

SENIHA ESEN YUKSEL, Ph.D.

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INTERESTS: Machine learning, computer vision, statistical analysis and applied math.

EDUCATION:

Doctor of Philosophy in Computer Sciences & Engineering 2006– 2011
University of Florida, Gainesville, USA
Chair: Prof. Paul D. Gader
Dissertation: Context-based classification via data-dependent mixtures of logistic and hidden Markov model classifiers.

Master of Science in Electrical and Computer Engineering 2003– 2005
University of Louisville, Louisville, Kentucky, USA
Chair: Prof. Aly A. Farag
Thesis: Image processing methods for the detection of acute rejection after kidney transplantation.

Bachelor of Science in Electrical and Electronics Engineering 1999 – 2003
Middle East Technical University, Ankara, Turkey

WORK EXPERIENCE:

Postdoctoral Researcher August 2011 – Present
Department of Material Science and Engineering, University of Florida, Gainesville, FL, USA.

- Working in an interdisciplinary project in the Material Science and Engineering Department and the Computer Engineering Department at UF, to develop tools for hyper-spectral data classification for the detection of explosive materials by differential reflection spectroscopy.
 - Keywords: **SVM, end-member detection, hyper-spectral data classification.**

Research Assistant 2007 – 2011
Computational Science & Intelligence Lab, University of Florida, Gainesville, FL, USA

- Worked on context-based multi-class classification for landmine detection using ground penetrating radar (GPR) and wide-band electro-magnetic Induction (WEMI) data.
 - Implemented a fusion algorithm of GPR and WEMI confidence values using Hierarchical Mixture of Experts that significantly increased the classification rates while providing insightful results.
 - Implemented the variational mixture of experts algorithm for multi-class classification and derived a lower bound for it to prevent over-training.
 - Keywords: **Landmine detection, fusion, Bayesian and variational models.**
- Developed a novel model, Mixture of Hidden Markov Models Experts (MHMME), for context-based multi-class classification of sequential data.
 - Keywords: **Context-based classification, hidden Markov models, mixture of experts, 2D shape recognition, MATLAB.**
- Developed a novel model based on multiple instance learning for the context-based classification of time-series data with ambiguous features.
 - Keywords: **Multiple instance learning, sampling, hidden Markov models.**

Research Assistant

2006 – 2007

Center for Vision, Graphics and Medical Imaging, University of Florida, Gainesville, FL, USA

- Worked on a project to validate the fiber paths from DT-MRI with histology fluoroscopy images obtained from a rat brain stem.
 - Implemented a vesselness algorithm to enhance the visualization of fibers in fluoroscopy images.
 - Implemented a level-set algorithm to segment the fibers from fluoroscopy images, and matched these fibers to the DT-MRI fibers using point-set registration.
 - Keywords: **Level-sets, visualization, point-set registration, C++, ITK, VTK.**

Research Assistant

2003 – 2005

Computer Vision and Image Processing Lab, University of Louisville, Louisville, KY, USA.

- Developed image processing methods for the detection of acute rejection after kidney transplantation.
 - Prepared a “Kidney Image Analysis Software” using C++/ITK/Qt that performs registration, segmentation and classification.
 - Developed a shape based segmentation model for kidney segmentation.
 - Keywords: **Mutual information based registration, shape based segmentation, C++/ITK/Qt, MATLAB.**

PUBLICATIONS:

Refereed Journal Articles:

1. **S.E. Yuksel**, J. N. Wilson, P. D. Gader, “Twenty Years of Mixture of Experts”, *IEEE Transactions on Neural Networks*, in review for minor revision.
2. **S.E. Yuksel**, Ayman El-Baz, Aly A. Farag, Mohamed El-Ghar, Tarek Eldiasty and Mohamed A. Ghoneim, “A Kidney Segmentation Framework for Dynamic Contrast Enhanced Magnetic Resonance Imaging”, *Journal of Vibration and Control*, 13(9–10): 1505–1516, 2007.

