

Sandor Szedmak, Innsbruck, Austria, 2015

Curriculum Vitae

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Sandor Szedmak

Intelligent and Interactive Systems(IIS) Research Group
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Citizenship

Hungarian

Academic Attainments

- PhD degree in Operations Research, RUTCOR, Rutgers Center For Operations Research, Rutgers, The State University of New Jersey, USA, 2002;
- MS degree in Mathematics, Kossuth Lajos University, Debrecen, Hungary, 1980;

PhD Thesis

Title: Methods for solving ill-conditioned and large scale probability bounding and discrete moment problems

Institute: RUTCOR, Rutgers Center for Operations Research, Rutgers, The State University of New Jersey, USA

Adviser: András Prékopa

Current Employer

Intelligent and Interactive Systems(IIS) Research Group
Institut für Informatik
Fakultät für Mathematik, Informatik und Physik
Leopold-Franzens-Universität Innsbruck (University of Innsbruck)
Innsbruck, A6020
Austria

Current Employment Details

Position : Senior Research Fellow

Project : Xperience("Robots Bootstrapped through Learning from Experience"), EU Project: FP7-ICT-2009-6 ;

Principal Investigator : Justus Piater

Employment History

1. Senior Research Fellow (2011-), Xperience Project, Institut für Informatik, University of Innsbruck, Austria
2. Senior Research Fellow (2009-2010), PinView Project, Electronics and Computer Science, University of Southampton, United Kingdom
3. Senior Research Fellow (2006-2009), SMART Project, Electronics and Computer Science, University of Southampton, United Kingdom
4. Research Scientist (2006-2006), Academy of Finland Project: Modelling Functional Shifts in Enzyme evolution, Department of Computer Science, University of Helsinki, Finland
5. Research Fellow (2005-2006), PASCAL Project: Learning with Labeled and Unlabeled Data, Electronics and Computer Science, University of Southampton, United Kingdom
6. Research Fellow (2004-2005), LAVA Project, Electronics and Computer Science, University of Southampton, United Kingdom
7. Research Assistant (2002-2003), LAVA Project, Department of Computer Science, Royal Holloway, University of London, United Kingdom
8. Graduate student (1999-2002), RUTCOR, Rutgers Center For Operations Research, Rutgers, The State University of New Jersey, USA;

9. Research Associate (1997-1999), Center of Health Management Sciences, Semmelweis University of Medicine, Budapest, Hungary;
10. Research Associate (1991-1999), Institute of Behavioural Sciences, Semmelweis University of Medicine, Budapest, Hungary;
11. Program Designer (1980-1990) VIDEOTON Computer Factory, Székesfehérvár, Hungary;
12. MS degree in Mathematics(1975-1980), Kossuth Lajos University, Debrecen, Hungary;

Teaching Experience

1. Convex Optimization, 2006 Spring,
Department of Computer Science, University of Helsinki, Finland
2. Numerical Methods, 1997-1999,
Center of Health Management Sciences, Semmelweis University of Medicine, Budapest, Hungary;

List of former projects

- **Project:** PinView(An eye movement based personal information navigator) European Community EU FP7, Collaborative Project, reference: 216529
Principal Investigator: Steve R. Gunn
- **Project:** SMART(Statistical Multilingual Analysis for Retrieval and Translation) European Community EU FP6 Project reference: 033917
Principal Investigator: Craig J. Saunders, Mahesan Niranjan
- **Project:** Learning with Labeled and Unlabeled Data, PASCAL Network of Excellence, European Community IST Programmes, IST-2002-506778
Principal Investigator: John Shawe-Taylor
- **Project:** Modelling Functional Shifts in Enzyme evolution, Academy of Finland, University of Helsinki, Helsinki, Finland
Principal Investigator: Juho Rousu
- **Project:** LAVA (Learning for Adaptive Visual Assistants), EU Project, IST-2001-34405
Principal Investigator: John Shawe-Taylor

