

# SELIM AKSOY

Department of Computer Engineering  
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## PERSONAL

Born January 5, 1976 in Ankara, Turkey. Citizen of the Republic of Turkey. Speaks Turkish (native) and English (fluent).

## INTERESTS

Computer vision, statistical and structural pattern recognition, machine learning and data mining with applications to remote sensing, medical imaging and multimedia data analysis.

## EDUCATION

- 09/1998 – 06/2001 Ph.D., Electrical Engineering**  
University of Washington, Seattle, WA, USA  
*Advisor:* Prof. Robert M. Haralick  
*Thesis:* A Probabilistic Similarity Framework for Content-Based Image Retrieval
- 09/1996 – 06/1998 M.S., Electrical Engineering**  
University of Washington, Seattle, WA, USA  
*Advisor:* Prof. Robert M. Haralick  
*Thesis:* Textural Features for Content-Based Image Database Retrieval
- 09/1992 – 07/1996 B.S., Electrical and Electronics Engineering**  
Middle East Technical University, Ankara, Turkey  
*B.S. Project:* Fingerprint Classification Using Wavelets

## EMPLOYMENT

- 01/2004 – Present Assistant Professor**  
Department of Computer Engineering,  
Bilkent University, Ankara, Turkey
- 09/2001 – 12/2003 Research Scientist**  
Research Department,  
Insightful Corporation, Seattle, WA, USA
- 09/1996 – 06/2001 Research Assistant**  
Intelligent Systems Laboratory,  
University of Washington, Seattle, WA, USA
- 06/2000 – 09/2000 Research Intern**  
Data Analysis and Products Division,  
MathSoft Inc. (currently Insightful Corp.), Seattle, WA, USA
- 06/1998 – 08/1998 Visiting Researcher**  
**06/1999 – 09/1999** Tampere International Center for Signal Processing,  
Tampere University of Technology, Tampere, Finland

**07/1995 – 08/1995 Intern**  
Microelectronics, Guidance and Electro-Optics Division,  
ASELSAN Military Electronics Industries Inc., Ankara, Turkey

**07/1994 – 08/1994 Intern**  
Microwave and System Technologies Division,  
ASELSAN Military Electronics Industries Inc., Ankara, Turkey

## RESEARCH EXPERIENCE

### ▷ Bilkent University, 01/2004 – Present

- Researching multi-scale image segmentation, structural scene models and spatial relationships for geospatial object recognition, content-based classification and retrieval in remote sensing image archives.
- Researching image segmentation and classification for cell detection and cancer grading in microscopic images.
- Researching multi-modal information, context models, and relevance feedback for scene classification and object recognition for content-based classification and retrieval in image and video archives.
- Also participating in:
  - European Commission COST 292 Action on Semantic Multimodal Analysis of Digital Media
  - European Commission FP6 Network of Excellence, MUSCLE — Multimedia Understanding Through Semantics, Computation and Learning
  - U.S. National Institute of Standards and Technology, TREC Video Retrieval Evaluation (TRECVID)

### ▷ University of Washington, 06/2007 – 07/2007

- Visiting Scholar at the Department of Computer Science & Engineering.
- Worked on content-based image retrieval with Prof. Linda Shapiro.

### ▷ Insightful Corporation, 09/2001 – 12/2003

- Researched statistical and structural pattern recognition, computer vision, machine learning and data mining algorithms with applications to interactive analysis, classification and content-based retrieval of remote sensing and medical images.
- Project work included image classification using decision tree, rule-based, naive Bayes and maximum likelihood classifiers; image segmentation; data fusion and robustness to missing data; automatic scene modeling using attributed relational graphs.
- Lead developer for the machine learning library of the VisiMine product for interactive mining in large image databases.
- Developed image enhancement and post-processing algorithms for the optical character recognition (OCR) module of the InFact search engine for natural language question answering and information retrieval.

### ▷ University of Washington, 09/1996 – 06/2001

- Developed and implemented algorithms, and designed the user interface for a content-based image database retrieval (CBIR) system.
- Researched image texture and color feature extraction algorithms, probabilistic similarity models, graph-theoretic clustering and probabilistic relevance feedback for CBIR.
- Designed a Bayesian framework for fusion of different features and similarity models.

- Investigated parametric and non-parametric statistical modeling, estimation and statistical inference, classifier design, machine learning, Bayesian methods, quantization, clustering and mathematical morphology.
  - Researched object recognition, model-based shape recognition, automatic target recognition.
- ▷ **MathSoft Inc., 06/2000 – 09/2000**
- Participated in the GeoBrowse project for content-based retrieval from remote sensing archives and added textural feature extraction and quantization algorithms.
  - Worked on Bayesian interactive land cover label training algorithm using relevance feedback.
  - Wrote functions and documentation for MathSoft Imaging C Library and Imaging Module for S-Plus statistical software.
- ▷ **Tampere University of Technology, Summer 1998 and Summer 1999**
- Collaborated in a content-based multimedia database retrieval project and conducted research on texture feature extraction, system integration and relevance feedback.
- ▷ **ASELSAN, Summer 1995**
- Responsible for the calibration and testing of measurement equipment used in the NATO Joint STINGER HMA Program.
- ▷ **ASELSAN, Summer 1994**
- Designed the software and hardware of a trackball controller using the Intel 8051 Microcontroller.

## STUDENT SUPERVISION

- ▷ **Current Graduate Students**
- Hüseyin Gökhan Akçay (Ph.D. student)
  - Çağlar Arı (Ph.D. student)
  - Fatih Karakuş (M.S. student)
  - Ash Kale (M.S. student)
  - Bahadır Özdemir (M.S. student)
  - Ahsen Ikbâl Yergök (M.S. student)
- ▷ **Past Graduate Students**
- Daniya Zamalieva, “Unsupervised Detection of Compound Structures Using Image Segmentation and Graph-Based Texture Analysis,” M.S., August 2009.
  - Fırat Kalaycılar, “An Object Recognition Framework Using Contextual Interactions Among Objects,” M.S., August 2009.
  - İsmet Zeki Yalnız, “Multi-scale multi-orientation segmentation and classification of structural textures,” Ph.D. student, 2009.
  - Özge Çavuş, “Semantic Scene Classification for Content-Based Image Retrieval,” M.S., August 2008.
  - Demir Gökâl, “Scene Classification Using Bag-of-Regions Representation,” M.S., July 2007.
  - Hüseyin Gökhan Akçay, “Hierarchical Segmentation, Object Detection and Classification in Remotely Sensed Images,” M.S., July 2007.
  - Emel Doğrusöz, “Generalized Texture Models for Detecting High-Level Structures in Remotely Sensed Images,” M.S., June 2007.
  - Ajda Karabulut, “Bayesian Scene Classification,” M.S., September 2006.