Refereed Journal Articles in Progress: (submitted or to be submitted within 2 months)

3. **S.E. Yuksel**, P. D. Gader, “Mixture of Hidden Markov Model Experts”, *IEEE Transactions on Systems, Man and Cybernetics, Part B: Cybernetics*, in review.
4. **S.E. Yuksel**, “Validation of Registration for Renal DCE-MRI Imaging,” in review.
5. **S.E. Yuksel**, J. Bolton, P. D. Gader, “Multiple Instance Learning for Landmine Detection”, to be submitted to *IEEE Trans. on Pattern Analysis and Machine Intelligence*.
6. **S.E. Yuksel**, T. Dubroca, A. Zare, R. E. Hummel, P. Gader, “Automatic Standoff Detection of Explosive Materials by Differential Reflection Spectroscopy,” (in preparation).

Books:

1. **S.E. Yuksel**, “Context-based classification”, LAMBERT Academic Publishing, March 22, 2012. ISBN: 978-3-8465-8323-4. Link: <http://amzn.com/3846583235>

Book Chapters:

1. A. El-Baz, A.A. Farag, **S.E. Yuksel**, M.A. El-Ghar, T. A. Eldiasty and M.A. Ghoneim, “Application Of Deformable Models For The Detection Of Acute Renal Rejection”, in *Deformable Models: Biomedical and Clinical Applications (Topics in Biomedical Engineering. International Book Series)*, J. S. Suri and A. A. Farag Editors, Springer-Verlag, New York, July 2007. ISBN: 978-0-387-31201-9.

Conference Papers:

**** WHISPERS, ICPR, PRRS, MICCAI, CVPRW, ISBI, and IEEC are peer-reviewed conferences based on full-length paper submission.**

1. **S.E. Yuksel**, P. Gader, "Mixture of HMM Experts with Applications to Landmine Detection", *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2012 (accepted). (talk)
2. **S.E. Yuksel**, T. Dubroca, R. Hummel, P. Gader, "Differential Reflection Spectroscopy: A Novel Method for Explosive Detection", *Advances in Applied Physics and Material Science Congress (APMAS)*, 2012 (accepted). (talk)
3. **S.E. Yuksel**, T. Dubroca, R. Hummel, P. Gader, "An automatic detection software for differential reflection spectroscopy," *SPIE Defense, Security, and Sensing: Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery*, 2012. (accepted) (talk)
4. A. Zare, P. Gader, J. Bolton, **S.E. Yuksel**, T. Dubroca, R. Close, R. Hummel, "Sub-pixel Target Spectra Estimation and Detection Using Functions of Multiple Instances," *IEEE Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS)*, pp.1-4, June 2011. (talk)
5. **S.E. Yuksel**, T. Dubroca, R. Hummel, P. Gader, "Spectral Analysis for the Detection of Explosives with Differential Reflectometry," *Grace Hopper Conference*, 2011. (talk)
6. **S.E. Yuksel**, P. Gader, "Variational Mixture of Experts for Classification with applications to landmine detection", *International Conference on Pattern Recognition (ICPR)*, pp. 2981-2984, 2010.
7. X. Zhang, **S.E. Yuksel**, P. Gader, J. Wilson, "Simultaneous Feature and HMM Model Learning for Landmine Detection using Ground Penetrating Radar," *Workshop on Pattern Recognition in Remote Sensing (PRRS)*, pp. 1-4, 2010. (talk)
8. **S.E. Yuksel**, P.J. Dobbins, "Engineering education for the net generation: A case study of how students use resources in software engineering", *International Engineering Education Conference (IEEC)*, pp. 179-182, 2010. (talk)
9. **S.E. Yuksel**, G. Ramachandran, P. Gader, J. Wilson, D. Ho, G. Heo, "Hierarchical methods for landmine detection with wideband electro-magnetic induction and ground penetrating radar multi-sensor systems," *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, vol.2, pp.II-177-II-180, 7-11 July 2008.
10. A. El-Baz, A.A. Farag, R. Fahmi, **S.E. Yuksel**, M.A. El-Ghar, T. Eldiasty, "Image Analysis of Renal DCE-MRI for the Detection of Acute Renal Rejection," *IEEE 18th International Conference on Pattern Recognition (ICPR)*, (3) 2006, pp. 822-825.
11. A. El-Baz, R. Fahmi, **S.E. Yuksel**, A.A. Farag, W. Miller, M.A. El-Ghar, T. Eldiasty, "A New CAD System for the Evaluation of Kidney Diseases Using DCE-MRI," *Proc. of International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)* (2) 2006, pp. 446-453.
12. A.A. Farag, A. El-baz, H. E. Abd El Munim, and **S.E. Yuksel**, "Level Set Segmentation using Statistical Shape Priors," *Proceedings of the Conference on Computer Vision and Pattern Recognition Workshop (CVPRW)*, NY, USA, June 17-18, 2006, pp. 78-85. (talk)
13. A. Farag, A. El-Baz, **S.E. Yuksel**, M.A. El-Ghar, T. Eldiasty, "A Framework for the Detection of Acute Renal Rejection with Dynamic Contrast Enhanced Magnetic Resonance Imaging," *Proceedings of International Symposium on Biomedical Imaging (ISBI)*, Arlington, Virginia, April 2006, pp.418 - 421.
14. A. El-Baz, A.A. Farag, **S.E. Yuksel**, M.A. El-Ghar and T. Eldiasty, "A Novel Approach for the Detection of Acute Rejection with Dynamic Contrast Enhanced Magnetic Resonance Imaging", *13th European Symposium on Urogenital Radiology (ESUR)*, 2006.
15. A. El-Baz, **S.E. Yuksel**, H. Shi, A.A. Farag, M.A. El-Ghar, T. Eldiasty, and M. A. Ghoneim, "2D and 3D Shape Based Segmentation Using Deformable Models," *Proc. of International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, (2) 2005, pp. 821-829.
16. **S.E. Yuksel**, A. El-Baz, A.A. Farag, M.E.A. El-Ghar, T.A. Eldiasty, and M.A. Ghoneim, "Automatic detection of renal rejection after kidney transplantation," *Proc. of Computer Assisted Radiology and Surgery (CARS)*, Germany, 2005, pp.773-778. (talk)
17. A. El-Baz, **S.E. Yuksel**, S. Elshazly, and A. A. Farag, "Non-rigid registration techniques for automatic follow-up of lung nodules," *Proc. of Computer Assisted Radiology and Surgery (CARS)*, Berlin, Germany, June 22-25, 2005, pp. 1115-1120. (talk)