Invited seminar talks

- “Playing games, learning complex, vectorized outputs via maximum margin” (2007), Department of Engineering Mathematics, University of Bristol
- “Learning structured outputs efficiently via maximum margins: unexplored and unexploited capabilities of the one-class classification” (2007), Department of Computer Science, University of Helsinki, Finland
- “How to teach Support Vector Machine to learn vector outputs” (2006), Centre for Computational Statistics and Machine Learning, University College London
- “How to teach the Support Vector Machine to learn vectors and structured outputs at one-class complexity” (2006), Workshop on Current Challenges in Kernel Methods, Belgium, Brussels

Computer skills

Operating systems: Unix(Linux, Solaris), MS-Windows

General purpose languages: C, C++, Python, Perl, Fortran, Visual Basic, Java, Prolog

Languages for Mathematics and Statistics: Matlab, R(SPlus), SPSS, AMPL

Reviewer activity

Journals •

- Discrete Applied Mathematics
- IEEE, Transaction on
 - Computational Biology and Bioinformatics
 - Knowledge and Data Engineering
 - Neural Networks
 - Image Processing
 - Pattern Analysis
 - Signal Processing
 - Signal Processing Letters
 - System Management and Cybernetics
- International Journal of Adaptive Control and Signal Processing

- Journal of Machine Learning Research
- Machine Learning
- Neurocomputing
- Neural Processing Letters
- Pattern Recognition Letters

Conferences •

- ECML PKDD
- ICML
- NIPS
- Bioinformatics

Publications (Refereed publications, research reports, conference papers)

Applied Mathematics, Computer Science and Operations Research

Journal papers

References

- [1] Hanchen Xiong, Sandor Szedmak, Justus Piater (2014), “Scalable, Accurate Image Annotation with Joint SVMs and Output Kernels” Appearing In *Neurocomputing*
- [2] Mustansar Ghazanfar, Adam Prügel-Bennett, Sandor Szedmak (2012) “Kernel-Mapping Recommender System Algorithms”, *Information Sciences, Elsevier* Volume 208, Pages 81–104
- [3] Y. Ni, C.J. Saunders, S. Szedmak and M. Niranjana (2011), “Exploitation of Machine Learning Techniques in Modelling Phrase Movements for Machine Translation” In *Journal of Machine Learning Research* Volume 12, Pages 1–10
- [4] Y. Ni, C.J. Saunders, S. Szedmak and M. Niranjana (2010), “The application of structure learning in Natural Language Processing” In *Machine Translation*, Springer, Volume 24, Issue 2, Pages 71–85
- [5] K. Astikainen, L. Holm, E. Pitkanen, S. Szedmak and J. Rousu, (2008) “Towards Structured Output Prediction of Enzyme Function”. *BMC Proceedings*, 2(Suppl 4):S2

- [6] S. Szedmak, J. Shawe-Taylor, (2007) “Synthesis of Maximum Margin and Multiview Learning using Unlabeled Data”, In *Neurocomputing* Volume 70, Numbers 7-9, Pages 1254–1264
- [7] J. Rousu, C.J. Saunders, S. Szedmak, J. Shawe-Taylor, (2006) “Kernel-based Learning of Hierarchical Multilabel Classification Models”, In *Journal of Machine Learning Research, Special issue on Machine Learning and Large Scale Optimization*
- [8] D.R. Hardoon, S. Szedmak, J. Shawe-Taylor, (2004) “Canonical correlation analysis; An overview with application to learning methods”, In *Journal of Neural Computation* Volume 16, Issue 12, Pages 2639–2664, MIT Press
- [9] P.L. Hammer, A. Kogan, B. Simeone, S. Szedmak (2004) “Pareto-Optimal Patterns in Logical Analysis of Data” , *Discrete Applied Mathematics*, Volume 144, Issues 1-2, Pages 79–102, Elsevier
- [10] P.L. Hammer, Y. Liu, B. Simeone, and S. Szedmak (2004) “Saturated Systems of Homogeneous Boxes and the Logical Analysis of Numerical Data”, *Discrete Applied Mathematics*, Volume 144, Pages 103–109, Elsevier

