Study Assistance and Resources List

EE60062 Digital Image Processing

MM61503 Digital Image Processing and Applications

(LTP 3-1-0), Autumn 2014-15

Image Segmentation

1. Global operations
   - 1.1. Heuristic or fixed value Threshold selection
     Sec. 10.3, pp. 760 - 763
     R. C. Gonzalez and R. E. Woods, "Ch 10: Image Segmentation", *Digital Image Processing*, 3/ed, 7th impression 2013.
   - 1.2. Binary segmentation
     - 1.2.1. Adaptive or Dynamic Threshold selection
       - 1.2.1.1. Histogram partitioning at minima or maxima
         Sec. II (B.1) and Sec. II (B.2), page 2476
         D. Sheet et al., "Brightness Preserving Dynamic Fuzzy Histogram Equalization", *IEEE Trans. Consumer Electronics*, vol. 56, no. 4, Nov. 2010.
       - 1.2.1.2. Iterative threshold selection
         Sec. 10.3.2, pp. 763 - 764
         R. C. Gonzalez and R. E. Woods, "Ch 10: Image Segmentation", *Digital Image Processing*, 3/ed, 7th impression 2013.
       - 1.2.1.3. Otsu's method using image intensity statistics
         Sec. 10.3.3, pp. 764 - 769
         R. C. Gonzalez and R. E. Woods, "Ch 10: Image Segmentation", *Digital Image Processing*, 3/ed, 7th impression 2013.
       - 1.2.1.4. Entropy based Kapur's method using information theory
         Sec. 7.4.3, pp. 146 - 147
         T. Acharya and A. K. Ray, "Ch 7: Image Segmentation", *Image Processing: Principles and Applications*, 2005.

         J. N. Kapur, P. K. Sahoo, A. K. C. Wong, "A new method for gray-level picture thresholding using the entropy of the histogram", *Computer Vision, Graphics and Image Processing*, vol. 29, pp. 273-285, 1985.
         [https://www.researchgate.net/publication/222143546]
     - 1.2.2. Learning based method or Multivariable thresholding
       Sec. 10.3.8, pp. 783 - 785
       R. C. Gonzalez and R. E. Woods, "Ch 10: Image Segmentation", *Digital Image Processing*, 3/ed, 7th impression 2013.
       - 1.2.2.1. Clustering (Unsupervised learning)
         Sec. 10.4.3: k-Means Clustering, pp. 526-528
         Richard O. Duda, Peter E. Hart, David G. Stork, "Ch 10: Unsupervised Learning and Clustering", *Pattern Classification*, 2/ed
       - 1.2.2.2. Nearest Neighbor search (Supervised learning)
         Sec. 4.5: Nearest Neighbor Rule, pp. 177-184

Richard O. Duda, Peter E. Hart, David G. Stork, "Ch 4: Non Parametric Techniques", *Pattern Classification*, 2/ed

1.3. Multi-class or multi-level segmentation

1.3.1. Dynamic Threshold selection

1.3.1.1. Dynamic splitting of histogram at minima or maxima into multiple segments

Sec. II (B.1) and Sec. II (B.2), page 2476

D. Sheet et al., "Brightness Preserving Dynamic Fuzzy Histogram Equalization", *IEEE Trans. Consumer Electronics*, vol. 56, no. 4, Nov. 2010.

1.3.1.2. Otsu's Bi-(multi-) threshold selection (constrained optimization)

Sec. 10.3.6, pp. 774 - 778

R. C. Gonzalez and R. E. Woods, "Ch 10: Image Segmentation", *Digital Image Processing*, 3/ed, 7th impression 2013.

1.3.2. Learning based method

1.3.2.1. k-means clustering

Sec. 10.4.3: k-Means Clustering, pp. 526-528

Richard O. Duda, Peter E. Hart, David G. Stork, "Ch 10: Unsupervised Learning and Clustering", *Pattern Classification*, 2/ed

1.3.2.2. K-Nearest Neighbor search (kNN)

Sec. 4.5: Nearest Neighbor Rule, pp. 177-184

Richard O. Duda, Peter E. Hart, David G. Stork, "Ch 4: Non Parametric Techniques", *Pattern Classification*, 2/ed

2. Locally adaptive segmentation or Variable Thresholding

Sec. 10.3.7, pp. 778 - 783

R. C. Gonzalez and R. E. Woods, "Ch 10: Image Segmentation", *Digital Image Processing*, 3/ed, 7th impression 2013.