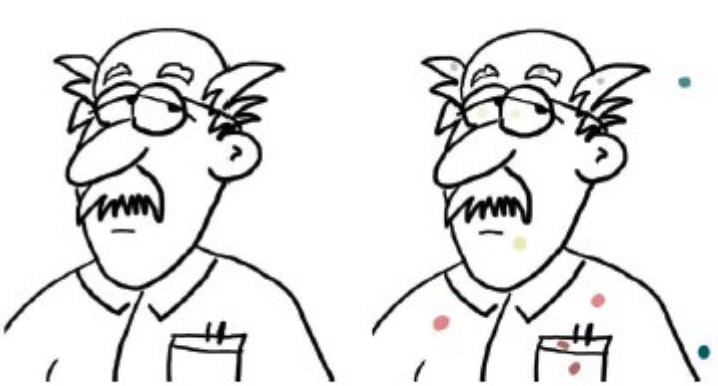


Hash both 2D points with 3D color attributes for fast pattern matching
Compare experimentally with RANSAC

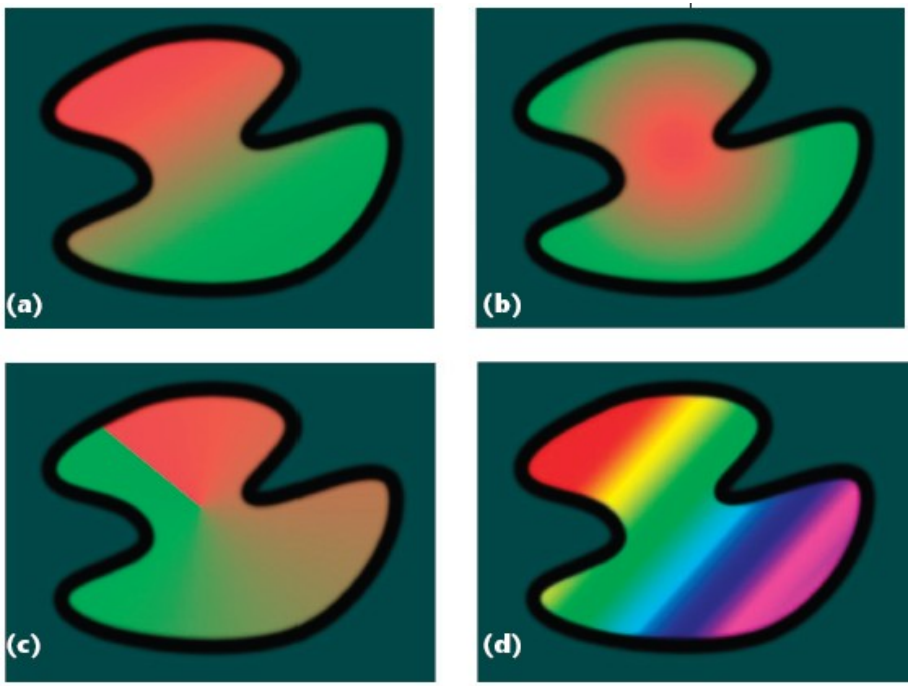
Wolfson, H.J. & Rigoutsos, I (1997). Geometric Hashing: An Overview.
IEEE Computational Science and Engineering, 4(4), 10-21.

http://en.wikipedia.org/wiki/Geometric_hashing

7. Soft flood filling: Tint fill and pattern fill



4 A combination of tint fill and pattern fill.



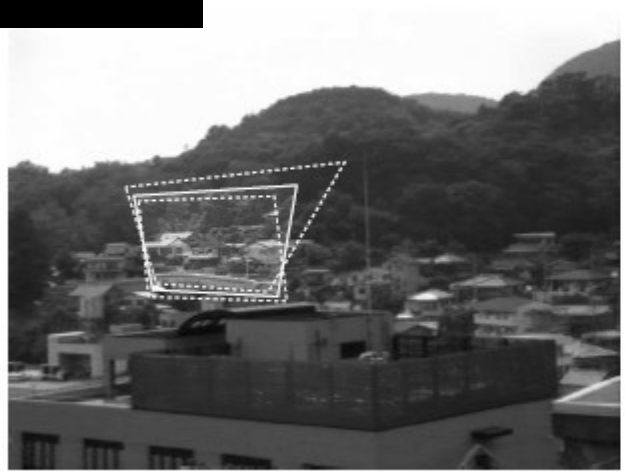
5 Gradient fills. (a) Linear. (b) Circular. (c) Radial. (d) Multicolor.