Book Chapters

References

- [1] J. Rousu, C.J. Saunders, S. Szedmak, J. Shawe-Taylor, (2007) “Efficient algorithms for max-margin structured classification”, In *Predicted Structured Data* Editors: G. Bakir, T. Hoffman, B. Schölkopf, A.J. B. Taskar and S.V.N. Vishy Vishwanathan, MIT Press, Cambridge, Massachusetts
- [2] M. Everingham, A. Zisserman, C. K. I. Williams, L. Van Gool, M. Allan, C. M. Bishop, O. Chapelle, N. Dalal, T. Deselaers, G. Dork, S. Duffner, J. Eichhorn, J.D.R. Farquhar, M. Fritz, C. Garcia, T. Griffiths, F. Jurie, T. Keysers, M. Koskela, J. Laaksonen, D. Larlus, B. Leibe, H. Meng, H. Ney, B. Schiele, C. Schmid, E. Seemann, J. Shawe-Taylor, A. Storkey, S. Szedmak, B. Triggs, I. Ulusoy, V. Viitaniemi, J. Zhang, (2006), “The 2005 PASCAL Visual Object Classes Challenge” *Selected Proceedings of the first PASCAL Challenges Workshop, LNAI*, Springer
- [3] H. Meng, J. Shawe-Taylor, S. Szedmak, J.R.D. Farquhar, (2005): “Support Vector Machine to Synthesise Kernels”, In *Sheffield Machine Learning Workshop Proceedings, Lecture Notes in Computer Science*, Volume 3635, Pages 242–255, Springer

- [4] H. Meng, D.R. Hardoon, J. Shawe-Taylor, S. Szedmak, (2005): “Generic object recognition by distinct features combination in machine learning.”, In: *Proceedings of SPIE*, Volume 5673

Conferences and Workshops

References

- [1] Hanchen Xiong, Sandor Szedmak, Justus Piater (2014), “Implicit Learning of Simpler Output Kernels for Multi-Label Prediction”, *NIPS workshop on Representation and Learning for Complex Outputs, 2014*, to appear
- [2] Hanchen Xiong, Sandor Szedmak, Justus Piater (2014), “Towards Maximum Likelihood: Learning Undirected Graphical Models using Persistent Sequential Monte Carlo”, *6th Asian Conference on Machine Learning(ACML), 2014*, to appear **Best Paper Award**
- [3] Emre Ugur, Sandor Szedmak, Justus Piater (2014), “Bootstrapping paired-object affordance learning with learned single-affordance features”, *The Fourth Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics*, to appear
- [4] Sandor Szedmak, Emre Ugur, Justus Piater (2014), “Knowledge Propagation and Relation Learning for Predicting Action Effects”, *IEEE/RSJ International Conference on Intelligent Robots and Systems(IROS), 2014*, pages 623–629
- [5] Emre Ugur, Sandor Szedmak, Justus Piater (2014), “Complex affordance learning based on basic affordances”, *IEEE, 22nd Signal Processing and Communications Applications Conference, 2014*, pages 698–701
- [6] Hanchen Xiong, Sandor Szedmak, Antonio Rodriguez-Sanchez, Justus Piater (2014), “Towards Sparsity and Selectivity: Bayesian Learning of Restricted Boltzmann Machine for Early Visual Features”, *24th International Conference on Artificial Neural Networks, 2014*, Springer LNCS. Springer-Verlag
- [7] Hanchen Xiong, Sandor Szedmak, Justus Piater (2014), “Comparing Binary Hamiltonian Monte Carlo and Gibbs Sampling for Training Discrete MRFs with Stochastic Approximation”, *Seventeenth International Conference on Artificial Intelligence and Statistics, 2014*
- [8] Hanchen Xiong, Sandor Szedmak, Justus Piater, (2014), “Joint SVM for Accurate and Fast Image Tagging” *European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning(ESANN), 2014*