## ▷ Past Undergraduate Students

- 2007–2008: Gökçe Balkan, Ramazan Gökberk Cinbiş, Ramazan Bertan Gündoğdu, Ali Osman Ulusoy
- 2006–2007: Ateş Akaydın, Cem Aksoy, Ebru Aydın, Ramazan Gökberk Cinbiş, Mert Eser Çetinkaya, Deniz Günaydın, Kerem Hadımlı, Levent Koç, Yunus Olgun, Can Orhan, Ali Osman Ulusoy, Görkem Yakın
- 2005–2006: Özer Akargün, Ateş Akaydın, Leman Akoğlu, Pelin Angın, Kazım Umut Aşkın, Ramazan Gökberk Cinbiş, Tunay Gür, Pınar Kavak, Ahmet Kızıl, Emre Küçükayvaz, Abdülkadir Tokgöz, Mehmet Ünlü
- 2004–2005: Akın Avcı, Erman Balçık, Ahmet Korhan Bircan, Ozan Dinçer, Zeynep Karaman, Cihan Kaynak, Mehmet Fatih Koca, Hüseyin Çağdaş Öcalan, Elif Bahar Önalın, Pınar Yıldız

## GRANTS

- “Automatic Detection and Segmentation of Hazelnut Orchards in Northern Turkey,” sponsored by European Commission, Joint Research Centre, contract no: 252972, 14,750 Euro, 7/2008–3/2009, Principal Investigator.
- “Automatic Mapping of Linear Woody Vegetation Features in Agricultural Landscapes,” sponsored by European Commission, Joint Research Centre, contract no: 253352, 20,750 Euro, 1/2008–6/2008, Principal Investigator.
- “IST-TURKEY: New Information Society Technologies for Turkey (BTT-Turkiye: Turkiye İcin Yeni Bilgi Toplumu Teknolojileri),” sponsored by TUBITAK (Scientific and Technological Research Council of Turkey), grant no: 105E065, 12/2005–12/2008, Researcher and Head of Intelligent Systems Research Group.
- Research Development Grant from Provost Office, Bilkent University, US\$945, 12/2005.
- “Hierarchical Classification, Mining and Semantic Retrieval in Remote Sensing Image Archives,” sponsored by European Commission, FP6 Marie Curie International Reintegration Grant, grant no: MIRG-CT-2005-017504, 80,000 Euro, 10/2005–10/2007, Principal Investigator.
- “E-DEVLET İçin Bilgisayar Destekli Görsel Dokümantasyon, Arşiv ve Yönetim Sistemi Gerçekleş-tirilmesi,” sponsored by DPT (State Planning Agency), ~5,000 YTL, 08/2005–12/2005, Researcher.
- “Probabilistic and Structural Approaches to Image Understanding, Classification and Retrieval, and Applications to Remote Sensing and Medical Image Analysis (CAREER Award),” sponsored by TUBITAK (Scientific and Technological Research Council of Turkey), grant no: 104E074, 158,000 YTL (~US\$105,000), 04/2005–04/2010, Principal Investigator.
- “Semantic Multimodal Analysis of Digital Media,” sponsored by TUBITAK (Scientific and Technological Research Council of Turkey), grant no: 104E077, 102,060 YTL (~US\$64,000), 10/2004–10/2008, Co-Principal Investigator.
- Research Development Grant from Provost Office, Bilkent University, US\$2,200, 06/2004.
- “Interactive Training of Advanced Classifiers for Remote Sensing Image Analysis,” sponsored by the U.S. Army, Topographic Engineering Center, grant no: DACA42-03-C-0016, Phase I US\$70,000, 01/2003–06/2003, grant no: W9132V-04-C-0001, Phase II US\$780,000, 08/2003–12/2005, Principal Investigator (worked until moving to Bilkent University in 01/2004).
- “Knowledge Discovery and Data Mining based on Hierarchical Segmentation of Image Data,” sponsored by NASA, Goddard Space Flight Center, grant no: NAS5-01123, US\$430,000, 09/2001–09/2004, Investigator (worked until moving to Bilkent University in 01/2004).
- “A Bayesian Textual and Multimedia Information Retrieval Engine,” sponsored by the National Institutes of Health, National Library of Medicine, grant no: 2-R44-LM06520-02, US\$750,000, 09/2001–04/2004, Investigator (worked until moving to Bilkent University in 01/2004).

- “GeoBrowse: An Integrated Environment for Satellite Image Retrieval and Mining,” sponsored by NASA, Goddard Space Flight Center, grant no: NAS5-98053, US\$600,000, 10/1998–08/2001, Researcher (worked during 06/2000–09/2000).

## TEACHING EXPERIENCE

### ▷ Bilkent University

- CS 201: Fundamental Structures of Computer Science I, Fall 2009 (2 sections with a total of 86 students).
- CS 484: Image Analysis, Spring 2009 (10 students).
- CS 551: Pattern Recognition, Spring 2009 (27 students).
- CS 201: Fundamental Structures of Computer Science I, Fall 2008 (2 sections with a total of 90 students).
- CS 484: Image Analysis, Spring 2008 (24 students).
- CS 551: Pattern Recognition, Spring 2008 (22 students).
- CS 201: Fundamental Structures of Computer Science I, Fall 2007 (2 sections with a total of 92 students).
- CS 484: Image Analysis, Spring 2007 (22 students).
- CS 551: Pattern Recognition, Spring 2007 (24 students).
- CS 201: Fundamental Structures of Computer Science I, Fall 2006 (2 sections with a total of 89 students).
- CS 551: Pattern Recognition, Spring 2006 (25 students).
- CS 201: Fundamental Structures of Computer Science I, Fall 2005 (2 sections with a total of 131 students).
- CS 551: Pattern Recognition, Spring 2005 (34 students).
- CS 111: Introduction to Computing in Engineering and Science, Fall 2004 (2 sections with a total of 105 students).
- CS 111: Introduction to Computing in Engineering and Science, Summer 2004 (31 students).
- CS 111: Introduction to Computing in Engineering and Science, Spring 2004 (2 sections with a total of 130 students).