http://en.wikipedia.org/wiki/Flood_fill

Andrew S. Glassner: Fill 'Er Up! IEEE Computer Graphics and Applications 21(1): 78-85 (2001)

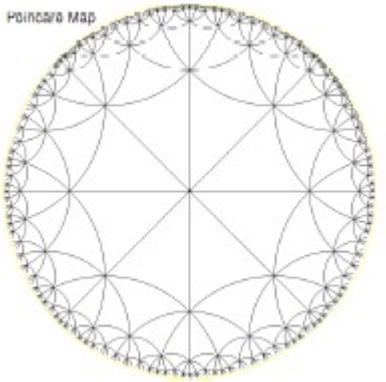
8. Robust Homography with image rectification

Homography from 4 pts or lines correspondence (projective geometry)
Homography from n pts correspondence
Ransac Homography
Interpolation
Statistical estimation



Ken-ichi Kanatani, Naoya Ohta:
Accuracy Bounds and Optimal Computation of Homography for Image Mosaicing Applications
ICCV 1999: 73-78
http://www.ics.forth.gr/~lourakis/homest/

9. Image browser in hyperbolic disk

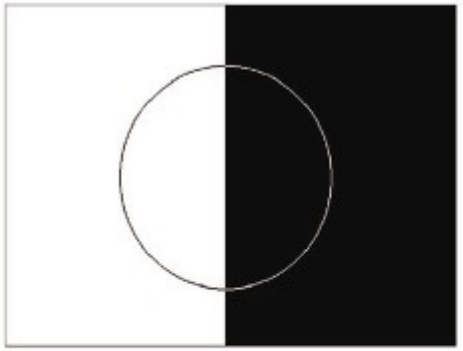


Texture synthesis

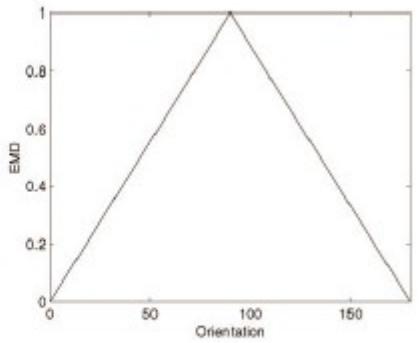
Jorg Walter, Daniel Wessling, Kai Essig, and Helge Ritter.
Interactive hyperbolic image browsing -towards an integrated multimedia navigator.
In ACM MDM/KDD Multimedia Data Mining and Conf
Knowledge Discovery and Data Mining, 2006.
http://www.techfak.uni-bielefeld.de/~walter/h2vis/

