

SAMY BENGIO

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Languages: french and english
Citizenship: canadian

Education

DOCTORATE: PH.D. IN COMPUTER SCIENCE

Université de Montréal, 1989–1993

Subject: *Optimization of a Parametric Learning Rule for Neural Networks.*

MASTER: M.SC. IN COMPUTER SCIENCE

Université de Montréal, 1986–1989

Subject: *Integration of Traditional and Intelligent Tutoring Systems.*

DIPLOMA: B.SC. IN COMPUTER SCIENCE

Université de Montréal, 1983–1986

Professional Experience

GOOGLE INC

2007–

Description: Search Engine and Advertising Company.

Position: Research Scientist in Machine Learning.

Activity: Fundamental and applied research on machine learning algorithms.

Main Research Tracks Ranking algorithms for large scale problems, involving different kinds of documents such as images, videos, speech, etc.

IDIAP RESEARCH INSTITUTE

1999–2007

Description: Swiss research center affiliated to EPFL devoted to multimodal interactions, speech processing, vision processing, and machine learning.

Position: Senior Researcher, Head of the Machine Learning group.

Activity: Fundamental and applied research on machine learning algorithms. Supervision of Ph.D. students and postdoctoral fellows. European and Swiss national research projet proposal and management. Organization of international workshops and conferences. Teaching at the doctoral level. Development of machine learning tools. Collaboration with other IDIAP and EPFL researchers (in speech, vision and multimodal processing).

Main Research Tracks Over the last few years, I have mainly looked at (1) various complex graphical models for speech and multimodal/multi-channel analysis, (2) various text representation and information retrieval approaches, (3) efficient algorithms for large scale databases, (4) various person authentication approaches.

Description: Research center of a Canadian mobile telecommunication company using the GSM standard.

Position: Research Director.

Activity: Direction of a research team focusing on the development and the application of various learning algorithms to exploit many dataware houses regarding the internal processes and client behaviors of a telecommunication company. Problems tackled: fraud detection, churning and traffic prediction.

Description: Canadian academic research center with many industrial partnerships devoted to the economical aspects of the organizations.

Position: Researcher.

Activity: Development of various machine learning and statistical models that make predictions and take decisions on financial markets: portfolio management, asset prediction, portfolio selection. In an other project, development of a machine learning model that simulates an agent on various types of auctions (buy at the best price given known information).

Description: Canadian academic research center on telecommunications.

Position: Postdoctoral Fellow.

Activity: Development and use of an Asynchronous Input/Output Hidden Markov Model (which can also be viewed as a connectionist recurrent mixture of experts) for speech recognition. This model was particularly well suited for non-stationary temporal problems.

Description: Research center of the french national telecommunication company.

Position: Postdoctoral Fellow.

Activity: Time series prediction with Neural Networks. Series were taken from a physical domain (sunspot-related) as well as a telecommunication domain. Various mixture models were proposed.

Description: Canadian academic research center on all aspects of transports.

Position: Research Assistant.

Activity: Use of Genetic Algorithms and Tabu Search for a Combinatorial Optimization Problem: *the Vehicle Routing Problem with Time Windows*.

Computer Science Technical Knowledge

- **Development of several simulators** of machine learning algorithms, including many types of neural networks, support vector machines, [input/output] hidden Markov models, Gaussian mixture models, and other statistical models, genetic algorithms, genetic programming, simulated annealing, tabu search, and expert systems. See for instance the recent <http://www.Torch.ch>.
- Many years experience in system administration on multi-platform environments (Linux, Macintosh, Unix, Windows, etc).
- **Known computer languages:** C, C++, Java, Lisp, Mathematica, Matlab, Objective C, Pascal, Prolog, Splus, Smalltalk.

Doctoral Students

PHD THESIS OBTAINED UNDER JOINT SUPERVISION:

- Françoise Fessant, Université de Rennes, 1995
- Miguel Moreira, EPFL Lausanne, 2001
- Nicolas Gilardi, Université de Lausanne, 2002
- Katrin Weber, EPFL Lausanne, 2003
- Ronan Collobert, Université de Paris, 2004
- Fabien Cardinaux, EPFL Lausanne, 2005
- Silvia Chiappa, EPFL Lausanne, 2006
- David Grangier, EPFL Lausanne, 2008
- Johnny Mariéthoz, Université de Lyon 2, 2006
- Jean-Francois Paiement, EPFL Lausanne, 2008
- Norman Poh, EPFL Lausanne, 2006
- Alexei Pozdnoukhov, EPFL Lausanne, 2006
- Mikaela Keller, EPFL Lausanne, 2006
- Christos Dimitrakakis, EPFL Lausanne, 2006
- Yann Rodriguez, EPFL Lausanne, 2006
- Dong Zhang, EPFL Lausanne, 2006