### ▷ University of Washington

- EE/CSE 576: Image Understanding, Spring 2001, Teaching Assistant.
- EE 562: Artificial Intelligence, Winter 2001, Teaching Assistant.
- EE/CSE 576: Image Understanding, Spring 2000, Guest Lecturer.
- EE 577: Mathematical Morphology, Fall 1998, Teaching Assistant.

## HONORS AND AWARDS

- Listed in Who’s Who in Science and Engineering, 10th edition, Who’s Who in the World, 25th edition.
- CAREER Award, given by TUBITAK (Scientific and Technological Research Council of Turkey), 2004.
- Nominee for the Outstanding Research Assistant Award, Department of Electrical Engineering, University of Washington, June 2000.
- Third Prize in the Annual Poster Contest, Ph.D. Category, Department of Electrical Engineering, University of Washington, May 1999.

- NATO Science Fellowship, grant for graduate study from TUBITAK (Scientific and Technological Research Council of Turkey), 1996.
- Bülent Kerim Altay Award for academic excellence, given by the Department of Electrical Engineering, Middle East Technical University, Fall 1994, Spring 1995, Fall 1995.
- Undergraduate fellowship for academic achievement, given by Sabancı Foundation, 1992–1996.

## PROFESSIONAL ACTIVITIES

### ▷ Membership

- Institute of Electrical and Electronics Engineers (IEEE): Computer Society and Technical Committee on Pattern Analysis and Machine Intelligence, Geoscience and Remote Sensing Society and Data Fusion Committee, 1996–Present.
- International Association for Pattern Recognition (IAPR): Technical Committees on Statistical Pattern Recognition, Structural and Syntactic Pattern Recognition, Remote Sensing, Graph-Based Representations, Data Mining, 2001–Present.
- Turkish Society for Image Analysis and Pattern Recognition, 2004–Present.
- Executive Board Member and Webmaster for the Turkish-American Student Association at the University of Washington, 1999–2001.

### ▷ Editorial Service

- Associate Editor, Pattern Recognition Letters, 2009–Present.
- Guest Editor, Pattern Recognition Letters, Special Issue on Pattern Recognition in Remote Sensing, 2009.
- Guest Editor, IEEE Transactions on Geoscience and Remote Sensing, Special Issue on Pattern Recognition in Remote Sensing, 2007.
- Associate Editor, International Journal of Image and Graphics, 2005–2007.

### ▷ Reviewer

- IEEE Computer
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Image Processing
- IEEE Transactions on Geoscience and Remote Sensing
- IEEE Transactions on Multimedia
- IEEE Transactions on Neural Networks
- IEEE Transactions on Medical Imaging
- IEEE Transactions on Circuits and Systems I
- Pattern Recognition Letters
- Machine Vision and Applications
- Photogrammetric Engineering & Remote Sensing
- IEEE Geoscience and Remote Sensing Letters
- Canadian Journal of Remote Sensing
- International Journal of Pattern Recognition and Artificial Intelligence
- EURASIP Journal on Applied Signal Processing
- Signal Processing
- Signal Processing: Image Communication
- Journal of Electronic Imaging

- Journal of Computer Science and Technology
- IEEE International Conference on Computer Vision and Pattern Recognition (CVPR)
- IEEE International Geoscience and Remote Sensing Symposium (IGARSS)
- IAPR International Conference on Pattern Recognition (ICPR)
- IAPR International Workshop on Pattern Recognition in Remote Sensing (PRRS)
- IEEE International Workshop on Semantic Learning Applications in Multimedia (SLAM)
- SPIE Multimedia Systems and Applications
- International Workshop on Pattern Recognition in Information Systems (PRIS)
- International Conference on Computer Vision Theory and Applications
- International Workshop on Multimedia Content Representation, Classification and Security
- International Symposium on Computer and Information Sciences (ISCIS)
- International Conference on Computer Analysis of Images and Patterns (CAIP)
- Pacific-Rim Conference on Multimedia
- Workshop on Spatial/Spatio-Temporal Data Mining and Learning
- IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı (Turkish) (SIU)

▷ **Conference Organization**

- Workshop Co-Chair, 20th IAPR International Conference on Pattern Recognition (ICPR 2010).
- Contest Co-Chair, 20th IAPR International Conference on Pattern Recognition (ICPR 2010).
- Review Committee Member, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR 2010).
- Program Committee Member, SPIE Conference on Image and Signal Processing for Remote Sensing (SPIE RS07 2010).
- Teknik Kurul Üyesi, IEEE 18. Sinyal İşleme ve İletişim Uygulamaları Kurultayı (Turkish) (SIU 2010).
- Program Committee Member, International Workshop on Validation of Geo-information Products for Crisis Management (VALgEO 2009).
- Program Committee Member, International Workshop on Spatial and Spatiotemporal Data Mining (SSTDm 2009).
- Co-Chair, ISPRS Workshop on Performance Evaluation of Pattern Recognition in Remote Sensing (PEPRRS 2009).
- Program Committee Member, ISPRS Workshop on Object Extraction for 3D City Models, Road Databases and Traffic Monitoring — Concepts, Algorithms and Evaluation (CMRT 2009).
- Review Committee Member, IEEE International Conference on Computer Vision (ICCV 2009).
- Review Committee Member, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR 2009).
- Program Committee Member, 13th International Conference on Computer Analysis of Images and Patterns (CAIP 2009).
- Program Committee Member, International Conference on Space Technology (2009).
- Teknik Kurul Üyesi, IEEE 17. Sinyal İşleme ve İletişim Uygulamaları Kurultayı (Turkish) (SIU 2009).
- Chair, 5th IAPR Workshop on Pattern Recognition in Remote Sensing (PRRS 2008).
- Program Committee Member, 19th IAPR International Conference on Pattern Recognition (ICPR 2008).

