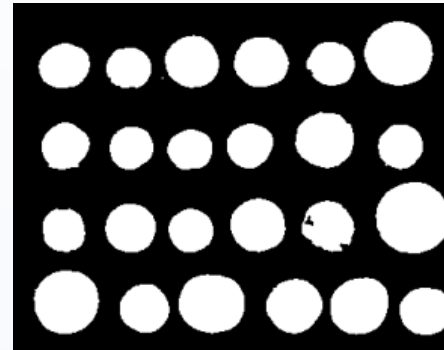
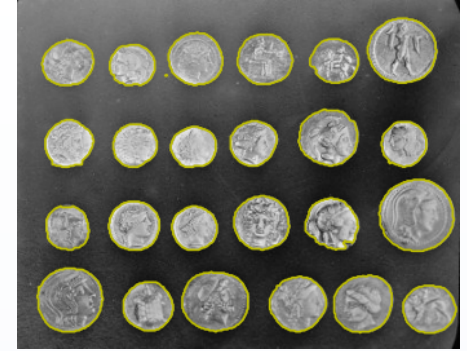


EGM702 – Photogrammetry and Advanced Image Analysis

Week 5, Part 2: Image Segmentation and OBIA

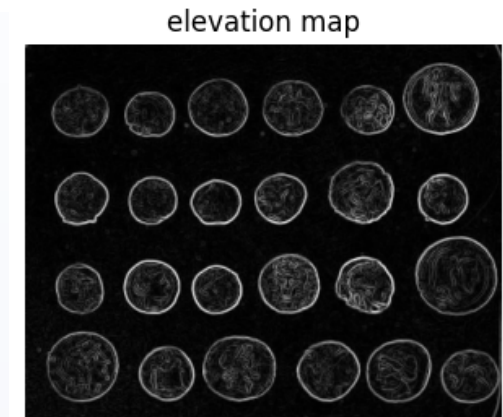
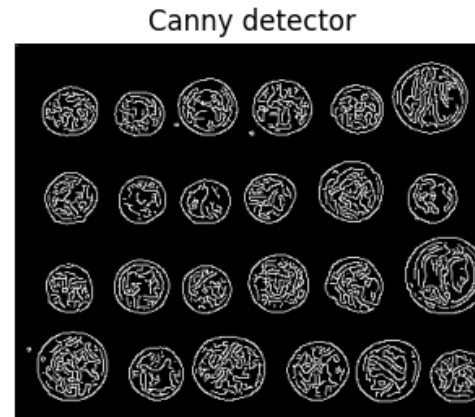
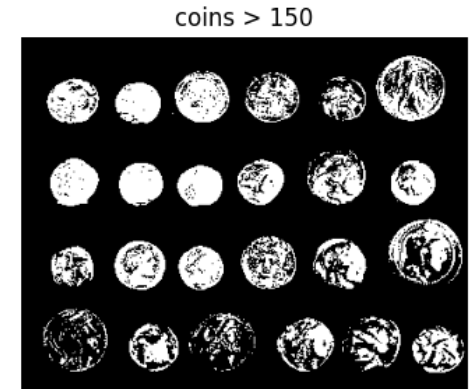
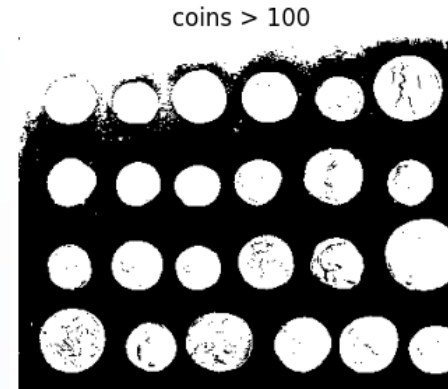
- Process of partitioning (segmenting) image
 - Mask
 - Labeled image
- Group similar pixels together:
 - Similar colour
 - Similar location
 - Using edges



scikit-image.org

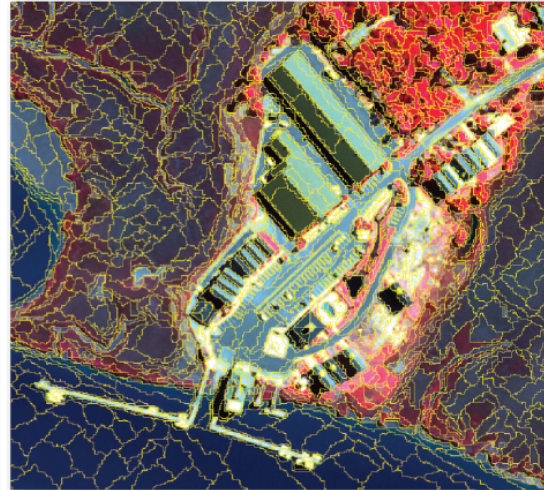
Some segmentation techniques

- Thresholding:
 - e.g., Otsu's method
 - Use histogram to find groups of pixels
- Clustering
 - e.g., k-means, non-iterative clustering
- Edge detection
- Watershed transformation