MEMBER OF OTHER PHD THESIS JURIES:

- Sébastien Marcel, Université de Rennes, 2000
- Pierre-Edouard Sottas, EPFL Lausanne, 2002
- Todd Stephenson, EPFL Lausanne, 2003
- Torsten Butz, EPFL Lausanne, 2003
- Liva Ralaivola, Université de Paris 6, 2003
- Vlad Popovici, EPFL Lausanne, 2004
- Mathieu Ben, Université de Rennes, 2004
- Serghei Kosinov, Université de Genève, 2005
- Jean-Julien Aucouturier, Université de Paris 6, 2006
- Sylvain Ferrandiz, Université de Caen, 2006
- Gianluca Monaci, EPFL Lausanne, 2007
- Ivana Arsic, EPFL Lausanne, 2007
- Marie Szafranski, Université de Technologie de Compiègne, 2008
- Mihai Gurban, EPFL Lausanne, 2008
- Jie Luo, EPFL Lausanne, 2011

MEMBER OF OTHER ACADEMIC JURIES:

- Hervé Glotin, HDR, Université Sud Toulon Var, 2007
- Vincent Lemaire, HDR, Université de Paris Sud, 2008

Teaching Activities

EPFL LAUSANNE

2005-2006

Activity: Course **IC-49**, on *Statistical Machine Learning from Data* given in the *I&C Computer, Communication and Information Sciences Doctoral Program*

- Lecture notes available at <http://lectures.idiap.ch/ic-49>.

IDIAP RESEARCH INSTITUTE

2002-2003

Activity: Advanced lectures on *statistical machine learning*

- Lecture notes available at <http://www.idiap.ch/~bengio/lectures/old>.

UNIVERSITÉ DE MONTRÉAL

1992,1993,1996

Activity: Teaching replacement for M.Sc./Ph.D. courses.

- Artificial Neural Networks.
- Genetic Algorithms.
- Hidden Markov Models.

Activity: Spring School (1996) on Learning Algorithms.

- Introduction to (Input/Output) Hidden Markov Models.

Funding Record

SWISS NATIONAL SCIENCE FOUNDATION PROJECTS:

IM2.{ACP,MI,BMI,MPR} – Interactive Multimodal Information Management.

4 PhD and 2 postdoc, 280kCHF/year for 10 years.

MULTI – Multimodal Interaction and Multimedia Data Mining.

several PhD thesis, 290kCHF/year for 3 years.

KerSpeech – Kernel Methods for Speech and Video Sequence Analysis.

1 PhD, 2 years, in the context of the Indo Swiss Joint Research Programme (ISJRP).

ADASEQ – Ensemble Methods for Sequence Processing.

1 PhD, 40kCHF/year for 4 years.

CARTANN – Cartography by Artificial Neural Networks.

1 PhD thesis finished, 40kCHF/year for 4 years.

Divide and Learn I – Various mixture models proposed.

1 PhD thesis finished, 40kCHF/year for 4 years.

Divide and Learn II – Mixture models for large datasets.

2 PhD, 100kCHF/year for 4 years done.

GLAD – Use of Boolean Methods for Classification.

1 PhD finished, 40kCHF/year for 4 years.

KERNEL – Kernel Methods for Sequence Processing.

1 PhD, 40kCHF/year for 4 years.

SCRIPT – Cursive Handwriting Recognition.

1 PhD thesis finished, 40kCHF/year for 4 years.

EUROPEAN PROJECTS

PASCAL – Pattern Analysis, Statistical Modelling and Computational Learning, 6th Framework Programme, Information Society Technology, Network of Excellence, 6th Framework Programme, Information Society Technology, Network of Excellence, 4 years. Member of the steering committee.

BANCA – Biometric Access Control for Networked and e-Commerce Applications, 5th Framework Programme, Information Society Technology.
2 researchers, 200kCHF/year for 3 years.