- Program Committee Member, 3rd International Workshop on Semantic Learning and Applications in Multimedia (SLAM 2008).
- Program Committee Member, 23rd International Symposium on Computer and Information Sciences (ISCIS 2008).
- Program Committee Member, 9th International Workshop on Image Analysis for Multimedia Interactive Services (WIAMIS 2008).
- Program Committee Member, International Conference on Computer Vision Theory and Applications (VISAPP 2008).
- Program Committee Member, Pacific-Rim Conference on Multimedia (PCM 2007).
- Yürütme Kurulu Üyesi ve Program Komitesi Eşbaşkanı, 3. Ulusal Yazılım Mühendisliği Sempozyumu (UYMS 2007) (Turkish).
- Program Committee Member, IEEE International Workshop on Semantic Learning Applications in Multimedia (SLAM 2007).
- Program Committee Member, SPIE Multimedia Systems and Applications X (2007).
- Program Committee Member, International Symposium on Computer and Information Sciences (ISCIS 2007).
- Program Committee Member, 7th International Workshop on Pattern Recognition in Information Systems (PRIS 2007).
- Program Committee Member, International Conference on Computer Vision Theory and Applications (VISAPP 2007).
- Co-Chair, 4th International Workshop on Pattern Recognition in Remote Sensing (PRRS 2006).
- Program Committee Member, 18th IAPR International Conference on Pattern Recognition (ICPR 2006).
- Program Committee Member, 6th International Workshop on Pattern Recognition in Information Systems (PRIS 2006).
- Program Committee Member, International Conference on Computer Vision Theory and Applications (VISAPP 2006).
- Organizing Committee Member, Workshop on Spatial/Spatio-Temporal Data Mining and Learning (SDM 2005).
- Assisted in the organization of the Algorithm Performance Contest, IAPR International Conference on Pattern Recognition, 1998 and 2000.

#### ▷ **Institutional Service**

- Co-director, RETINA Vision and Learning Group, Department of Computer Engineering, Bilkent University, April 2004–Present.
- Chair, International Association for Pattern Recognition (IAPR) Technical Committee on Remote Sensing, 2006–2008, 2008–2010.
- Vice-Chair, International Association for Pattern Recognition (IAPR) Technical Committee on Remote Sensing, 2004–2006.
- Co-Chair, International Society for Photogrammetry and Remote Sensing (ISPRS) Intercommission Working Group III/VII on Pattern Recognition for Remote Sensing, 2008–2012.
- Member, Program Improvement Coordination Committee, Department of Computer Engineering, Bilkent University, April 2004–Present.
- Member, Alumni Performance Evaluation Committee, Department of Computer Engineering, Bilkent University, April 2004–Present.
- Member, Summer Practice Committee, Department of Computer Engineering, Bilkent University, December 2005–Present.

## COMPUTER SKILLS

- Programming: C/C++, Java, Matlab, S-Plus, Pascal, LISP, SQL, Assembly (Intel 8051 and Motorola 6800).
- Operating Systems: UNIX (SunOS, Solaris, HP-UX), Linux, Windows NT/2000/XP.
- Scripting: Perl, UNIX Shell, Visual Basic Scripting, Microsoft Active Server Pages.
- Others: Perforce, RCS, Microsoft SourceSafe, Purify, LaTeX, HTML, CGI, PostScript.

## PUBLICATIONS

### ▷ Journal Publications

1. **S. Aksoy**, R. M. Haralick, “Feature Normalization and Likelihood-Based Similarity Measures for Image Retrieval,” in *Pattern Recognition Letters*, 22(5):563–582, May 2001.
2. **S. Aksoy**, K. Koperski, C. Tusk, G. Marchisio, J. C. Tilton, “Learning Bayesian Classifiers for Scene Classification with a Visual Grammar,” in *IEEE Transactions on Geoscience and Remote Sensing*, 43(3):581–589, March 2005.
3. D. A. Clausi, **S. Aksoy**, J. C. Tilton, “Foreword to the Special Issue on Pattern Recognition in Remote Sensing,” in *IEEE Transactions on Geoscience and Remote Sensing*, 45(12):3855–3856, December 2007.
4. H. G. Akcay, **S. Aksoy**, “Automatic Detection of Geospatial Objects Using Multiple Hierarchical Segmentations,” in *IEEE Transactions on Geoscience and Remote Sensing*, 46(7):2097–2111, July 2008.
5. **S. Aksoy**, K. Koperski, C. Tusk, G. Marchisio, “Land Cover Classification with Multi-Sensor Fusion of Partly Missing Data,” in *Photogrammetric Engineering & Remote Sensing*, 75(5):577–593, May 2009.
6. **S. Aksoy**, H. G. Akcay, T. Wassenaar, “Automatic Mapping of Linear Woody Vegetation Features in Agricultural Landscapes Using Very High-Resolution Imagery,” in *IEEE Transactions on Geoscience and Remote Sensing*, 48(1):511–522, January 2010.
7. **S. Aksoy**, R. G. Cinbis, “Image Mining Using Directional Spatial Constraints,” accepted for publication in *IEEE Geoscience and Remote Sensing Letters*, 2010.
8. B. Ozdemir, **S. Aksoy**, S. Eckert, M. Pesaresi, D. Ehrlich, “Performance Measures for Object Detection Evaluation,” accepted for publication in *Pattern Recognition Letters*, 2010.

### ▷ Book Chapters

9. **S. Aksoy**, R. M. Haralick, “Using Texture in Image Similarity and Retrieval,” in M. Pietikainen, ed., *Texture Analysis in Machine Vision*, vol. 40 of *Series in Machine Perception and Artificial Intelligence*, pp:129–149, World Scientific, 2000.
10. **S. Aksoy**, C. Tusk, K. Koperski, G. Marchisio, “Scene Modeling and Image Mining with a Visual Grammar,” in C.H. Chen, ed., *Frontiers of Remote Sensing Information Processing*, pp:35–62, World Scientific, 2003.
11. **S. Aksoy**, “Spatial Techniques for Image Classification,” in C.H. Chen, ed., *Signal and Image Processing for Remote Sensing*, Taylor & Francis, 2006.