- [9] Hanchen Xiong, Sandor Szedmak, Justus Piater (2013), “3D Object Class Geometry Modeling with Spatial Latent Dirichlet Markov Random Fields”, *35th German Conference on Pattern Recognition (former DAGM)*, pages 51–60, Springer LNCS 8142. Springer-Verlag
- [10] Hanchen Xiong, Sandor Szedmak, Justus Piater (2013), “Homogeneity Analysis for Object-Action Relation Reasoning in Kitchen Scenarios” *2nd Workshop on Machine Learning for Interactive Systems 2013* (Workshop at IJCAI), pages 37–44
- [11] Hanchen Xiong, Sandor Szedmak, Justus Piater (2013), “A Study of Point Cloud Registration with Probability Product Kernel Functions”, *IEEE, International Conference on 3D Vision*, pages 207–214
- [12] Hanchen Xiong, Sandor Szedmak, Justus Piater (2013), “Efficient, General Point Cloud Registration With Kernel Feature Maps”, *IEEE, Tenth Conference on Computer and Robot Vision*, pages 83–90
- [13] Mustansar Ghanzanfar, Sandor Szedmak, Adam Prügel-Bennett (2011), “Incremental Kernel Mapping Algorithms for Scalable Recommender Systems”, *IEEE International Conference on Tools with Artificial Intelligence*, pages 1077–1084
- [14] S. Szedmak, Y. Ni and S.R. Gunn (2010) “Maximum Margin Learning with Incomplete Data: Learning Networks instead of Tables”, *PASCAL, Workshop on Applications of Pattern Analysis, Journal of Machine Learning Research, Proceedings*, volume 11, pages 96–102,
- [15] S. Szedmak (2010) “Exploring relations of entities via common space representation”, *24th European Conference on Operational Research, EURO 2010*,
- [16] K. Pasupa, D.R. Hardoon and S. Szedmak, (2009) “Image Ranking with Eye Movement”, *Proceedings of the 23rd Annual Conference on Neural Information Processing Systems (NIPS’2009) Workshop on Advance in Rankings* pages 37–42
- [17] K. Pasupa, C.J. Saunders, S. Szedmak, A. Klami, S. Kaski and S. Gunn (2009), “Learning to Rank Images from Eye Movements”, *Proceeding of 2009 IEEE 12th International Conference on Computer Vision (ICCV 2009) Workshops on Human-Computer Interaction (HCI 2009)*, pages 2009–2016
- [18] K. Astikainen, L. Holm, E. Pitkänen, J. Rousu and S. Szedmak (2009), “Reaction Kernels, Structured Output Prediction Approaches for Novel Enzyme Function” *Conference on Bioinformatics 2010, Valencia*, **Best Paper Award**

