

PIERRE VANDEKERKHOVE

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Visiting Researcher

Georgia Institute of Technology
School of Aerospace Engineering
270 Ferst Drive
Atlanta GA 30332-0150

Employment authorization card : valid up to 09/25/2016

EDUCATION

University Paris-Est, 2007

Higher Degree of Research (HDR)

HDR dissertation : *Contribution to the study of missing data models and statistical learning about markovian models.*

Reviewers : P. Bertail, B. G. Lindsay, E. Moulines

Jury : J.-F. Delmas, P. Del Moral, E. Gassiat, M. Hoffmann, D. Lamberton

University Montpellier 2, 1992-1997

Ph.D. in Biostatistics, 1997, advisor : X. Milhaud

Regents Fellowship, 1992-1997

Doctoral dissertation : *Order identification for stable ARMA processes and contribution to the study of Hidden Markov chains.*

University Montpellier 2, 1989-1991

Master's degree in Applied Mathematics, specialized in Biostatistics

University of Besançon, 1987-1989

Bachelor's degree in Pure Mathematics

POSITIONS HELD

Consultant at Predictix (nov. and dec. 2014) : Big Data analyst. Sales prediction improvement based on Factorization machine learning

Teaching position at GeorgiaTech (Time Series Analysis, Spring 2013)

CNRS Research Fellow, 3 years during 2012-2014 at GeorgiaTech

Maitre de conférences of Statistics, University Paris-Est (fall 1998 -present)

Post-doc of TMR (Training and Mobility Researcher) Network, University of Pavia (Italy, fall 1997-summer 1998)

Lecturer, University Paul Sabatier (UPS), Toulouse (fall 1996-summer 1998)

Teaching assistant with research fellowship, UPS (fall 1994-summer 1996)

Teaching assistant with research fellowship, University Montpellier 2 (fall 1993-summer 1994)

PUBLISHED PAPERS

Referenced by [P.] in research statement

1. Bakry, D., Milhaud, X. and Vandekerkhove, P. (1997). Statistics of Hidden Markov chains with finite state space. The nonstationary case. *C. R. Acad. Sci. Paris, Série. I*, 203–206.
2. Vandekerkhove, P. (1998). Simulated annealing with a sequential estimator of the energy. *C. R. Acad. Sci. Paris, Série I*, 1003–1006.
3. Chauveau, D. and Vandekerkhove, P. (1999). Un algorithme de Hastings-Metropolis avec apprentissage séquentiel. *C. R. Acad. Sci. Paris, Série I*, 173–176.
4. Giudici, P., Rydén, T. and Vandekerkhove, P. (2000). Likelihood-Ratio Tests for Hidden Markov Models. *Biometrics*, **56**, 742-747.
5. Chauveau, D. and Vandekerkhove, P. (2001). Algorithmes de Hastings Metropolis en interaction. *C. R. Acad. Sci. Paris, Série I*, 881–884.
6. Chauveau, D. and Vandekerkhove, P. (2002). Improving convergence of the Hastings-Metropolis Algorithm with a learning proposal. *Scand. J. Statist*, **28**, 13–29.
7. Bordes, L. and Vandekerkhove, P. (2005). Statistical inference for Partially Hidden Markov Models. *Communications in Statistics*, **34**, 1081–1104.
8. Vandekerkhove, P. (2005). Consistent and asymptotically normal estimates for hidden Markov mixtures of Markov models. *Bernoulli*, **11**, 103–129.
9. Bordes, L., Mottelet, S. and Vandekerkhove, P. (2006). Semiparametric estimation of a two component mixture model. *Ann. Statist.*, **34**, 1204–1232.