### ▷ Conference Publications

12. **S. Aksoy**, R. M. Haralick, “Textural Features for Image Database Retrieval,” in *IEEE Workshop on Content-Based Access of Image and Video Libraries*, pp:45–49, Santa Barbara, CA, June 21, 1998.
13. **S. Aksoy**, R. M. Haralick, “Content-Based Image Database Retrieval Using Variances of Gray Level Spatial Dependencies,” in *IAPR International Workshop on Multimedia Information Analysis and Retrieval*, (also in *Lecture Notes in Computer Science*, vol. 1464), pp:3–19, Hong Kong, August 13–14, 1998.

14. M. L. Schauf, **S. Aksoy**, R. M. Haralick, "Model-Based Shape Recognition Using Recursive Mathematical Morphology," in *14th IAPR International Conference on Pattern Recognition*, pp:202–204, Brisbane, Australia, August 16–20, 1998.
15. **S. Aksoy**, R. M. Haralick, "A Graph–Theoretic Approach to Image Database Retrieval," in *3rd International Conference on Visual Information Systems*, (also in *Lecture Notes in Computer Science*, vol. 1614), pp:341–348, Amsterdam, The Netherlands, June 2–4, 1999.
16. **S. Aksoy**, R. M. Haralick, "Using Texture in Image Similarity and Retrieval," in *International Workshop on Texture Analysis in Machine Vision*, pp:111–117, Oulu, Finland, June 14–15, 1999.
17. **S. Aksoy**, R. M. Haralick, "Graph–Theoretic Clustering for Image Grouping and Retrieval," in *IEEE International Conference on Computer Vision and Pattern Recognition*, 1:63–68, Fort Collins, CO, June 23–25, 1999.
18. **S. Aksoy**, R. M. Haralick, "Probabilistic vs. Geometric Similarity Measures for Image Retrieval," in *IEEE International Conference on Computer Vision and Pattern Recognition*, 2:357–362, Hilton Head Island, SC, June 13–15, 2000.
19. **S. Aksoy**, R. M. Haralick, F. A. Cheikh, M. Gabbouj, "A Weighted Distance Approach to Relevance Feedback," in *15th IAPR International Conference on Pattern Recognition*, IV:812–815, Barcelona, Spain, September 3–8, 2000.
20. **S. Aksoy**, M. Ye, M. L. Schauf, M. Song, Y. Wang, R. M. Haralick, J. R. Parker, J. Pivovarov, D. Royko, C. Sun, G. Farneback, "Algorithm Performance Contest," in *15th IAPR International Conference on Pattern Recognition*, IV:870–876, Barcelona, Spain, September 3–8, 2000.
21. **S. Aksoy**, G. Marchisio, K. Koperski, C. Tusk, "Probabilistic Retrieval with a Visual Grammar," in *IEEE International Geoscience and Remote Sensing Symposium, Data Mining in Remote Sensing Session*, 2:1041–1043, Toronto, Canada, June 24–28, 2002.
22. K. Koperski, G. Marchisio, **S. Aksoy**, C. Tusk, "VisiMine: Interactive Mining in Image Databases," in *IEEE International Geoscience and Remote Sensing Symposium, Data Mining Session*, 3:1810–1812, Toronto, Canada, June 24–28, 2002.
23. K. Koperski, G. Marchisio, **S. Aksoy**, C. Tusk, "Applications of Terrain and Sensor Data Fusion in Image Mining," in *IEEE International Geoscience and Remote Sensing Symposium, Data Mining in Remote Sensing Session*, 2:1026–1028, Toronto, Canada, June 24–28, 2002.
24. **S. Aksoy**, G. Marchisio, C. Tusk, K. Koperski, "Interactive Classification and Content-Based Retrieval of Tissue Images," in *SPIE Annual Meeting, Applications of Digital Image Processing Session, Proceedings of SPIE*, 4790:71–81, Seattle, WA, July 7–11, 2002.
25. K. Koperski, G. Marchisio, C. Tusk, **S. Aksoy**, "Interactive Models for Semantic Labeling of Satellite Images," in *SPIE Annual Meeting, Earth Observing Systems Session, Proceedings of SPIE*, 4814:423–434, Seattle, WA, July 7–11, 2002.
26. **S. Aksoy**, R. M. Haralick, "A Classification Framework for Content-Based Image Retrieval," in *16th IAPR International Conference on Pattern Recognition*, 2:503–506, Quebec City, Canada, August 11–15, 2002.
27. C. Tusk, K. Koperski, **S. Aksoy**, G. Marchisio, "Automated Feature Selection through Relevance Feedback," in *IEEE International Geoscience and Remote Sensing Symposium*, 6:3691–3693, Toulouse, France, July 21–25, 2003.
28. **S. Aksoy**, K. Koperski, C. Tusk, G. Marchisio, J. C. Tilton, "Learning Bayesian Classifiers for a Visual Grammar," in *IEEE GRSS Workshop on Advances in Techniques for Analysis of Remotely Sensed Data*, pp:212–218, Washington, DC, October 27–28, 2003.
29. **S. Aksoy**, K. Koperski, C. Tusk, G. Marchisio, "Interactive Training of Advanced Classifiers for Mining Remote Sensing Image Archives," in *ACM International Conference on Knowledge Discovery and Data Mining*, pp:773–782, Seattle, WA, August 22–25, 2004.
30. **S. Aksoy**, H. G. Akcay, "Multi-resolution Segmentation and Shape Analysis for Remote Sensing Image Classification," in *2nd International Conference on Recent Advances in Space Technologies*, Istanbul, Turkey, June 9–11, 2005.