EDAM – Environmental data mining: machine Learning algorithms and statistical tools for monitoring and forecasting, INTAS foundation.
1 invited researcher, 40kCHF/year for 2 years.

LAVA – Learning for Adaptable Visual Assistants.
1 postdoc and 2 PhD, 200kCHF/year for 3 years.

COST-275 – Biometric-Based Recognition of People over the Internet.
1 PhD, 40kCHF/year for 3 years.

Innovation, Technology Transfer, Patents

PATENTS

- S. Bengio, F. Clerot, A. Gravey, D. Collobert. Process for the renewal -during communication- of the traffic parameters of an ATM network. France Telecom. United States Patent 6018517. International Patent WO 97/31456. 1997.

TECHNOLOGY TRANSFER

- Release of the popular Support Vector Machine software SVMTorch on the web for academic research (see <http://www.idiap.ch/learning/SVMTorch.html>).
- Release of the complete machine learning library Torch on the web (see <http://www.Torch.ch>).

Other Professional Activities

MEMBER OF THE EDITORIAL BOARD FOR THE JOURNAL OF MACHINE LEARNING RESEARCH since 2009

MEMBER OF THE EDITORIAL BOARD FOR THE MACHINE LEARNING journal since 2010

ASSOCIATE EDITOR FOR THE JOURNAL OF COMPUTATIONAL STATISTICS, 2002-2011

ASSOCIATE EDITOR FOR THE JOURNAL OF SELECTED TOPICS IN SIGNAL PROCESSING, 2009

ORGANIZATION OF CONFERENCES AND WORKSHOPS:

- Chair:
 - NIPS Demonstration Chair (NIPS'2011)
 - NIPS Workshop on Learning to Compare Examples (NIPS'2006)
 - NIPS Workshop on Multimodal Signal Processing (NIPS'2004)
 - Workshop on Multimodal Interaction and Related Machine Learning Algorithms (MLMI'2004, 2005, 2006)
- Programme Committee Chair - Area Chair:
 - European Conference on Machine Learning (ECML-PKDD'2010)
 - IEEE Workshop on Neural Networks for Signal Processing (NNSP'2002)

- International Conference on Machine Learning (ICML’2009)
- International Joint Conference on Artificial Intelligence (IJCAI’2011), Senior Program Committee
- International Joint Conference on Artificial Intelligence (IJCAI’2005), Poster Track
- Neural Information Processing Systems (NIPS’2003, 2006)
- Reviewer - Programme Committee Member - International Conferences:
 - European Symposium on Artificial Neural Networks (ESANN)
 - Extraction et Gestion des Connaissances (EGC)
 - IEEE Conference on Face and Gesture Recognition (FG)
 - IEEE Conference on Machine Learning for Signal Processing, (NNSP, MLSP)
 - IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)
 - IEEE International Conference on Robotics and Automation (ICRA)
 - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
 - International Conference on Artificial Intelligence and Statistics (AISTATS)
 - International Conference on Audio and Video Based Biometric Person Authentication (AVBPA)
 - International Conference on Biometrics (ICB)
 - International Conference on Computer Vision and Pattern Recognition (CVPR)
 - International Conference on Machine Learning (ICML)
 - International Conference on Pattern Recognition (ICPR)
 - International Conference on Biometrics Authentication (ICBA)
 - International Joint Conference on Neural Networks (IJCNN)
 - International Workshop on Multiple Classifier Systems (MCS)
 - Neural Information Processing Systems (NIPS)
- Reviewer - Programme Committee Member - International Workshops:
 - AAAI Spring Symposium on Human Behavior Modeling (2009)
 - ACM Symposium on Applied Computing - Special Track on Applied Biometrics (2010)
 - CVPR Workshop on Multi-biometrics (CVPR’2006)
 - CVPR Workshop on Beyond Patches (CVPR’2006)
 - International Workshop on Biometric Recognition Systems (IWBRIS’2005)
 - Morpho Challenge Workshop (2005, 2007)
 - SIGIR 2007 Workshop on Searching Spontaneous Conversational Speech
 - Workshop on Multimodal Interaction and Related Machine Learning Algorithms (MLMI’2007, 2008, 2009)
 - Multimodal User Authentication Workshop (MMUA’2006)
 - NIPS Workshop on Machine Learning for Implicit Feedback and User Modeling (NIPS’2005)
 - Spatial Interpolation Comparison (SIC’2004)
- Member of Advisory Boards: MLMI
- Session Chair: Eurospeech’2003, NNSP’2002, ICASSP’2006

