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Professional Preparation

Ph.D., 2005	University of Waterloo, Canada	Computer Science
M. Math, 2000	University of Waterloo, Canada	Computer Science
B.Sc., 1997	University of Guelph, Canada	Physics, Computing & Information Science

Appointments

June 2009 – Present	Professeur adjoint Département de génie informatique et génie logiciel, École Polytechnique de Montréal, Montréal, PQ, Canada
Sept. 2008 – May 2009	Chercheur – Département de génie informatique et génie logiciel École Polytechnique de Montréal, Montréal, PQ, Canada
Sept. 2007 – Present	Assistant Professor (currently on family leave) Dept. Computer Science University of Rochester, Rochester, NY, USA
Jan 2005 – Aug. 2007	Research Scientist – Dept. Computer Science University of Massachusetts, Amherst, MA, USA
July 2004 – Oct 2004	Intern, Vision Technology Group, Microsoft Research Redmond, WA, USA
Jan. 2004 – March 2004	Intern, Vision Technology Group, Microsoft Research Redmond, WA, USA
May 2003 – Sept. 2003	Intern, Vision Technology Group, Microsoft Research Redmond, WA, USA
Sept. 2001 – May 2003	Research Assistant, Probabilistic and Statistical Inference Group Dept. Electrical and Computer Engineering University of Toronto, ON, Canada
Sept. 1997 – Sept. 2001	Research Assistant School of Computer Science University of Waterloo, ON, Canada

- Sept. 1997 – Dec. 2003 Teaching Assistant
School of Computer Science, University of Waterloo
Courses: Computational Vision, Introduction to Artificial
Intelligence, Concurrent Programming, Intro. To Programming,
Operating Systems, Scientific Computation.
- April 1997 – August 1997 Intern, Signal Processing Research
Interval Research, Palo Alto, CA, USA
- April 1996 – April 2000 Research Assistant, Environmental Informatics
University of Guelph, ON, Canada
- Oct. 1996 – April 1997 Director, Electronic Voting Project, Central Student Association
University of Guelph, ON, Canada
- March 1995 – June 1996 Research Assistant, Human Computer Interaction,
Dept. Computing and Information Science
University of Guelph, ON, Canada
- May 1995 – Aug. 1995 Research Assistant,
Dept. Physics, University of Guelph, ON, Canada
- May 1993 – Aug. 1993 Engineering Management Intern
COM DEV, Cambridge, ON, Canada

Professional Service and Activities

Reviewer and program committee member (PC) where indicated

- The International Conference on Computer Vision (ICCV)
- The International Conference on Machine Learning (ICML) - PC
- The European Conference on Computer Vision (ECCV)
- The Conference, Computer Vision and Pattern Recognition (CVPR)
- The Conference, Artificial Intelligence (AAAI) - PC
- The Conference, Uncertainty in Artificial Intelligence (UAI)
- The Conference, Knowledge Discovery and Data Mining (KDD) - PC
- The Conference, Advances in Neural Information Processing Systems (NIPS)
- The Conference, Artificial Intelligence and Statistics (AISTATS)
- The Canadian Conference on Artificial Intelligence (CCAI)
- The Conference, IEEE Visualization (VIS)
- The International Journal of Remote Sensing (IJRS)
- The Journal, IEEE Transactions on Pattern Analysis and Machine Learning (PAMI)
- The Journal, IEEE Transactions on Neural Networks
- The Journal, Computerized Medical Imaging and Graphics
- The Journal, Pattern Recognition
- The Journal, Machine Learning

University of Waterloo Committee Member

The Committee for Selecting the Director of the School of Computer Science (2002),
The Departmental Committee on Academic Appointments (2001-2002),
The External Relations and Graduate Student Recruitment Committees (2001-2002),
The CS Department Representative for the Graduates Student Association (2001-2002)

University of Rochester Committee Member

Computing Infrastructure Committee & Graduate Admissions Committee (2007-2008)

École Polytechnique Committee Member

Graduate and Undergraduate Recruiting and Promotion (2009)

Volunteer Activities

The CS Seminar Series encouraging women to enter Computer Science (May 2002)

University of Waterloo, Waterloo Ontario

I gave a seminar on Artificial Intelligence and interactive music and made a CD-ROM.