- [19] Y. Ni, C.J. Saunders, S. Szedmak and M. Niranjan (2009), “Handling Phrase Reorderings for Machine Translation”, *ACL-IJCNLP 2009, Singapore*
- [20] Y. Ni, C.J. Saunders, S. Szedmak and M. Niranjan (2009), “Structure Learning for Language Processing”, *MLSP 2009 (IEEE Workshop on Machine Learning for Signal Processing), Grenoble 2009*
- [21] S. Szedmak, E. Galbrun, C.J. Saunders and Y. Ni (2009), “Large scale maximum margin regression based, structural learning approach to phrase translations”. *EAMT-2009 Workshop ,Barcelona, Spain*
- [22] K. Astikainen, J. Rousu, L. Holm, E. Pitkanen and S. Szedmak (2007) “Towards Structured Prediction of Enzyme Function”. *Machine Learning in Systems Biology (MLSB-2007), Evry, France, September 2007*
- [23] Z. Wang, J. Shawe-Taylor and S. Szedmak (2007), “Kernel Regression Based Machine Translation”, *Proceedings of NAACL-HLT’07, 185-188*
- [24] S. Szedmak (2007) “Maximum margin regression with infinite dimensional inputs and outputs”, *Euro XXII, Prague*
- [25] S. Szedmak T. De Bie and D.R. Hardoon (2007) “A metamorphosis of Canonical Correlation Analysis into Multivariate Maximum Margin Learning”, *ESANN 2007*
- [26] Z. Wang, J. Shawe-Taylor, S. Szedmak(2007) “Kernel Regression Based Machine Translation”. *HLT-NAACL 2007*
- [27] S. Szedmak, C.J. Saunders, J. Shawe-Taylor and J. Rousu (2006) “How to teach the Support Vector Machine to learn vectors and structured outputs at one-class complexity”, *Workshop on Current Challenges in Kernel Methods, Belgium, Brussels* Invited Talk
- [28] D. R. Hardoon, C.J. Saunders, S. Szedmak and J. Shawe-Taylor, (2006) “A Correlation Approach for Automatic Image Annotation”, *The 2nd International Conference on Advanced Data Mining and Applications (ADMA 2006), Xi’An, China, by In Springer LNAI 4093, Pages 681-692*
- [29] S. Szedmak, J. Shawe-Taylor, (2006) “Synthesis of Maximum Margin and Multiview Learning using Unlabeled Data”, *ESANN 2006*
- [30] S. Szedmak, C.J. Saunders, J. Shawe-Taylor and J. Rousu (2005) “Learning Hierarchies at Two-class Complexity”, *NIPS 2005, Workshop, Kernel Methods and Structured Domains*

- [31] J.D.R. Farquhar, D. R. Hardoon, H. Meng, J. Shawe-Taylor and S. Szedmak (2005) “Two view learning: SVM-2K, Theory and Practice”, *NIPS 2005*
- [32] J.D.R. Farquhar, H. Meng, S. Szedmak and J. Shawe-Taylor (2005) “Probabilistic Kernels and Feature Synthesis for Image Categorisation”, *Visual Object Classes, PASCAL Challenges Workshop, Southampton, 2005 April*
- [33] S. Szedmak, E.P. Hernández, J. Shawe-Taylor, J.D.R. Farquhar and H. Meng (2005), “Learning structured data via flow represented interactions of Support Vector Machines”, *Machine Learning, Support Vector Machines, and Large Scale Optimization Workshop, PASCAL, Thurnau, 2005*
- [34] J. Rousu, C.J. Saunders, S. Szedmak and J. Shawe-Taylor (2005) “Learning Hierarchical Multi-Category Text Classification Models”, *ICML 2005*
- [35] J. Rousu, C.J. Saunders, S. Szedmak, J. Shawe-Taylor, (2004) “On Maximum Margin Hierarchical Multilabel Classification”, *NIPS 2004, Workshop, Learning with Structured Outputs*
- [36] S. Szedmak, J. Shawe-Taylor, C. .J. Saunders and D. .R. Hardoon, (2004) “Multiclass classification by L1 norm Support Vector Machine” In *Pattern Recognition and Machine Learning in Computer Vision Workshop(PASCAL)*, Grenoble, France

Research Reports(most relevant ones)

References

- [1] S. Szedmak and Z. Hussain, (2009) “A Universal Machine Learning Optimization Framework For Arbitrary Outputs” *PASCAL Research Reports*, <http://eprints.pascal-network.org/>
- [2] S. Szedmak, C.J. Saunders, Y. Ni and J. Rousu , (2009) “Max-margin structured output learning in L1 norm space” *PASCAL Research Reports*, <http://eprints.pascal-network.org/>
- [3] S. Szedmak, J. Shawe-Taylor and E. Parado-Hernandez, (2005) “Learning via Linear Operators: Maximum Margin Regression” *PASCAL Research Reports*, <http://eprints.pascal-network.org/>
- [4] S. Szedmak and J. Shawe-Taylor (2005) “Multiclass Learning at One-class Complexity” *Technical Report, ISIS Group, Electronics and Computer Science*