REVIEWER FOR MANY JOURNALS:

- Computer Speech and Language
- EURASIP Journal of Applied Signal Processing
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Evolutionary Computation
- IEEE Transactions on Neural Networks
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Speech and Audio Processing
- IEEE Transactions on Systems, Man and Cybernetics - Part B
- Information Fusion

- International Journal of Neural Systems
- International Journal of Pattern Recognition and Artificial Intelligence
- Journal of Machine Learning Research
- Journal of Pattern Recognition Letters
- Machine Learning Journal
- Neural Computing Surveys
- Neural Computation
- Neural Networks
- Neurocomputing Journal
- Pattern Recognition
- Pattern Recognition Letters
- Signal Processing
- Speech Communication

Publication List

ARTICLES IN PEER REVIEWED JOURNALS

- [1] C. Dimitrakakis and S. Bengio. Phoneme and sentence-level ensembles for speech recognition. *EURASIP Journal on Audio, Speech, and Music Processing*, 2011, 2011.
- [2] J. Weston, S. Bengio, and P. Hamel. Multi-tasking with joint semantic spaces for large-scale music annotation and retrieval. *Journal of New Music Research*, to be published:1–12, 2011.
- [3] G. Chechik, V. Sharma, U. Shalit, and S. Bengio. Large scale online learning of image similarity through ranking. *Journal of Machine Learning Research, JMLR*, 11:1109–1135, 2010.
- [4] D. Erhan, Y. Bengio, A. Courville, P.-A. Manzagol, P. Vincent, and S. Bengio. Why does unsupervised pre-training help deep learning? *Journal of Machine Learning Research, JMLR*, 11:625–660, 2010.
- [5] R. F. Lyon, M. Rehn, S. Bengio, T. C. Walters, and G. Chechik. Sound retrieval and ranking using sparse auditory representations. *Neural Computation*, 22(9):2390–2416, 2010.
- [6] J. Weston, S. Bengio, and N. Usunier. Large scale image annotation: Learning to rank with joint word-image embeddings. *Machine Learning Journal*, 81(1):21–35, 2010.
- [7] J. Keshet, D. Grangier, and S. Bengio. Discriminative keyword spotting. *Speech Communication*, 51:317–329, 2009.
- [8] J.-F. Paiement, S. Bengio, and D. Eck. Probabilistic models for melodic prediction. *Artificial Intelligence Journal*, 173(14):1266–1274, 2009.
- [9] J.-F. Paiement, Y. Grandvalet, and S. Bengio. Predictive models for music. *Connection Science*, 21(2 & 3):253–272, 2009.
- [10] D. Grangier and S. Bengio. A discriminative kernel-based model to rank images from text queries. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 30(8):1371–1384, 2008.
- [11] H. Paugam-Moisy, R. Martinez, and S. Bengio. Delay learning and polychronization for reservoir computing. *Neurocomputing*, 71(7–9):1143–1158, 2008.
- [12] J. Mariéthoz and S. Bengio. A kernel trick for sequences applied to text-independent speaker verification systems. *Pattern Recognition*, 40:2315–2324, 2007.
- [13] N. Poh, A. Martin, and S. Bengio. Performance generalization in biometric authentication using joint user-specific and sample bootstraps. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 29(3):492–498, 2007.