31. D. Gokalp, **S. Aksoy**, “Finding Faces in News Videos,” in *4th International Workshop on Content-Based Multimedia Indexing*, Riga, Latvia, June 21–23, 2005.
32. **S. Aksoy**, O. Cavus, “A Relevance Feedback Technique for Multimodal Retrieval of News Videos,” in *EUROCON*, Belgrade, Serbia & Montenegro, November 21–24, 2005.
33. O. Cavus, **S. Aksoy**, “Haber Videolarında İlgililik Geribeslemesiyle İçerik Tabanlı Erişim (in Turkish),” in *15. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Antalya, Turkey, April 17–19, 2006.
34. Y. Bastanlar, I. S. Altıngövdü, A. Aksay, O. Alav, O. Cavus, Y. Yardımcı, O. Ulusoy, U. Gudukbay, E. Cetin, G. Bozdagi-Akar, **S. Aksoy**, “E-Müze: Müzeler İçin Web-Tabanlı Gezi ve Bilgi Sistemi (in Turkish),” in *15. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Antalya, Turkey, April 17–19, 2006.
35. **S. Aksoy**, “Modeling of Remote Sensing Image Content using Attributed Relational Graphs,” in *IAPR International Workshop on Structural and Syntactic Pattern Recognition*, (also in *Lecture Notes in Computer Science*, vol. 4109), pp:475–483, Hong Kong, China, August 17–19, 2006.
36. **S. Aksoy**, E. Doğrusoz, “Modeling Urbanization Using Spatial Building Patterns,” in *4th IAPR International Workshop on Pattern Recognition in Remote Sensing*, Hong Kong, China, August 20, 2006.
37. H. G. Akcay, **S. Aksoy**, “Morphological Segmentation of Urban Structures,” in *4th IEEE GRSS/ISPRS Joint Workshop on Remote Sensing and Data Fusion over Urban Areas*, Paris, France, April 11–13, 2007.
38. H. G. Akcay, **S. Aksoy**, “Kentsel Yapıların Biçimbilimsel Bölütlenmesi (in Turkish),” in *15. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Eskisehir, Turkey, June 11–13, 2007.
39. E. Doğrusoz, **S. Aksoy**, “Bina Örüntüleri Kullanarak Kentleşme Modellemesi (in Turkish),” in *15. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Eskisehir, Turkey, June 11–13, 2007.
40. R. G. Cinbis, **S. Aksoy**, “Konuma Bağlı Uzamsal İlişkilerin Biçimbilimsel Modellenmesi (in Turkish),” in *15. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Eskisehir, Turkey, June 11–13, 2007.
41. D. Gokalp, **S. Aksoy**, “Scene Classification Using Bag-of-Regions Representations,” in *IEEE International Conference on Computer Vision and Pattern Recognition, Beyond Patches Workshop*, Minneapolis, Minnesota, June 23, 2007.
42. H. G. Akcay, **S. Aksoy**, “Automated Detection of Objects Using Multiple Hierarchical Segmentations,” in *IEEE International Geoscience and Remote Sensing Symposium*, pp:1468–1471, Barcelona, Spain, July 23–27, 2007.
43. E. Doğrusoz, **S. Aksoy**, “Modeling Urban Structures Using Graph-Based Spatial Patterns,” in *IEEE International Geoscience and Remote Sensing Symposium*, pp:4826–4829, Barcelona, Spain, July 23–27, 2007.
44. R. G. Cinbis, **S. Aksoy**, “Relative Position-Based Spatial Relationships Using Mathematical Morphology,” in *IEEE International Conference on Image Processing*, II:97–100, San Antonio, Texas, September 16–19, 2007.
45. O. Cavus, **S. Aksoy**, “İçerik Tabanlı Görüntü Erişimi İçin Sahne Sınıflandırması (in Turkish),” in *16. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Didim, Turkey, April 20–22, 2008.
46. **S. Aksoy**, H. Boyacı, D. Gökçay, “Nesne Tanımda Bağlam ve Anlambilimsel Sınıflandırmanın Önemi: Bilgisayarla Görme ve İnsanda Görme Alanlarındaki Çalışmalar (in Turkish, invited),” in *16. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Didim, Turkey, April 20–22, 2008.
47. **S. Aksoy**, H. G. Akcay, R. G. Cinbis, T. Wassenaar, “Automatic Mapping of Linear Woody Vegetation Features in Agricultural Landscapes,” in *IEEE International Geoscience and Remote Sensing Symposium*, IV:403–406, Boston, Massachusetts, July 6–11, 2008.
48. F. Kalaycılar, A. Kale, D. Zamalieva, **S. Aksoy**, “Mining of Remote Sensing Image Archives Using Spatial Relationship Histograms,” in *IEEE International Geoscience and Remote Sensing Symposium*, III:589–592, Boston, Massachusetts, July 6–11, 2008.

49. O. Cavus, **S. Aksoy**, “Semantic Scene Classification for Image Annotation and Retrieval,” in *IAPR International Workshop on Structural and Syntactic Pattern Recognition*, (also in *Lecture Notes in Computer Science*, vol. 5342), pp:402–410, Orlando, Florida, December 4–6, 2008.
50. **S. Aksoy**, B. Ozdemir, S. Eckert, F. Kayitakire, M. Pesaresi, O. Aytakin, C. C. Borel, J. Cech, E. Christophe, S. Duzgun, A. Erener, K. Ertugay, E. Hussain, J. Inglada, S. Lefevre, O. Ok, D. K. San, R. Sara, J. Shan, J. Soman, I. Ulusoy, R. Witz, “Performance Evaluation of Building Detection and Digital Surface Model Extraction Algorithms: Outcomes of the PRRS 2008 Algorithm Performance Contest,” in *5th IAPR Workshop on Pattern Recognition in Remote Sensing*, Tampa, Florida, December 7, 2008.
51. I. Z. Yalniz, **S. Aksoy**, “Uydu Görüntülerinde Düzenli Dikim Alanlarının Belirlenmesi (in Turkish),” in *17. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Antalya, Turkey, April 9–11, 2009.
52. F. Kalaycılar, **S. Aksoy**, “Bağlamsal Çıkarımla Nesne Sezimi (in Turkish),” in *17. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Antalya, Turkey, April 9–11, 2009.
53. A. Kale, **S. Aksoy**, S. Onder, “Pap Smear Test Görüntülerinde Hücre Çekirdeklerinin Bölütlenmesi (in Turkish),” in *17. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Antalya, Turkey, April 9–11, 2009.
54. H. G. Akcay, **S. Aksoy**, “Tarım Alanlarında Doğrusal Odunsu Bitki Gruplarının Otomatik Sezimi (in Turkish),” in *17. IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı*, Antalya, Turkey, April 9–11, 2009.
55. D. Zamalieva, **S. Aksoy**, J. C. Tilton, “Finding Compound Structures in Images Using Image Segmentation and Graph-Based Knowledge Discovery,” in *IEEE International Geoscience and Remote Sensing Symposium*, Cape Town, South Africa, July 13–17, 2009.