- [5] S. Szedmak, J Shawe-Taylor, (2005): “Application of a bundle type method for extremely large scale Linear Programming Boosting and Linear Programming Machine”, *Research Report*, <http://eprints.pascal-network.org>
- [6] Z. Hussain, S. Szedmak and J. Shawe-Taylor(2004), “The Linear Programming Set Covering Machine” *PASCAL Research Reports*, <http://eprints.pascal-network.org/> ,
- [7] D.R Hardoon, S. Szedmak, J. Shawe-Taylor (2004) “Retrieving Keyword’s to an Image Query using Kernel CCA”,*PASCAL Research Reports*, <http://eprints.pascal-network.org/> ,
- [8] A. Prékopa, S. Szedmak (2003) “On the numerical solution of the univariate discrete moment problem”, *RUTCOR Research Report, RRR 32-2003*
- [9] S. Szedmak (2002), “How to find more efficient initial solution for searching?”, *RUTCOR Research Report, RRR 49-2001*

Medical and Social Statistics

References

- [1] M. Kovacs, A. Stauder, S. Szedmak (2003) ”Severity of allergic complaints: the importance of depressed mood”, *Journal of Psychosomatic Research*, Volume 54, Issue 6, Pages 549–557, Elsevier
- [2] A. Stauder, S. Szedmak, M. Kopp (2001) “Psychosocial characteristics of people reporting allergic symptoms in a representative population survey”, *ACI International*, Vol 13, 18-22.
- [3] M. Kopp, Á. Skrabski, S. Szedmak (2001) “The influence of societal structure on depressive symptomatology and morbidity in the Hungarian population”, *The Practice of Social Influence in Multiple Cultures*, (editors: W. Wosinska, R.B. Cialdini, J. Reykowski, D.W. Barrett) Lawrence Erlbaum, 207-22
- [4] M. Kopp, Á. Skrabski, S. Szedmak (2000) “Self-rated health and social transition”, *Self-Rated Health in a European Perspective*, (editors: Nilson P. Orth-Gomer K) FRN,Stockholm, 85-102.
- [5] M. Kopp, A. Skrabski, S. Szedmak (2000) “Psychosocial risk factors, inequality and self-rated morbidity in a changing society”, *Social Science and Medicine*. Vol 51, 1351-1361.

- [6] M. Kopp, Á. Skrabski, J. Löke, S. Szedmák (1999) "The Hungarian state of Mind in a Transforming society", *Hungary in Flux, Society, Politics and Transformation*, (Ed: Spéder Zs) Verlag Dr. Reinhold Kramer, Hamburg, 117-134.
- [7] M. Kopp, P. Falger, A. Appels, S. Szedmák (1998) "Depression and Vital Exhaustion are differentially related to behavioural risk factors for coronary heart disease", *Psychosomatic Medicine*, 752-758.
- [8] S. Kopp, S. Szedmák, Á. Skrabski (1998) "Socioeconomic differences and psychosocial aspects of stress in a changing society", *Stress of Life from Molecules to Man* (Ed: P.Csermely) Ann.New York Acad. Sci., Vol 851, 538-543.
- [9] I. Janszky, S. Szedmák, R. Istók, M. Kopp (1997) "Possible role of Sweating in Psychophysiology of Panic Attacks", *International Journal of Psychophysiology* Vol 27, 249-252.
- [10] M. Kopp, Á. Skrabski, S. Szedmák (1995) "Socioeconomic factors, severity of depressive symptomatology and sickness absence rate in the Hungarian population", *Journal of Psychosomatic Research* Vol 39, 1019-1029