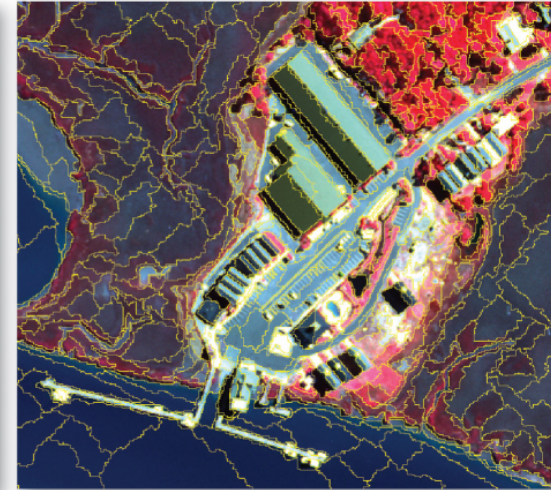


scikit-image.org

- Segmentation creates objects
- Roughly correspond to real-world objects
- Often segment hierarchically (i.e., different scales)



a. Segmentation scale 10.

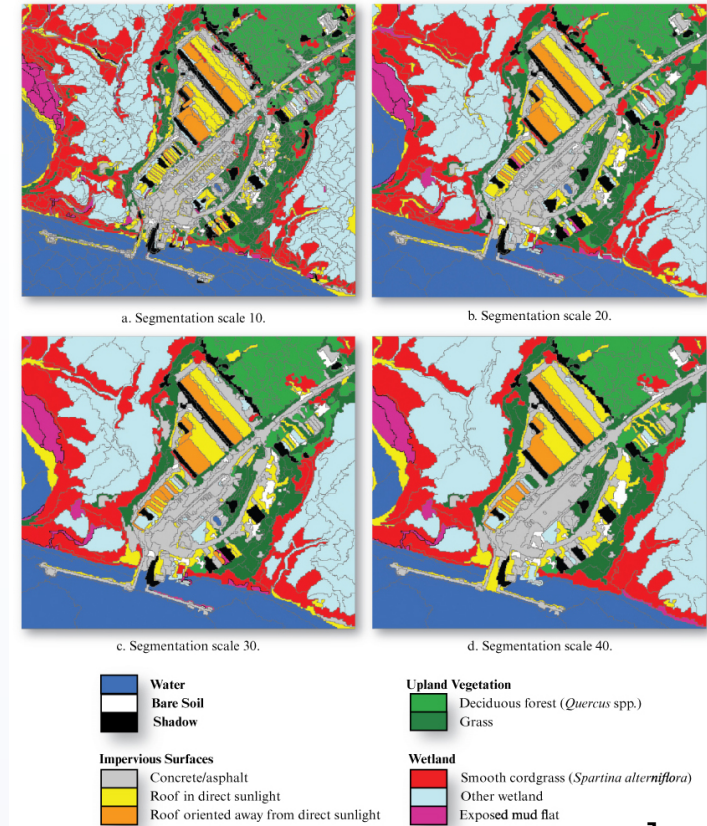


b. Segmentation scale 20.

Jensen

Object-based Image Analysis (OBIA)

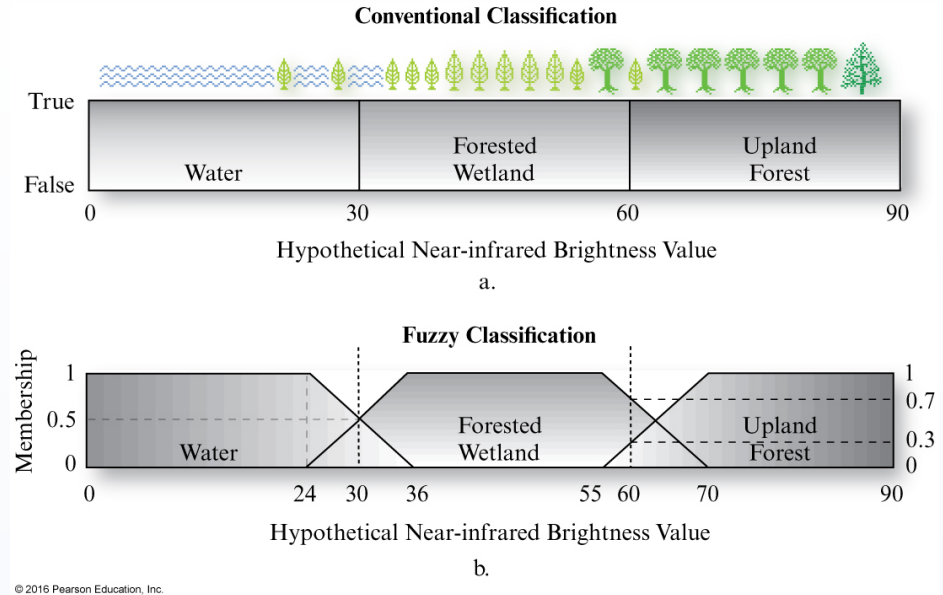
- Classify image objects, not pixels
- Can use:
 - Pixel value statistics
 - Texture
 - Object properties (e.g., shape, size)
 - Relationships to other classes