- [14] S. Sonnenburg, M. L. Braun, C. Soon Ong, S. Bengio, L. Bottou, G. Holmes, Y. LeCun, K.-R. Müller, F. Pereira, C. E. Rasmussen, G. Rätsch, B. Schölkopf, A. Smola, P. Vincent, J. Weston, and R. Williamson. The need for open source software in machine learning. *Journal of Machine Learning Research, JMLR*, 8:2443–2466, 2007.
- [15] F. Cardinaux, C. Sanderson, and S. Bengio. User authentication via adapted statistical models of face images. *IEEE Transactions on Signal Processing*, 54(1):361–373, 2006.
- [16] N. Poh and S. Bengio. Database, protocol and tools for evaluating score-level fusion algorithms in biometric authentication. *Pattern Recognition*, 39(2):223–233, 2006.
- [17] A. Pozdnoukhov and S. Bengio. Invariances in kernel methods: From samples to objects. *Pattern Recognition Letters*, 27(10):1087–1097, 2006.
- [18] Y. Rodriguez, F. Cardinaux, S. Bengio, and J. Mariéthoz. Measuring the performance of face localization systems. *Image and Vision Computing*, 24(8):882–893, 2006.
- [19] C. Sanderson, S. Bengio, and Y. Gao. On transforming statistical models for non-frontal face verification. *Pattern Recognition*, 39(2):288–302, 2006.
- [20] D. Zhang, D. Gatica-Perez, S. Bengio, and I. McCowan. Modeling individual and group actions in meetings with layered HMMs. *IEEE Transactions on Multimedia*, 8(3):509–520, 2006.
- [21] C. Dimitrakakis and S. Bengio. Online adaptive policies for ensemble classifiers. *Neurocomputing*, 64:211–221, 2005.
- [22] J. Mariéthoz and S. Bengio. A unified framework for score normalization techniques applied to text independent speaker verification. *IEEE Signal Processing Letters*, 12(7):532–535, 2005.
- [23] I. McCowan, D. Gatica-Perez, S. Bengio, G. Lathoud, M. Barnard, and D. Zhang. Automatic analysis of multimodal group actions in meetings. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 27(3):305–317, 2005.
- [24] N. Poh and S. Bengio. How do correlation and variance of base classifiers affect fusion in biometric authentication tasks? *IEEE Transactions on Signal Processing*, 53(11):4384–4396, 2005.
- [25] V. Popovici, S. Bengio, and J.-P. Thiran. Kernel matching pursuit for large datasets. *Pattern Recognition*, 38(12):2385–2390, 2005.
- [26] S. Bengio. Multimodal speech processing using asynchronous hidden markov models. *Information Fusion*, 5(2):81–89, 2004.
- [27] F. de Wet, K. Weber, L. Boves, B. Cranen, S. Bengio, and H. Bourlard. Evaluation of formant-like features for automatic speech recognition. *Journal of the Acoustical Society of America (JASA)*, 116(3):1781–1792, 2004.
- [28] A. Vinciarelli, S. Bengio, and H. Bunke. Offline recognition of unconstrained handwritten texts using HMMs and statistical language models. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 26(6):709–720, 2004.
- [29] R. Collobert, Y. Bengio, and S. Bengio. Scaling large learning problems with hard parallel mixtures. *International Journal on Pattern Recognition and Artificial Intelligence (IJPRAI)*, 17(3):349–365, 2003.
- [30] K. Weber, S. Ikbali, S. Bengio, and H. Bourlard. Robust speech recognition and feature extraction using HMM2. *Computer, Speech and Language*, 17(2-3):195–211, 2003.
- [31] S. Bengio, C. Marcel, S. Marcel, and J. Mariéthoz. Confidence measures for multimodal identity verification. *Information Fusion*, 3(4):267–276, 2002.
- [32] R. Collobert, S. Bengio, and Y. Bengio. A parallel mixture of SVMs for very large scale problems. *Neural Computation*, 14(5):1105–1114, 2002.
- [33] A. Vinciarelli and S. Bengio. Writer adaptation techniques in HMM based off-line cursive script recognition. *Pattern Recognition Letters*, 23(8):905–916, 2002.
- [34] R. Collobert and S. Bengio. SVM-Torch: Support vector machines for large-scale regression problems. *Journal of Machine Learning Research, JMLR*, 1:143–160, 2001.
- [35] S. Bengio and Y. Bengio. Taking on the curse of dimensionality in joint distributions using neural networks. *IEEE Transaction on Neural Networks, special issue on data mining and knowledge discovery*, 11(3):550–557, 2000.

- [36] N. Gilardi and S. Bengio. Local machine learning models for spatial data analysis. *Journal of Geographic Information and Decision Analysis*, 4(1):11–28, 2000.
- [37] S. Bengio, Y. Bengio, J. Robert, and G. Bélanger. Stochastic learning of strategic equilibria for auctions. *Neural Computation*, 11(5):1199–1209, 1999.
- [38] S. Bengio, F. Fessant, and D. Collobert. Use of modular architectures for time series prediction. *Neural Processing Letters*, 3(2):101–106, 1996.
- [39] F. Fessant, S. Bengio, and D. Collobert. On the prediction of solar activity using different neural network models. *Annales Geophysicae*, 14:20–26, 1996.
- [40] J.-Y. Potvin and S. Bengio. The vehicle routing problem with time windows - part II: Genetic search. *INFORMS Journal on Computing*, 8(2):165–172, 1996.
- [41] S. Bengio, Y. Bengio, and J. Cloutier. On the search for new learning rules for ANNs. *Neural Processing Letters*, 2(4):26–30, 1995.
- [42] S. Bengio, G. Brassard, Y. Desmedt, C. Goutier, and J.-J. Quisquater. Secure implementation of identification systems. *Journal of Cryptology*, 4(3):175–183, 1991.