Dissertation & Thesis:

1. **S.E. Yuksel**, "Context-based classification via data-dependent mixtures of logistic and hidden Markov model classifiers", Doctor of Philosophy, University of Florida, Gainesville, FL, August 2011.
2. **S.E. Yuksel**, "Image Processing Methods For the Detection of Acute Rejection After Kidney Transplantation", Master of Science, University of Louisville, KY, December 2005.

Poster Presentations:

1. **S.E. Yuksel**, P. Gader, "Context-based classification of time-series data", *Grace Hopper Conference*, Atlanta, 2010.
2. **S.E. Yuksel**, G. Ramachandran, P. Gader, J. Wilson, D. Ho, G. Heo, "Advances in landmine detection using WEMI and GPR data," *NSF Research Day*, October 13, 2009.
3. **S.E. Yuksel**, G. Ramachandran, P. Gader, J. Wilson, D. Ho, G. Heo, "Hierarchical methods for landmine detection with wideband electro-magnetic induction and ground penetrating radar multi-sensor systems," *Google Workshop for Women Engineers*, 2008.
4. **S.E. Yuksel**, A. El-Baz, A.A. Farag and G.C. Postel, "Automatic detection of renal rejection after kidney transplantation," Research!Louisville, Oct.31-Nov.4, 2005 (**1st place award**).

Invited Talks:

1. **S.E. Yuksel**, "Advances in landmine detection", invited talk at the CNEL Lab, Department of Electrical and Computer Engineering, University of Florida, 2012.
2. **S.E. Yuksel**, "When databases meet datamining", Appalachian State University, Boone, NC, 2012.
3. **S.E. Yuksel**, "Securing our borders: from landmine to explosive detection", Hacettepe University, Ankara, Turkey, 2011.
4. **S.E. Yuksel**, "Context-based classification with mixture of hidden Markov model experts," Opera Solutions, San Diego, 2011.
5. **S.E. Yuksel**, "Variational and traditional mixture of experts for landmine detection," ARCON Cooperation, Boston, 2011.