CFRU 93.3 Community Radio (2000)

Guelph, Ontario

Volunteer helping with Internet audio streaming technologies.

Canadian Undergraduate Physics Conference Executive (April 1996- January 1997)

University of Guelph, Guelph, Ontario

Involved with the organization of various aspects of this national conference, including: fund raising, guest lecturers, informal speakers, advertising, industrial tours and numerous team projects.

Board of Directors of the University Centre (Nov. 1993- April 1997)

University Centre, University of Guelph, Guelph, Ontario

Responsible for general direction and policy for the University Centre. The University Centre houses administration, various levels of government, student clubs, the student newspaper, retail outlets and various common areas.

Awards, Honors & Scholarships

Ontario Graduate Scholarship	2003 and 2004, awarded twice
NSERC PGS B	2001, National Graduate Scholarship
Copernicus Scholarship in Physics	1994, Institutional Undergraduate Scholarship
Canada Scholarship	1993-1997, National Undergraduate Scholarship
Valedictorian	1993, Glenview Park Secondary School

Delivered inaugural address on behalf of students on the occasion of the opening of the University of Waterloo School of Computer Science, (April 2002)

Selected Recent Talks

<i>Date</i>	<i>Organization</i>
May 2008	University of Rochester – Delivered Graduation Speech
May 2008	George Eastman Museum of Photography and Film
Oct. 2007	Cornell University - Bill and Melinda Gates Foundation Workshop
Dec. 2006	Kodak Research, Rochester, NY
Dec. 2006	Genomic Sciences Centre, Vancouver, BC
Sept. 2006	Invention to Venture, University of Massachusetts Business School
Sept. 2006	Canadian Independent Media Arts Alliance - National Conference Speaker
July 2006	Microsoft Research Redmond, WA
May 2006	Microsoft Research Cambridge, UK

Teaching

École Polytechnique de Montréal, Département de Génie informatique

Fall 2009	INF8702	- Infographie avancée (Advanced Computer Graphics)
Winter 2009	INF6953E	- Traitement et analyse de données multimédias (études supérieur)

INF6953E is a new graduate level course on computer vision, pattern recognition and data mining for multimedia, which I developed myself. Note also that these courses are taught in French.

University of Rochester, Department of Computer Science

Fall 2007	CSC 290A	- Computational Photography and Video (undergraduates only)
Winter 2008	CSC 577	- Advanced Topics in Pattern Recognition (graduates only)

CSC 290A and CSC 577 were new course offerings and I created the content for both courses.

Specific Programming and Software Development Knowledge and Experience

I have a general knowledge of most major programming languages, internet development methods, programming environments, operating systems, database systems, applications servers and software applications. I have extensive and specific experience with the following.

Programming Languages: Java, C, C++, Matlab, Pascal, Assembly Language and Visual Basic.

Internet development tools: HTML, PHP, VB, JavaScript, Cold Fusion, CGI programming.

Programming Environments: MS Visual Studio, IntelliJ and various others.

Operating Systems: Unix, most varieties including SunOS, Linux, BSD, Mac OSX, etc.

Windows (most variants including Windows servers and mobile).

Database Systems: ORACLE, MS-SQL, MySQL, MS Access.

Software Engineering Revision Control: CVS, SourceSafe.

Publications, Summary

Book Chapter:	1
Refereed Journal Papers:	6
Refereed Conference Papers and Presentations:	21
Issued Patents:	3
Filed Patents:	1
Workshops, Demonstrations and Invited	10

Book Chapter

- [1] Morsillo, N., Mann, G., and Pal, C. (2010) “YouTube Scale, Large Vocabulary Video Annotation”. Book chapter to appear in *Video Search and Mining, Springer-Verlag series on Studies in Computational Intelligence*.