http://www.sonycsl.co.jp/person/nielsen/stagesX/hyperbolicvisualizer.pdf

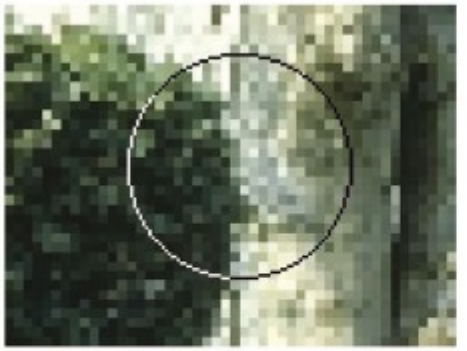
10. Generalized compass operator



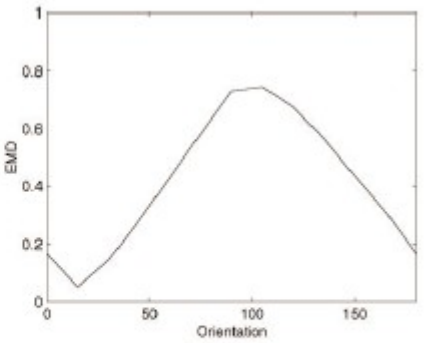
Ideal Step Edge



$h(\theta)$



Natural Step Edge



$h(\theta)$

Initial Corner Candidates

After Edge Test

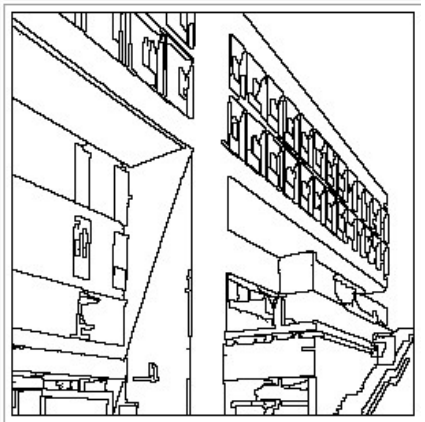
Final Result

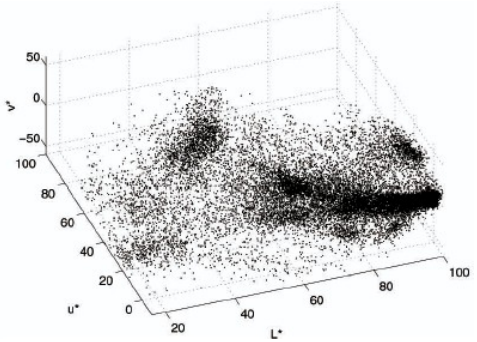
M. Ruzon and C. Tomasi,
"Edge, Junction, and Corner Detection Using Color Distributions,"
IEEE Transactions on Pattern Analysis and Machine Intelligence,
V. 23, No. 11, pp. 1281-1295, November 2001
http://ai.stanford.edu/~ruzon/compass/

11. Mean shift for image segmentation

Etablir le parallele entre le papier theorique (1975) et l'``application'' (2002)



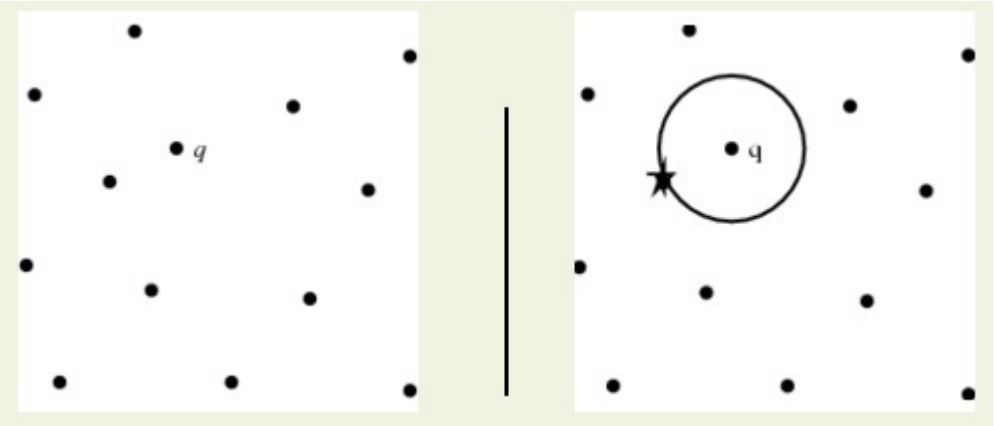


http://www.caip.rutgers.edu/riul/research/code/EDISON/

Comaniciu, Dorin; Peter Meer (May 2002).
"Mean Shift: A Robust Approach Toward Feature Space Analysis".
IEEE Transactions on Pattern Analysis and Machine Intelligence **24** (5): 603–619. IEEE
Fukunaga, Keinosuke; Larry D. Hostetler (January 1975).
"The Estimation of the Gradient of a Density Function, with Applications in Pattern Recog
IEEE Transactions on Information Theory **21** (1): 32–40