▷ **Nonrefereed Conference Publications**

56. **S. Aksoy**, K. Bircan, S. Ciraci, P. Duygulu, E. Karaca, S. Kasirga, T. Sevilmiş, M. Sener, “Bilkent University at TRECVID 2004,” in *TREC Video Retrieval Evaluation Workshop*, Gaithersburg, MD, November 15-16, 2004.
57. **S. Aksoy**, A. Avci, E. Balcik, O. Cavus, P. Duygulu, Z. Karaman, P. Kavak, C. Kaynak, E. Kucukayvaz, C. Ocalan, P. Yildiz, “Bilkent University at TRECVID 2005,” in *TREC Video Retrieval Evaluation Workshop*, Gaithersburg, MD, November 14-15, 2005.
58. **S. Aksoy**, P. Duygulu, G. Akcay, E. Ataer, M. Bastan, T. Can, O. Cavus, E. Dogrusoz, D. Gokalp, A. Akaydin, L. Akoglu, P. Angin, G. Cinbis, T. Gur, M. Unlu, “Bilkent University at TRECVID 2006,” in *TREC Video Retrieval Evaluation Workshop*, Gaithersburg, MD, November 13–14, 2006.
59. J. Calic, N. Campbell, P. Kramer, J. Benois-Pineau, S. Vrochidis, C. Doulaverakis, V. Mezaris, I. Kompatsiaris, E. Spyrou, G. Koumoulos, Y. Avrithis, **S. Aksoy**, A. Dalkilic, A. Saracoglu, A. Alatan, Q. Zhang, E. Izquierdo, U. Naci, A. Hanjalic, “COST292 Experiments for TRECVID 2006,” in *TREC Video Retrieval Evaluation Workshop*, Gaithersburg, MD, November 13–14, 2006.
60. **S. Aksoy**, P. Duygulu, C. Aksoy, E. Aydın, D. Günaydın, K. Hadımlı, L. Koç, Y. Olgun, C. Orhan, G. Yakın, “Bilkent University at TRECVID 2007,” in *TREC Video Retrieval Evaluation Workshop*, Gaithersburg, MD, November 5–6, 2007.
61. Q. Zhang, M. Corvaglia, **S. Aksoy**, U. Naci, N. Adami, N. Aginako, A. Alatan, L. A. Alexandre, P. Almeida, Y. Avrithis, J. Benois-Pineau, K. Chandramouli, U. Damnjanovic, E. Esen, J. Goya, M. Grzegorzec, A. Hanjalic, E. Izquierdo, R. Jarina, P. Kapsalas, I. Kompatsiaris, M. Kuba, R. Leonardi, L. Makris, B. Mansencal, V. Mezaris, A. Moutzidou, P. Mylonas, S. Nikolopoulos, T. Piatrik, A. M. G. Pinheiro, B. Reljin, E. Spyrou, G. Toliás, S. Vrochidis, G. Yakın, G. Zajić, “The COST292 experimental framework for TRECVID 2007,” in *TREC Video Retrieval Evaluation Workshop*, Gaithersburg, MD, November 5–6, 2007.

## TALKS AND PRESENTATIONS

- “Textural Features for Image Database Retrieval,” IEEE Workshop on Content-Based Access of Image and Video Libraries, Santa Barbara, CA, June 21, 1998.
- “Content-Based Image Database Retrieval,” (poster presentation) Annual Poster Contest at the Department of Electrical Engineering at the University of Washington, May 21, 1999.
- “A Graph Theoretic Approach to Image Database Retrieval,” (poster presentation) International Conference on Visual Information Systems, Amsterdam, The Netherlands, June 3, 1999.
- “Using Texture in Image Similarity and Retrieval,” International Workshop on Texture Analysis in Machine Vision, Oulu, Finland, June 15, 1999.
- “A Probabilistic Framework for Content-Based Image Database Retrieval,” IBM Almaden Research Center, San Jose, CA, February 20, 2001.
- “A Probabilistic Framework for Content-Based Image Database Retrieval,” Fuji-Xerox Palo Alto Laboratory, Palo Alto, CA, April 6, 2001.
- “A Probabilistic Similarity Framework for Content-Based Image Retrieval,” Image Mining Workshop at Insightful Corporation, Seattle, WA, June 15, 2001.
- “Probabilistic Retrieval with a Visual Grammar,” IEEE International Geoscience & Remote Sensing Symposium, Toronto, Canada, June 26, 2002.
- “Applications of Terrain and Sensor Data Fusion in Image Mining,” IEEE International Geoscience & Remote Sensing Symposium, Toronto, Canada, June 26, 2002.
- “VisiMine: Interactive Mining in Image Databases,” IEEE International Geoscience & Remote Sensing Symposium, Toronto, Canada, June 28, 2002.
- “Probabilistic Approaches to Image Classification and Content-Based Retrieval,” Engineering Seminar at Koç University, Istanbul, Turkey, July 16, 2002.
- “Classification and Retrieval of Tissue Images Using a Visual Grammar,” Structural Informatics Research Seminar at the Department of Biological Structure at the University of Washington, Seattle, WA, October 30, 2002.
- “Probabilistic Approaches to Image Classification and Content-Based Retrieval,” Department of Computer Science at Sabancı University, Istanbul, Turkey, August 15, 2003.
- “Probabilistic Approaches to Image Classification and Content-Based Retrieval,” Department of Computer Engineering at Bilkent University, Ankara, Turkey, September 2, 2003.
- “Learning Bayesian Classifiers for a Visual Grammar,” (poster presentation) NASA Goddard Space Flight Center, Greenbelt, MD, October 28, 2003.
- “Interactive Training of Advanced Classifiers for Remote Sensing Image Analysis,” U.S. Army Topographic Engineering Center, Alexandria, VA, December 1, 2003.
- “A Probabilistic Similarity Framework for Content-Based Image Retrieval,” Department of Computer Engineering at Middle East Technical University, Ankara, Turkey, March 31, 2004.
- “Probabilistic Approaches to Image Classification and Content-Based Retrieval,” Computer Vision and Intelligent Systems Seminar Series at the Department of Electrical Engineering at Middle East Technical University, Ankara, Turkey, May 17, 2004.
- “Bilkent University at TRECVID 2004,” (poster presentation) U.S. National Institute of Standards and Technology, Gaithersburg, MD, November 15, 2004.
- “Multi-resolution Segmentation and Shape Analysis for Remote Sensing Image Classification,” International Conference on Recent Advances in Space Technologies, Istanbul, Turkey, June 9, 2005.
- “Finding Faces in News Videos,” International Workshop on Content-Based Multimedia Indexing, Riga, Latvia, June 21, 2005.
- “A Relevance Feedback Technique for Multimodal Retrieval of News Videos,” Belgrade, Serbia & Montenegro, November 24, 2005.