PROPOSALS:

1. Paul Gader (PI), **Seniha Esen Yuksel** (Postdoctoral investigator), "Physics-based mixture models for hyperspectral pixel unmixing with applications in explosive detection", submitted to NSF Algorithms for Threat Detection, NSF 12-502, Jan. 2012, in review.
 - o Responsibilities included experimental design, generating results, writing parts of the proposal, and organizing the submission.
2. **Seniha Esen Yuksel (PI)**, "Sustainability of European Manufacturing Through Optimal Procurement Strategies", Marie Curie International Fellowships, 2011, in review.
 - o Submitted in collaboration with the swissQuant Group.
3. Paul Gader (PI), **Seniha Esen Yuksel** (Postdoctoral investigator), "Visible, Near-Infrared, and Short-Wave Infrared Imaging Spectroscopy Instrumentation to Support Advanced Algorithm Research, Development, and Technology Transfer", submitted to Defense University Research Instrumentation Program (DURIP), BAA-AFOSR-2011-07, in review.
 - o I organized this submission.
4. **Seniha Esen Yuksel** (investigator) "Image Analysis for Identification of Renal Transplant Rejection," PI's: Dr. Aly A. Farag and Tarek El-Diasty, NSF Grant, 60K. Project Duration: 9/1/06 – 9/1/08.
 - o I was responsible for a significant amount of the work to enable the success of the original proposal being accepted by the NSF. Responsibilities included generating results, proposing ideas and writing the proposal.

AWARDS & ACHIEVEMENTS:

- Selected by Schiphol International Airport to field test our prototype at an active security checkpoint in 2012, **Schiphol Security Innovation Days**, October 2011.
- Scholarship from **NSF** to attend GHC Conference, 2011.
- **College of Engineering Outstanding International Student Award**, UF, 2010.
- **1st Place Award**, Innovation through Institutional Integration NSF Writing Contest, 2010.
- Scholarship from **Association for Computing Machinery (ACM)** to attend GHC 2010.
- Travel award from the Department of CISE, University of Florida, 2010.
- Travel award from the Graduate Student Council (GSC), University of Florida, 2010.
- Travel award from the Office of Research, University of Florida, 2010.
- **Phyllis M. Meek Spirit of Susan B. Anthony Award**, University of Florida, 2008.
- Travel award from **Google**, to attend the Google Workshop for Women Engineers, 2008.
- Two travel awards from **CRA** to attend CRA-W Grad Cohort, 2008 and 2009.
- Recognized in **Who's Who** Among Students in American Universities and Colleges, 2009.
- **Full assistantship** from Department of CISE, University of Florida, 2006 - 2011.
- **Full assistantship** by the CVIP Lab, University of Louisville, 2003 - 2005.
- **1st Place Award** in research competition, Research!Louisville, Louisville, KY, 2005.
- Travel award from the International Center of University of Louisville, 2005.
- Travel award from the Graduate School of University of Louisville, 2005.
- Member, Eta Kappa Nu (national electrical engineering honor society), invited in 2004.
- Member, Phi Kappa Phi (honor society), invited in 2004.
- Ranked **153rd in 1.5million** students in the university entrance exams, 1999.
- **1st Place Award** in Ministry of National Education (MEB) writing contest, 1995.

TEACHING EXPERIENCE:

Substitute Teacher Fall 2009
*CAP 6617 **Advanced Machine Learning**, University of Florida*

- Taught the following topics to graduate students: mixtures of Gaussians, expectation maximization (EM) algorithm, variational inference, variational mixture of Gaussians.

Substitute Teacher Spring 2009
*CAP 6610 **Machine Learning**, University of Florida*

- Taught the following topics to graduate students: Bayesian inference for Gaussian models, linear models for regression, support vector machines for non-separable patterns.

Teaching Assistant with Teaching Responsibilities Fall 2010 & Fall 2008
*CEN 3031 **Introduction to Software Engineering**, University of Florida*

- Lead 6 & 4 discussion sections weekly. Each section of 10 & 15 students worked on a scalable open source project.
- Developed course material, graded students, and held office hours.

Instructor Summer 2008
*IDH 2931 **Artificial Intelligence and Machine Learning: State of the Art Applications**, UF.*

- Prepared and presented syllabus, course material and lectures to high school students.

Teaching Assistant Spring 2006 & Fall 2007
*CGS3063 **Computers and Modern Society**, University of Florida.*

- Assisted students to prepare web pages with HTML in Unix.
- Designed exams, graded assignments, held office hours.