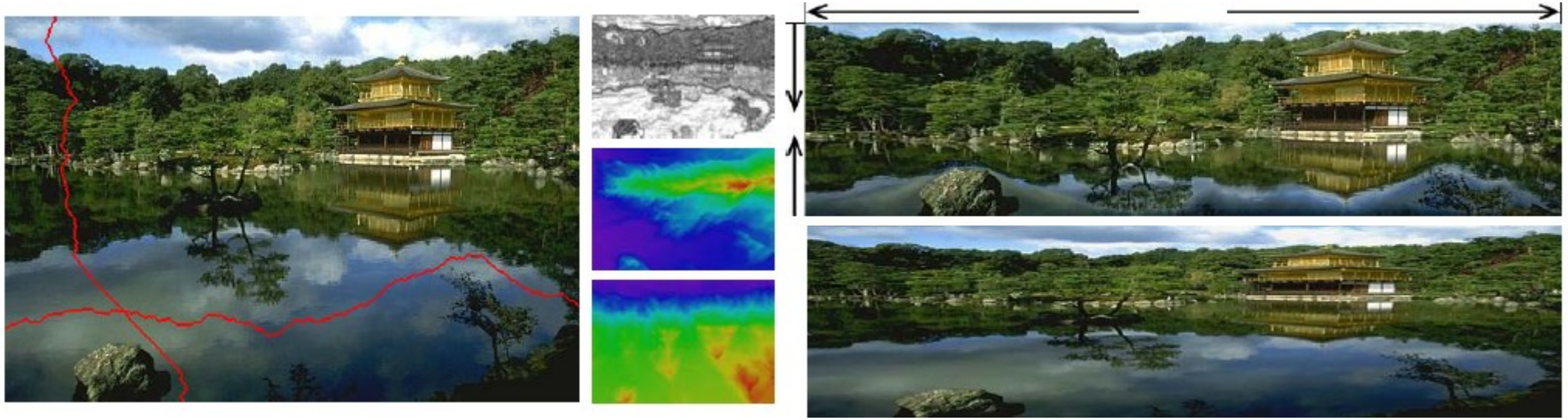
12. Nearest neighbor in high dimensions



Locally sensitive hashing LSH

Andoni, Piotr Indyk:
Near-optimal hashing algorithms for approximate nearest neighbor in high dimen
Finding a Good Neighbor, Near and Fast, B. Chazelle, CACM 51 (2008), 115.

13. Image Retargetting



Seam Carving. Shai Avidan, Ariel Shamir
Seam Carving for Content-Aware Image Resizing
ACM Transactions on Graphics, Volume 26, Number 3, SIGGRAPH 2007

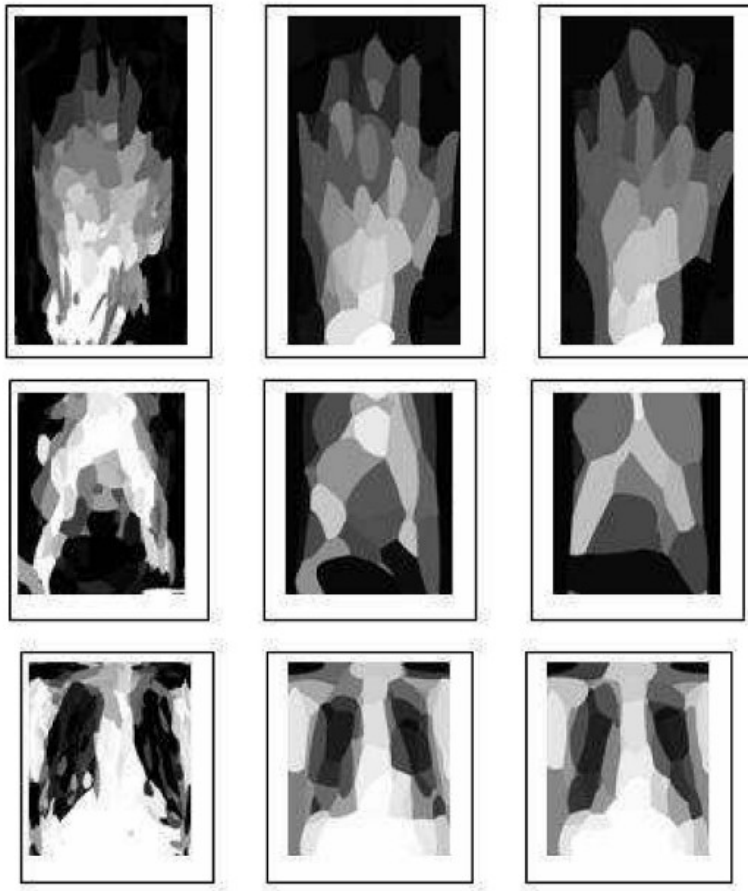
http://www.blog.lessrain.com/seam-carving-for-content-aware-image-resizing/