Refereed Journal Publications

- [2] Jagalur, M.N., Pal, C., Learned-Miller, E., Zoeller, R. T., and Kulp, D. “Analyzing in situ Gene Expression in the Mouse Brain with Image Registration, Feature Extraction and Row Column Clustering”. *BMC Bioinformatics*. vol. 8, suppl. 10, Dec. 21 2007.
- [3] Baudisch, P., Tan, D., Steedly, D., Rudolph, R., Uyttendaele, M., Pal, C. and Richard Szeliski. (2007) “An Exploration of User Interface Designs for Real-time Panoramic Photography”. *Australian Journal of Information Systems (AJIS)*, vol. 13, no. 2.
- [4] Agarwala, A., Zheng, C., Pal, C., Agrawala, M., Cohen, M., Curless, B., Salesin, D., and Szeliski, R. (2005) “Panoramic video textures”. In the proceedings of ACM SIGGRAPH 2005, *ACM Transactions on Graphics*, vol. 24, issue 3, pp. 821-827.
- [5] Wen-Tao Peng, Mark D. Robinson, Sanie Mnaimneh, Nevan J. Krogan, Gerard Cagney, Quaid Morris, Armaity P. Davierwala, Jörg Grigull, Xueqi Yang, Wen Zhang, Nicholas Mitsakakis, Owen W. Ryan, Nira Datta, Vladimir Jojic, Chris Pal, Veronica Canadien, Dawn Richards, Bryan Beattie, Lani F. Wu, Steven J. Altschuler, Sam Roweis, Andrew Emili, Brendan J. Frey, Jack F. Greenblatt, and Timothy R. Hughes. (2003) “A Panoramic View of Yeast Non-Coding RNA processing”. *Cell*, vol. 113, pp. 919-933.
- [6] Pal, C. Swayne, D. and Frey, B. (2001) “The Automated Extraction of Environmentally Relevant Features from Digital Imagery using Bayesian Multi-Resolution Analysis”. *Advances in Environmental Research*. vol. 5, issue 4, pp 435-444.
- [7] Dorner, S. Swayne, D. A., Rudra, R. P., Pal, C., Newald, C. (2001) “Integrating Parametric Uncertainty and Modelling Results into an Advisory System for Watershed Management”. *Advances in Environmental Research*. vol. 5, issue 4, pp. 445-451.

Refereed Conference Publications

- [8] Messing, R., Pal, C., and Kautz, H. (2009) “Activity recognition using the velocity histories of tracked keypoints”. In the *proceedings of the IEEE International Conference on Computer Vision, Kyoto, Japan, ICCV 2009*.
- [9] Morsillo, N., Pal, C., and Nelson, R. (2009) “Semi-Supervised Learning of Visual Classifiers from Web Images and Text”. In the *proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*.