ARTICLES IN PEER REVIEWED CONFERENCES

- [43] J. Weston, S. Bengio, and N. Usunier. Wsabie: Scaling up to large vocabulary image annotation. In *Proceedings of the International Joint Conference on Artificial Intelligence, IJCAI*, 2011.
- [44] S. Bengio, J. Weston, and D. Grangier. Label embedding trees for large multi-class tasks. In *Advances in Neural Information Processing Systems, NIPS*, 2010.
- [45] J. Weston, S. Bengio, and N. Usunier. Large scale image annotation: Learning to rank with joint word-image embeddings. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, ECML-PKDD*, 2010. Best Paper Award in Machine Learning.
- [46] S. Bengio, F. Pereira, Y. Singer, and D. Strelow. Group sparse coding. In *Advances in Neural Information Processing Systems, NIPS*. MIT Press, 2009.
- [47] G. Chechik, V. Sharma, U. Shalit, and S. Bengio. Large-scale online learning of image similarity through ranking: Extended abstract. In *4th Iberian Conference on Pattern Recognition and Image Analysis IbPRIA*, 2009.
- [48] G. Chechik, V. Sharma, U. Shalit, and S. Bengio. An online algorithm for large scale image similarity learning. In *Advances in Neural Information Processing Systems, NIPS*. MIT Press, 2009.
- [49] D. Erhan, P.-A. Manzagol, Y. Bengio, S. Bengio, and P. Vincent. The difficulty of training deep architectures and the effect of unsupervised pre-training. In D. van Dyk and M. Wellings, editors, *Proceedings of The Twelfth International Conference on Artificial Intelligence and Statistics, AISTATS*, volume 5 of *JMLR Workshop and Conference Proceedings*, pages 153–160, 2009.
- [50] M. Rehn, R. F. Lyon, S. Bengio, T. C. Walters, and G. Chechik. Sound ranking using auditory sparse-code representations. In *ICML 2009 Workshop on Sparse Method for Music Audio*, 2009.
- [51] G. Chechik, E. Ie, M. Rehn, S. Bengio, and D. Lyon. Large-scale content-based audio retrieval from text queries. In *ACM International Conference on Multimedia Information Retrieval, MIR*, 2008.
- [52] J.-F. Paiement, Y. Grandvalet, S. Bengio, and D. Eck. A distance model for rhythms. In *International Conference on Machine Learning, ICML*, 2008.
- [53] S. Bengio and J. Mariéthoz. Biometric person authentication is a multiple classifier problem. In M. Haindl, J. Kittler, and F. Roli, editors, *7th International Workshop on Multiple Classifier Systems, MCS, Lecture Notes in Computer Science*, volume LNCS 4472. Springer-Verlag, 2007.
- [54] D. Grangier and S. Bengio. Learning the inter-frame distance for discriminative template-based keyword detection. In *Proceedings of the 10th European Conference on Speech Communication and Technology, Eurospeech-Interspeech*, 2007.