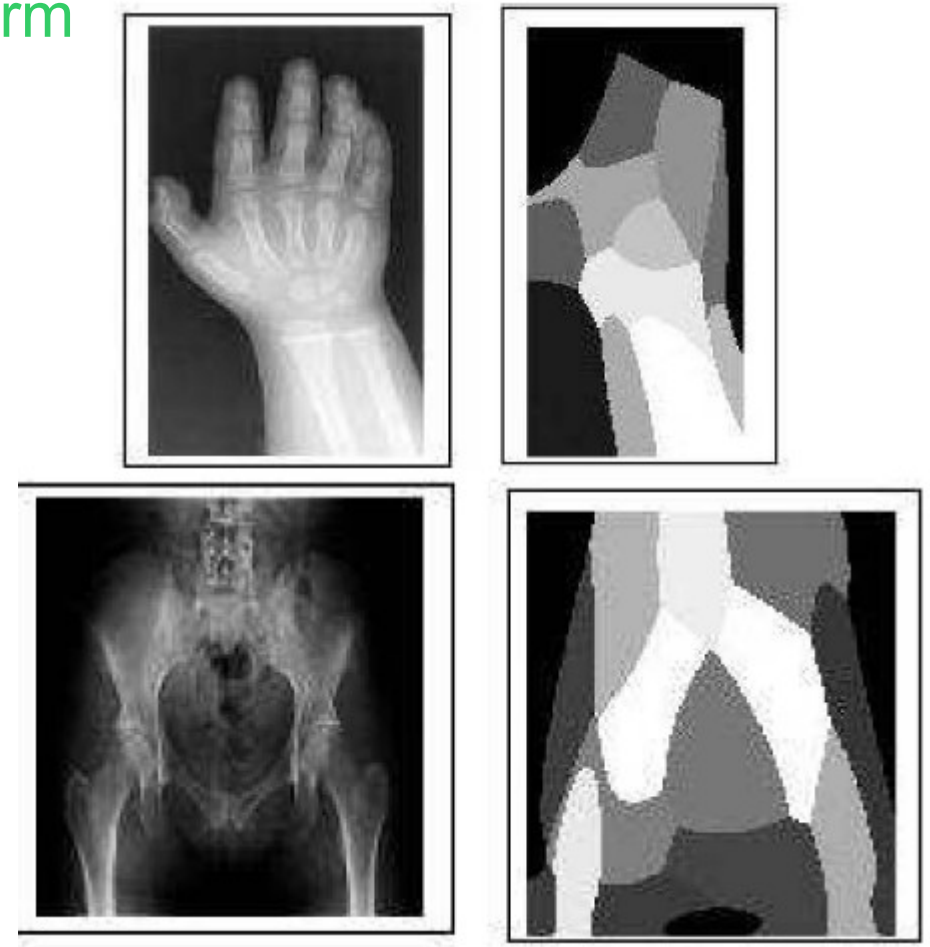
http://pierrefrancois.leon.free.fr/smart-resizing/