- “Graph-Theoretic Clustering for Image Grouping and Retrieval,” Statistical Data Analysis Seminar at the Department of Computer Engineering at Middle East Technical University, Ankara, Turkey, April 20, 2006.
- “Modeling of Remote Sensing Image Content Using Attributed Relational Graphs,” (poster presentation) IAPR International Workshop on Structural and Syntactic Pattern Recognition, Hong Kong, China, August 19, 2006.
- “Modeling Urbanization Using Spatial Building Patterns,” IAPR International Workshop on Pattern Recognition in Remote Sensing, Hong Kong, China, August 20, 2006.
- “Modeling Urbanization Using Spatial Building Patterns,” Department of Geodetic and Geographic Information Technologies at Middle East Technical University, Ankara, Turkey, November 22, 2006.
- “Scene Classification Using Bag-of-Regions Representations,” IEEE Conference on Computer Vision and Pattern Recognition, Beyond Patches Workshop, Minneapolis, Minnesota, June 23, 2007.
- “Scene Classification and Retrieval Using Bag-of-Regions Representations,” Department of Computer Science & Engineering at the University of Washington, Seattle, Washington, June 26, 2007.
- “Automated Detection of Objects Using Multiple Hierarchical Segmentations,” IEEE International Geoscience and Remote Sensing Symposium, Barcelona, Spain, July 24, 2007.
- “Modeling Urban Structures Using Graph-Based Spatial Patterns,” IEEE International Geoscience and Remote Sensing Symposium, Barcelona, Spain, July 27, 2007.
- “Statistical and Structural Modeling of Geospatial Patterns Using Mathematical Morphology and Generalized Texture Techniques,” European Commission Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra, Italy, July 30, 2007.
- “Relative Position-Based Spatial Relationships Using Mathematical Morphology,” IEEE International Conference on Image Processing, San Antonio, Texas, September 17, 2007.
- “Hierarchical Classification, Mining and Semantic Retrieval in Remote Sensing Image Archives,” TUBITAK (Scientific and Technological Research Council of Turkey), Ankara, Turkey, November 27, 2007.
- “Nesne Tanımda Bağlam ve Anlambilimsel Sınıflandırmanın Önemi: Bilgisayarla Görme ve İnsanda Görme Alanlarındaki Çalışmalar (in Turkish, invited),” IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı, Didim, Turkey, April 21, 2008.
- “İçerik Tabanlı Görüntü Erişimi İçin Sahne Sınıflandırması (in Turkish),” IEEE Sinyal İşleme ve İletişim Uygulamaları Kurultayı, Didim, Turkey, April 21, 2008.
- “Mining of Remote Sensing Image Archives Using Spatial Relationship Histograms,” IEEE International Geoscience and Remote Sensing Symposium, Boston, Massachusetts, July 9, 2008.
- “Automatic Mapping of Linear Woody Vegetation Features in Agricultural Landscapes,” IEEE International Geoscience and Remote Sensing Symposium, Boston, Massachusetts, July 10, 2008.
- “Automatic VHR Imagery Based Mapping of Linear Woody Vegetation Features in Agricultural Landscapes,” European Commission Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra, Italy, September 9, 2008.
- “Semantic Scene Classification for Image Annotation and Retrieval,” (poster presentation) IAPR International Workshop on Structural and Syntactic Pattern Recognition, Orlando, Florida, December 5, 2008.
- “Algorithm Performance Contest,” IAPR Workshop on Pattern Recognition in Remote Sensing, Tampa, Florida, December 7, 2008.
- “Structural Modeling of Geospatial Data for Unsupervised Object Recognition,” Department of Mathematics, Kyushu University, Fukuoka, Japan, June 19, 2009.

- “Finding Compound Structures in Images Using Image Segmentation and Graph-Based Knowledge Discovery,” IEEE International Geoscience and Remote Sensing Symposium, Cape Town, South Africa, July 17, 2009.
- “Structural Models for Content-Based Classification and Retrieval of Geospatial Data (invited),” Workshop on Innovative Data Mining Techniques in Support of Global Earth Observation System of Systems, Sinaia, Romania, September 2, 2009.
- “Spatial Relationship Models for Image Information Mining (invited),” Global Earth Observation System of Systems — Summer School on Advancing Earth Observation Data Understanding, Sinaia, Romania, September 3, 2009.
- “Automatic Detection of Hedges and Orchards Using Very High Spatial Resolution Imagery (invited),” 15th GeoCAP Conference on Geomatics in Support of the Common Agricultural Policy, Taormina, Italy, November 19, 2009.
- “Automatic Detection and Segmentation of Hazelnut Orchards in Northern Turkey,” European Commission Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra, Italy, November 23, 2009.

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