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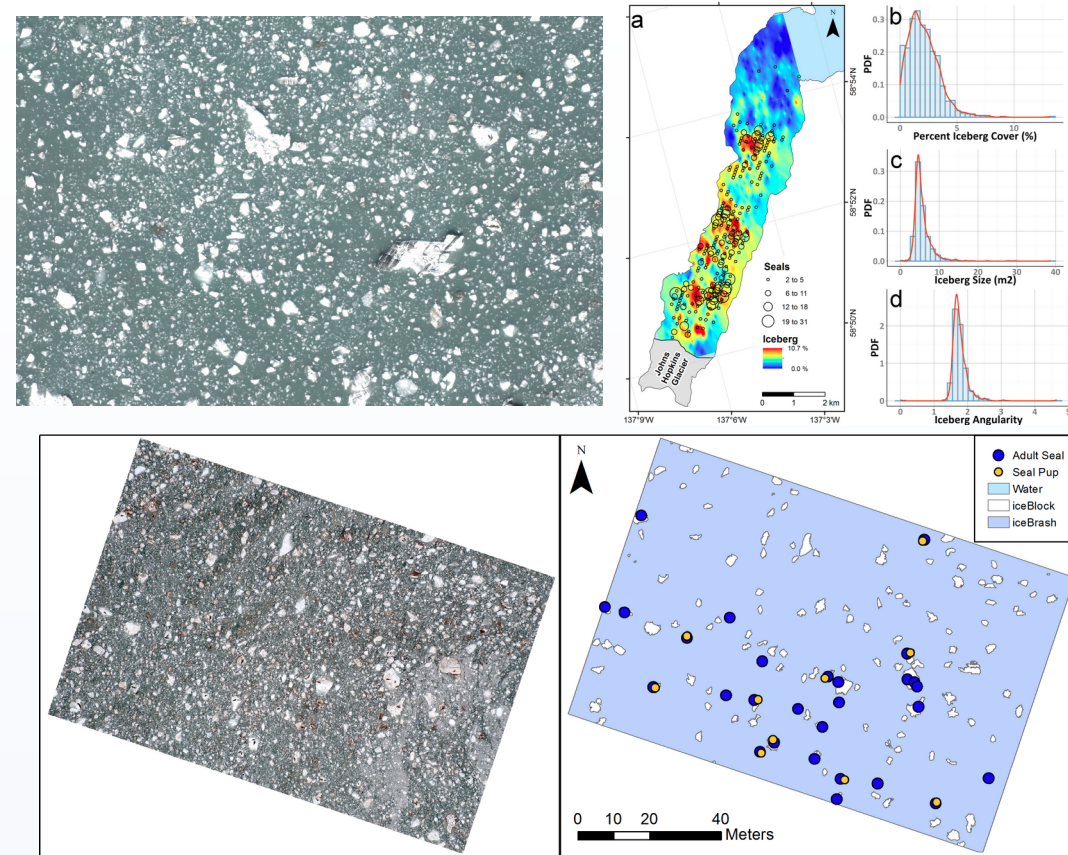
Jensen

- Problem:
 - Imperfectly defined boundaries exist between classes
 - Pixels are often mixed (i.e., more than one object/surface present)
- One solution: use a membership function to relate pixels/objects to classes
 - “Fuzzy” logic/set theory



Jensen

- OBIA well-suited for high-resolution images
- Iceberg mapping (McNabb et al., 2016)
 - OBIA of air photos
- Mangrove mapping (Heumann, 2011)
 - WorldView images



- Our brains work by separating image into objects
- Segmenting image does the same thing
- OBIA classifies image objects, rather than pixels – allows for more information to be used
- Many applications for OBIA in geography/RS

- Jensen – Chapter 9
- Blaschke, Lang & Hay, 2008
- Otsu, 1979 [[IEEE Trans Systems, Man & Cybernetics](#)]
- Haralick and Shapiro, 1985 [[Comp Vis, Graphics & Im Proc](#)]
- Blaschke, 2010 [[ISPRS J Photogramm & Rem Sens](#)]
- Blaschke et al., 2014 [[ISPRS J Photogramm & Rem Sens](#)]
- Ma et al., 2017 [[ISPRS J Photogramm & Rem Sens](#)]
- Heumann, 2011 [[Remote Sensing](#)]
- McNabb et al., 2016 [[PLoS One](#)]