- [10] Weinman, J., Tran, L. and Pal, C. (2008) “Efficiently Learning Random Fields for Stereo Vision with Sparse Message Passing”. In the *proceedings of the European Conf. on Computer Vision (ECCV)*, Springer-Verlag LNCS, vol. 1, pp. 617-630.
- [11] Druck, G., Pal, C., Zhu, X., and Andrew McCallum. (2007) “Semi-Supervised Classification with Hybrid Generative/Discriminative Methods”. In the *proceedings of Knowledge Discovery and Data Mining (KDD)*.
- [12] Wang, X., Pal, C., and McCallum, A. (2007) “Generalized Component Analysis for Text with Heterogeneous Attributes”. In the *proceedings of Knowledge Discovery and Data Mining (KDD)*.
- [13] Scharstein, D. and Pal, C. (2007) “Learning Conditional Random Fields for Stereo”. In the *proceedings of IEEE Computer Vision and Pattern Recognition, CVPR 2007*.
- [14] Kanani, P., McCallum, A. and Pal, C. (2007) “Improving Author Co-reference by Resource-bounded Information Gathering from the Web”. In the *proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI)*.
- [15] Pal, C., Sutton, C., and McCallum, A. (2006) “Sparse Forward-Backward using Minimum Divergence Beams for Fast Training of Conditional Random Fields”. In the *proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*.
- [16] McCallum, A., Pal, C., Druck, G., and Wang, X. (2006) “Multi-Conditional Learning: Generative/Discriminative Training for Clustering and Classification”. In the *proceedings of AAAI 2006*.
- [17] Kelm, M., Pal, C., and McCallum, A. (2006) “Combining Generative and Discriminative Methods for Pixel Classification with Multi-Conditional Learning”. In the *proceedings of ICPR 2006*.
- [18] Pal, C. and McCallum, A. (2006) “CC Prediction with Graphical Models”. In the *proceedings of the Third Conference on Email and Anti-Spam, (CEAS)*.
- [19] Steedly, D., Pal, C. and Szeliski, R. (2005) “Efficiently Registering Video into Panoramic Mosaics”. In the *proceedings of the IEEE International Conference on Computer Vision, ICCV 2005*, Beijing, China, October 15-21.
- [20] Baudisch, P., Tan, D., Steedly, D., Rudolph, E., Uyttendaele, M., Pal, C., and Szeliski, R. (2005) “Panoramic Viewfinder: providing a real-time preview to help users avoid flaws in panoramic pictures”. In the *Proceedings of OZCHI 2005*, Canberra, Australia, November 2005.
- [21] Pal, C., Szeliski, R., Uyttendaele, M. and Jovic, N. (2004) “Probability Models for High Dynamic Range Imaging”. In the *Proceedings of IEEE Computer Vision and Pattern Recognition, CVPR 2004*. vol. 2, pp. 173-180.
- [22] Pal, C., Frey, B. and Jovic, N. (2002) “Learning Montages of Transformed Latent Images as Representations of Objects that Change in Appearance”. In the *proceedings of ECCV: The European Conference on Computer Vision*, Springer-Verlag lecture notes in Computer Science, vol. 4, pp. 715-731.
- [23] Pal, C., Frey, B. and Kristjansson, T. (2002) “Noise Robust Speech Recognition Using Gaussian Basis Functions For Non-linear Likelihood Function Approximation”. In the *proceedings of IEEE ICASSP: International Conference on Acoustics Speech and Signal Processing*, Orlando, Florida May 13-17, 2002.
- [24] Pal, C. and Hu, M. (2001) “Methodologies for Constructing and Training Large Hierarchical Hidden Markov Models for Sequence Analysis”. *Research in Computational Biology, RECOMB 2001*. (Conference Poster Presentation). April 22-25, 2001.
- [25] Pal, C. Swayne, D. and Frey, B. (2000) “Image Interpretation and Segmentation with Hierarchical Probabilistic Models”. *4th International Conference on Integrating GIS and Environmental Modeling (GIS/EM4)*. Banff, Alberta , Canada, September 2-8, 2000.

- [26] Dorner, S., Pal, C. and Swayne, D.A. (1999) “Case Libraries and Information Theoretic Case Matching for Water Resource Management”. *Proceedings of ISESS 1999, The International Symposium on Environmental Software Systems*.
- [27] Pal, C. (1998) “A Technique for Illustrating Dynamic Component Level Interactions Within a Software Architecture”. *Proceedings of CASCON, The IBM Centre for Advanced Studies Conference*. pp. 134-146.
- [28] MacKenzie, I.S., Soukoreff, R.W., and Pal, C. (1997) “A two ball mouse affords three degrees of freedom”. *Extended Abstracts of CHI 1997. The ACM Conference on Human Factors in Computing Systems*, pp. 303-304. New York: ACM.