Tutor 2000 - 2001
 Uyum Tutoring, Ankara, Turkey

- Prepared students for the university entrance exams.
- Prepared lecture notes and explanatory solutions of tests.

LEADERSHIP/SERVICE ACTIVITIES:

Panel Organizer,

Grace Hopper Conference, Baltimore, 2012 (submitted)

Title: "Securing our borders: are we there yet?"

Organizer: Seniha Esen Yuksel, University of Florida.

Speakers: Pamela Arya, vice President of *A-TSolutions* ; Kay Sementilli, Deputy Director of *Raytheon*; Laura McLay, assistant prof. at *Virginia Commonwealth Univ.*

Speaker in Birds of a Feather,

Grace Hopper Conference, Baltimore, 2012 (submitted)

Title: "How you can make a difference: Bootstrapping efforts toward gender balance?"

Fiona Tay, Harvey Mudd College; Sharon Mason, Rochester Institute of Technology;

Sophia Westwood, Stanford University; Seniha Esen Yuksel, University of Florida.

Reviewer,

IEEE Transactions on Neural Networks and Learning Systems,

IEEE Geoscience and Remote Sensing Letters,

Machine Learning in Medical Imaging 2011.

IEEE Congress for Evolutionary Computing 2009,

External reviewer, International Journal of Computer Mathematics 2010, IEEE Trans. On Geoscience and Remote Sensing 2008, MICCAI 2005, CVPR 2005.

Co-founder, Turkish women in computing,

Seminar organizer, CSI:Florida Lab, University of Florida, 2009 - 2010.

- Organized the weekly seminars where students from CSI:Florida Lab and professors from other departments and universities are invited to present their latest work.

Graduate advisor, Society of Women Engineers (SWE), University of Florida, 2009 - 2010.

- Organized meetings and facilitated interaction among the graduate members of SWE.
- Invited female faculty and professionals to these meetings.
- Introduced CRA-W, Google, GHC and other conference opportunities to members of SWE.

President, Turkish Student Association at University of Florida, 2006 - 2007.

- Facilitated social interaction among Turkish students in Gainesville.
- Organized events to introduce Turkish culture to Gainesville community.

Student member, Society of Women Engineers (SWE), 2004 - Present

- Introduced high school girls to engineering, organized lab tours.
- Encouraged women to pursue graduate studies via information sessions.

Student volunteer at the IEEE Visualization Conference, Austin, Texas, 2004.

ECE representative, University of Louisville Graduate Student Council, 2003 - 2005.

Member, METU departmental magazine BILTEK, IEEE student section, 2001.

One of the **editors and writers** of ADA school magazine, 1995 - 1997.

SKILLS:

- Programming: C, C++, C#, Java, MATLAB, ITK, VTK, Qt, OpenGL, HTML
- Operating Systems: Linux, Unix, Windows
- Engineering Design Tools: HPVee, Workbench, Xilinx
- Editing Tools: LaTeX, Word, Excel, Power Point, FrontPage
- Languages: English (fluent), Turkish (native)

OTHER EXPERIENCE:

Intern Engineer, Ayesas Software and Electronics, Ankara, Turkey. Summer 2002

- Worked in a small arms simulation project to provide indoor training.
- Designed simulations using VEGA/LYNX programs.

Intern Engineer, Aselsan Inc., Ankara, Turkey. Summer 2001

- Performed various tests using HP equipment in the Product Quality Dept.
- Assisted in the preparation of test procedures and inspection results.

PROFESSIONAL ASSOCIATIONS:

- Member of **IEEE** (Inst. of Electrical and Electronics Eng.), **IEEE Geoscience and Remote Sensing Society**, **SWE** (Society of Women Engineers), **MICCAI** (Medical Image Computing Society), **SPIE**

SELECTED GRADUATE COURSEWORK:

- Hidden Markov Models, Machine Learning, Neural Networks, Pattern Recognition and Machine Intelligence, Digital Signal Processing, Communication & Modulation
- Computer Vision, Digital Image Processing, Computer Graphics
- Modern Analysis, Basic Analysis, Statistics, Random Processes & Estimation Theory
- Medical Image Analysis, Intro. to Biomedical Computing, Intro. to Biomedical Engineering.
- Distributed Operating Systems, Advanced Data Structures, Analysis of Algorithms, Programming Language Principles.