



# RETINA Vision and Learning Group

<http://retina.cs.bilkent.edu.tr>



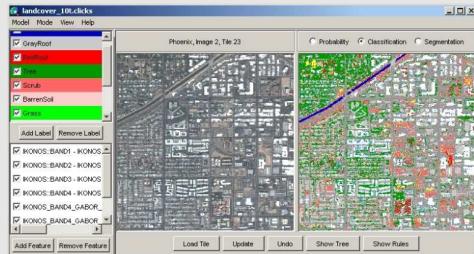
## Research expertise

- Computer vision
- Pattern recognition
- Machine learning
- Data mining

## Current research focus

- Remote sensing image analysis
  - Geospatial object recognition
  - Land cover and land use classification
  - Spatial relationship models
  - Change detection
  - Image mining in large archives
- Image and video analysis
  - Scene classification and annotation
  - Object recognition
  - Content-based image and video retrieval
- Medical image analysis
  - Image segmentation and classification
  - Cancer detection and grading

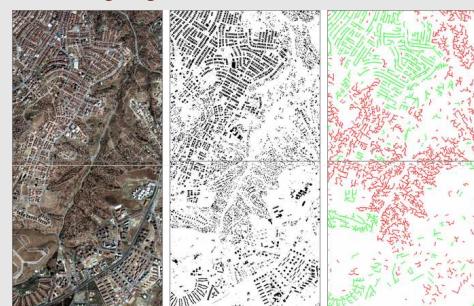
## Land cover / land use classification



S. Aksoy, "Spatial Techniques for Image Classification," *Signal and Image Processing for Remote Sensing*, Taylor & Francis, 2006.

S. Aksoy, K. Koperski, C. Tusk, G. Marchisio, "Land Cover Classification with Multi-Sensor Fusion of Partly Missing Data," *Photogrammetric Engr. & Remote Sensing*, 2008.

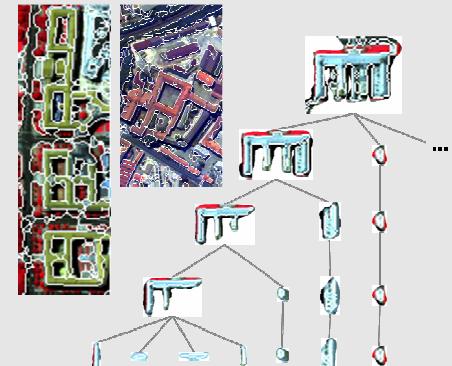
## Modeling high-level urban structures



S. Aksoy, E. Dogrusoz, "Modeling Urbanization Using Spatial Building Patterns," *PRRS* 2006.

E. Dogrusoz, S. Aksoy, "Modeling Urban Structures Using Graph-Based Spatial Patterns," *IGARSS* 2007.

## Image segmentation



H. G. Akcay, S. Aksoy, "Morphological Segmentation of Urban Structures," *URBAN* 2007.

## Sponsored research projects

- TÜBİTAK CAREER Grant, 2005-2010
- European Commission, Joint Research Centre, 2008
- European Commission, Marie Curie Fellowship, 2005-2007
- TÜBİTAK and COST 292 Action, 2004-2008
- U.S. Army, Topographic Engineering Center, 2003-2005
- NASA Goddard Space Flight Center, 2001-2004
- U.S. National Library of Medicine, 2001-2004

## Contact

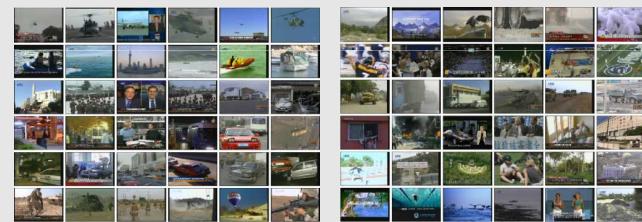
Asst. Prof. Dr. Selim Aksoy

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## International participation



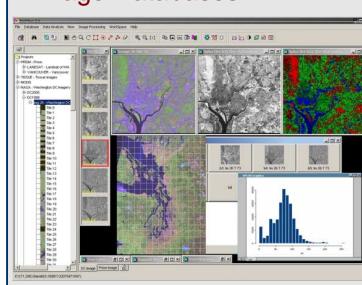
## Semantic scene classification and annotation