- [55] J. Keshet, D. Grangier, and S. Bengio. Discriminative keyword spotting. In *ISCA Research Workshop on Non Linear Speech Processing, NOLISP*, 2007.
- [56] J.-F. Paiement, Y. Grandvalet, S. Bengio, and D. Eck. A generative model for rhythms. In *NIPS Workshop on Brain, Music and Cognition*, 2007.
- [57] H. Paugam-Moisy, R. Martinez, and S. Bengio. A supervised learning approach based on STDP and polychronization in spiking neuron networks. In *European Symposium on Artificial Neural Networks, ESANN*, 2007.
- [58] N. Poh and S. Bengio. Estimating the confidence interval of expected performance curve in biometric authentication using joint bootstrap. In *IEEE International Conference on Acoustic, Speech, and Signal Processing, ICASSP*, 2007.
- [59] D. Zhang and S. Bengio. Exploring contextual information in a layered framework for group action recognition. In *IEEE International Conference on Multimedia & Expo, ICME*, 2007.
- [60] O. Glickman, I. Dagan, M. Keller, S. Bengio, and W. Daelemans. Investigating lexical substitution scoring for subtitle generation. In *Tenth Conference on Computational Natural Language Learning, CONLL*, 2006.
- [61] D. Grangier and S. Bengio. A neural network to retrieve images from text queries. In *Proceedings of the 16th International Conference on Artificial Neural Networks: Biological Inspirations, ICANN, Lecture Notes in Computer Science*, volume LNCS 4132. Springer-Verlag, 2006.
- [62] D. Grangier, F. Monay, and S. Bengio. A discriminative approach for the retrieval of images from text queries. In *European Conference on Machine Learning, ECML, Lecture Notes in Computer Science*, volume LNCS 4212. Springer-Verlag, 2006.
- [63] D. Grangier, F. Monay, and S. Bengio. Learning to retrieve images from text queries with a discriminative model. In *International Workshop on Adaptive Multimedia Retrieval, AMR*, 2006.
- [64] J. Keshet, S. Shalev-Shwartz, S. Bengio, Y. Singer, and D. Chazan. Discriminative kernel-based phoneme sequence recognition. In *Proceedings of the International Conference on Spoken Language Processing, Interspeech-ICSLP*, 2006.
- [65] H. Ketabdar, J. Vepa, S. Bengio, and H. Bourlard. Posterior based keyword spotting with a priori thresholds. In *Proceedings of the International Conference on Spoken Language Processing, Interspeech-ICSLP*, 2006.
- [66] H. Ketabdar, J. Vepa, S. Bengio, and H. Bourlard. Using more informative posterior probabilities for speech recognition. In *IEEE International Conference on Acoustic, Speech, and Signal Processing, ICASSP*, 2006.
- [67] M. Liwicki, A. Schlappbach, H. Bunke, S. Bengio, J. Mariéthoz, and J. Richiardi. Writer identification for smart meeting room systems. In H. Bunke and A. L. Spitz, editors, *Document Analysis Systems VII: 7th International Workshop, DAS, Lecture Notes in Computer Science*, volume LNCS 3872, pages 186–195. Springer-Verlag, 2006.
- [68] J. Mariéthoz and S. Bengio. A max kernel for text-independent speaker verification systems. In *Second Workshop on Multimodal User Authentication, MMUA*, 2006.
- [69] J.-F. Paiement, D. Eck, and S. Bengio. Probabilistic melodic harmonization. In L. Lamontagne and M. Marchand, editors, *Advances in Artificial Intelligence: 19th Conference of the Canadian Society for Computational Studies of Intelligence, Canadian AI, Lecture Notes in Computer Science*, volume LNCS 4013, pages 218–229. Springer-Verlag, 2006.
- [70] N. Poh and S. Bengio. Chimeric users to construct fusion classifiers in biometric authentication tasks: An investigation. In *IEEE International Conference on Acoustic, Speech, and Signal Processing, ICASSP*, 2006.
- [71] N. Poh, S. Bengio, and A. Ross. Revisiting Doddington’s zoo: A systematic method to assess user-dependent variabilities. In *Second Workshop on Multimodal User Authentication, MMUA*, 2006.
- [72] A. Pozdnoukhov and S. Bengio. Graph-based invariant manifolds for invariant pattern recognition with kernel methods. In *International Conference on Pattern Recognition, ICPR*, 2006.
- [73] A. Pozdnoukhov and S. Bengio. Semi-supervised kernel methods for regression estimation. In *IEEE International Conference on Acoustic, Speech, and Signal Processing, ICASSP*, 2006.

- [74] D. Zhang, D. Gatica-Perez, D. Roy, and S. Bengio. Modeling interactions from email communication. In *IEEE International Conference on Multimedia & Expo, ICME*, 2006.
- [75] S. Bengio and H. Boullard. Multi channel sequence processing. In J. Winkler, M. Niranjana, and N. Lawrence, editors, *Deterministic and Statistical Methods in Machine Learning: First International Workshop, Lecture Notes in Artificial Intelligence*, volume LNAI 3635, pages 22–36. Springer-Verlag, 2005.
- [76] S. Bengio, J. Mariéthoz, and M. Keller. The expected performance curve. In *International Conference on Machine Learning, ICML, Workshop on ROC Analysis in Machine Learning*, 2005.
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