14. Simplifying Gaussian Mixture Models I

$$f = \sum_{i=1}^{n} \alpha_i f_i = \sum_{i=1}^{n} \alpha_i N(\mu_i, \Sigma_i)$$

Unscented transform

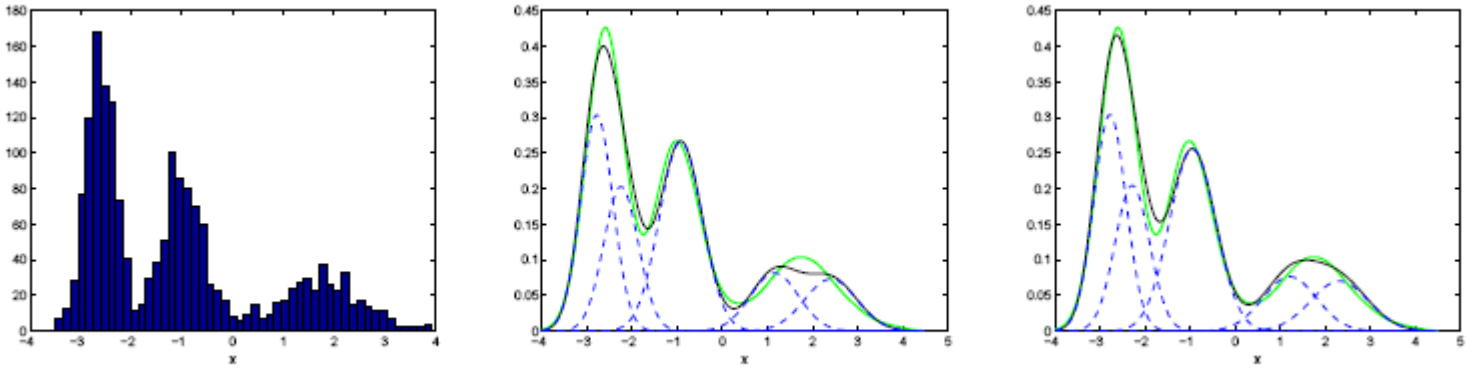




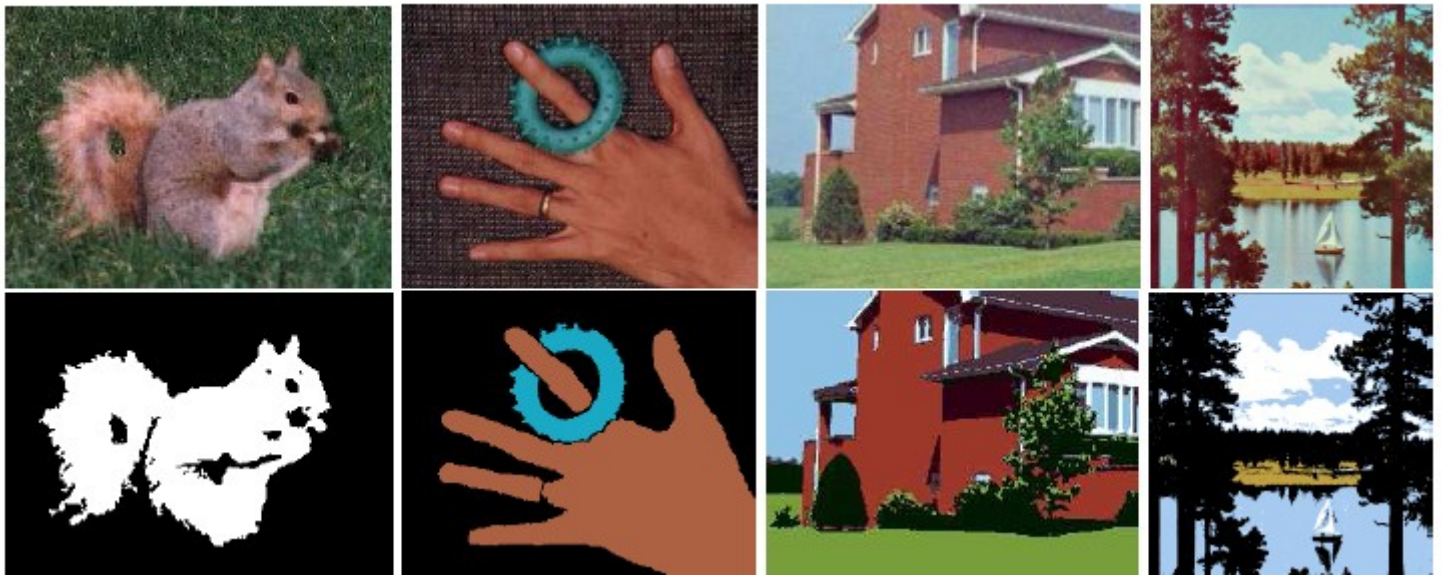
Simplifying Mixture Models Using the Unscented Transform
Pattern Analysis and Machine Intelligence, IEEE Transactions on
Aug. 2008

15. Simplifying Gaussian Mixture Models II

Optimization: Function approximation



(a) Histogram. (b) Result by [5]. (c) Our result.



Kai Zhang, James T. Kwok. Simplifying Mixture Models Through Function Approximation, submitted to ***Journal of Machine Learning Research***