Theses

- [29] Pal, C. (2004) “Probability Models for Information Processing and Machine Perception”. PhD Thesis, University of Waterloo.
- [30] Pal, C. (2000) “A Probabilistic Approach to Image Feature Extraction, Segmentation and Interpretation”. Masters of Mathematics Thesis, University of Waterloo.

Workshop, Demonstration and Invited Papers

- [31] Messing, R. & Pal, C. (2009) “Behavior Recognition in Video with Extended Models of Feature Velocity Dynamics”. In the *proceeding of the AAAI Spring Symposium*. (Refereed Workshop paper)
- [32] Morsillo, N., Pal, C. and Nelson, R. (2008) “Mining the Web for Visual Concepts”. In the *9th International Workshop on Multimedia Data Mining at KDD*. (Refereed Workshop paper)
- [33] Pal, C., Mann, G., and Minerich, R. (2007) “Putting Semantic Information Extraction on the Map: Noisy Label Models for Fact Extraction”. In the *proceedings of the AAAI Workshop on Information Integration on the Web (IIWeb)*. (Refereed Workshop paper).
- [34] Jagalur, M., Pal, C., Learned-Miller, E., Zoeller, R.T. and Kulp, D. (2006) “The Processing and Analysis of in situ Gene Expression Images of the Mouse Brain”. In *Advances in Neural Information Processing Systems (NIPS) Workshop on New Problems and Methods in Computational Biology*. (Refereed Workshop paper)
- [35] Pal, C. Kelm, M., Wang, X., Druck, G. and McCallum, A. (2006) “On Discriminative and Semi-Supervised Dimensionality Reduction”. In *Advances in Neural Information Processing Systems (NIPS) Workshop on Novel Applications of Dimensionality Reduction*. (Refereed Workshop paper)
- [36] Pal, C., Wang, X. Kelm, M. and McCallum, A. (2005) “Multi-Conditional Learning for Joint Probability Models with Latent Variables”. *NIPS 2005 Workshop: Advances in Structured Learning for Text and Speech Processing*. (Refereed Workshop paper)
- [37] Sutton, C., Pal, C. and McCallum, A. (2005) “Sparse Forward-Backward for Fast Training of Conditional Random Fields”. *NIPS 2005 Workshop: Advances in Structured Learning for Text and Speech Processing*. (Refereed Workshop paper)
- [38] Pal, C. and Jovic, N. (2005) “Interactive Montages of Sprites for Indexing and Summarizing Security Video”. In the *Video Proceedings of IEEE Computer Vision and Pattern Recognition, CVPR 2005*. vol. 2, pp. 1192. (Refereed Demonstration)
- [39] Baudisch, P., Tan, D., Steedly, D., Rudolph, E., Uyttendale, M., Pal, C., and Szeliski, R. “Panoramic Viewfinder: shooting panoramic pictures with the help of a real-time preview”. *UIST 2005 Companion* (Demonstration paper), Seattle, WA, October 2005.

- [40] Pal, C. (2001) “Probabilistic Models and Decision Problems”. Presentation at the *International Symposium for Environmental Software Systems, ISESS 2001*, Banff, Alberta, Canada, May 22-25, 2001. (Invited contribution)

Patents

- [41] Pal, C., Steedly, D., and Szeliski, R. (2008) “Video registration and image sequence stitching”. *United States Patent Number: 7,460,730*.
- [42] Baudisch, P., Pal, C., Rudolph, E., Steedly, D., Szeliski, R., Tan, D., Uyttendaele, M. (2008) “Real-time preview for panoramic images”. *United States Patent Number: 7,424,218*.
- [43] Pal, C., Slaney, M. and Adams, R. (2000) “Sound-based Event Control Using Timbral Analysis”. *United States Patent Number: 6,054,646*.
- [44] Jojic, N. and Pal, C. (2006) “Interactive montages of sprites for indexing and summarizing video”. *United States Patent Application #20060117356*. Appears June 2006, Filed Dec. 2004.