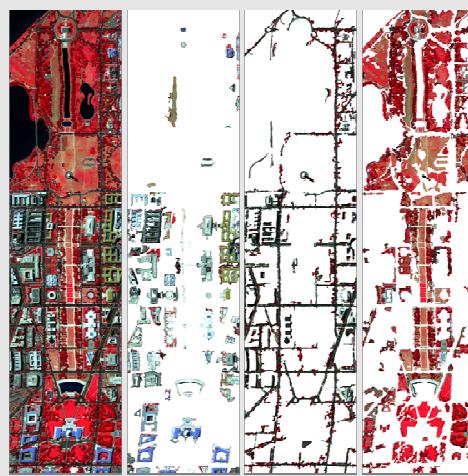
D. Gokalp, S. Aksoy, "Scene Classification Using Bag-of-Regions Representations," *CVPR* 2007.

O. Cavus, S. Aksoy, "Semantic Scene Classification for Image Annotation and Retrieval," *SSPR* 2008.

## Interactive Mining in Large Image Databases



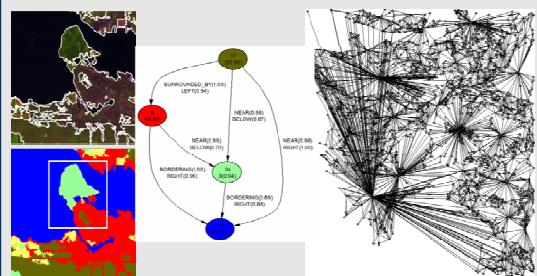
## Automatic geospatial object recognition



H. G. Akcay, S. Aksoy, "Automated Detection of Objects Using Multiple Hierarchical Segmentations," *IGARSS* 2007.

H. G. Akcay, S. Aksoy, "Automatic Detection of Geospatial Objects Using Multiple Hierarchical Segmentations," *IEEE Trans. on Geoscience and Remote Sensing*, 2008.

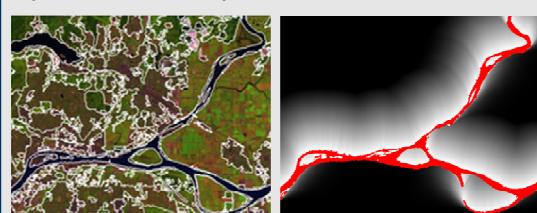
## Structural modeling of image content



S. Aksoy, "Modeling of Remote Sensing Image Content Using Attributed Relational Graphs," *SSPR* 2006.

F. Kalaycilar, A. Kale, D. Zamalieva, S. Aksoy, "Mining of Remote Sensing Image Archives Using Spatial Relationship Histograms," *IGARSS* 2008.

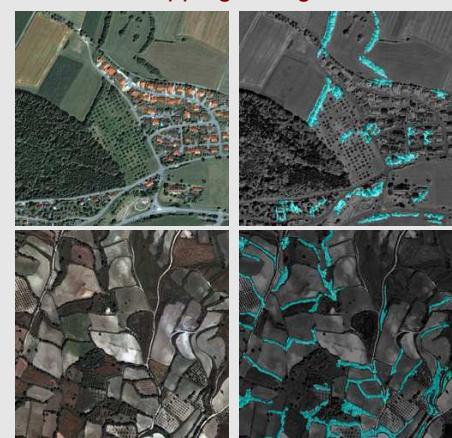
## Spatial relationship models



S. Aksoy, K. Koperski, C. Tusk, G. Marchisio, J. C. Tilton, "Learning Bayesian Classifiers for Scene Classification with a Visual Grammar," *IEEE Trans. on Geoscience and Remote Sensing*, 2005.

R. G. Cinbis, S. Aksoy, "Relative Position-Based Spatial Relationships Using Mathematical Morphology," *ICIP* 2007.

## Automatic mapping of vegetation



S. Aksoy, H. G. Akcay, R. G. Cinbis, T. Wassenaar, "Automatic Mapping of Linear Woody Vegetation Features in Agricultural Landscapes," *IGARSS* 2008.

## Cancer detection and grading