10. Bordes, L., Delmas, C. and P. Vandekerkhove. (2006). Semiparametric estimation of a two-component mixture model where a component is known. *Scand. J. Statist.*, **33**, 733–752.
11. Chauveau, D. and Vandekerkhove, P. (2007). A Monte Carlo estimation of the entropy for Markov chains. *Methodology and Computing in Applied Probability*, **9**, 133–149.
12. Bordes, L., Chauveau, D. and Vandekerkhove, P. (2007). A stochastic EM algorithm for a semiparametric mixture model. *Computational Statistics and Data Analysis*, **51**, 5429–5443.
13. Bordes, L. and Vandekerkhove, P. (2010). Semiparametric two-component mixture model when a component is known : an asymptotically normal estimator. *Math. Meth. Statist.*, **19**, 22–41.
14. Tarrès, P. and Vandekerkhove, P. (2012). On ergodic two-armed bandits. *Ann. Appl. Probab.*, **22**, 457–476.
15. Fort, G., Moulines, E., Priouret, P., Vandekerkhove, P. (2012). A simple variance inequality for U-statistics of a Markov chain with applications. *Statist. Probab. Letters*. **82**, 1193–1201.
16. Vandekerkhove, P. (2012). Estimation of a semiparametric mixture of regression model. *J. Nonparam. Statist.* , **25**, 181-208.
17. Chauveau, D. and Vandekerkhove, P. (2013). Smoothness of Metropolis-Hastings algorithm and application to entropy estimation. *ESAIM P&S*, **17**, 419-431.
18. Bordes, L., Kojadinovic, I. and Vandekerkhove, P. (2013). Semiparametric estimation of a mixture of two linear regressions where one component is known. *Electronic Journal of Statistics*, p. 2603-2644.
19. Fort, G., Moulines, E., Priouret, P., Vandekerkhove, P. (2014). A central limit Theorem for adaptive and interacting Markov chains. *Bernoulli*, **20**, 457-485 .
20. Butucea, C. and Vandekerkhove, P. (2014). Estimation in semiparametric mixtures of symmetric distributions. *Scand. J. Statist.*, **41**, 227-239.
21. Chauveau, D. and Vandekerkhove, P. (2014). Simulation Based Nearest Neighbor Entropy Estimation for (Adaptive) MCMC Evaluation, *JSM Proceedings, Statistical Computing Section. Alexandria, VA : American Statistical Association*, 2816-2827.
22. P. Vandekerkhove, P., Padbidri, J.M. and McDowell, D.L. (2014). Integrated Cumulative Error (ICE) distance for mixture model selection : Application to extreme values in metal fatigue problems. *Electronic Journal of Statistics*, **8**, p. 3141-3175.
23. Butucea, C., Nguyepe-Tzoumpe, R. and Vandekerkhove, P. (2015). Semiparametric prediction for topographical mixture models. To appear in *Bernoulli*.

SUBMITTED PAPER

Referenced by [S·] in research statement

1. Chauveau, D. and Vandekerkhove, P. (2014). The Nearest Neighbor entropy estimate : an adequate tool for high dimensional adaptive MCMC evaluation. *The R package linked with this paper is about to be released.*

WORKS IN PROGRESS

Referenced by [W·] in research statement

1. Pommeret, D. and Vandekerkhove, P. (2014) False discovery parametric modeling test.
2. Holzmann, H., Werner, H., Vandekerkhove, P. (2014). Semiparametric topographical Mixture model with one known component.

UNPUBLISHED PAPERS

1. Vandekerkhove, P. (1998). A sequential Metropolis-Hastings algorithm. *Università di Pavia, Quaderni di Dipartimento # 80.*
2. Vandekerkhove, P. (1998). A new simulated annealing method. *Università di Pavia, Quaderni di Dipartimento # 79.*

WORKSHOP/CONFERENCE ORGANIZATION

1. SESO 2015 : International Thematic Week “Smart Energy and Stochastic Optimization” June 22 to 26, 2015.

<http://cermics.enpc.fr/delara/SES02015/SES02015>

2. SESO 2014 : International Thematic Week “Smart Energy and Stochastic Optimization” June 23 to 27, 2014.

<http://cermics.enpc.fr/delara/SES02014/SES02014>

3. Meeting Bézout GeorgiaTech, university Paris-Est, June 2013.

<http://umr-math.univ-mlv.fr/evenements/journees/journee-bezout-gatech-2013>

4. Statistics and Modelling for Complex Data, university Paris-Est, 22-24, June 2011

<http://congres-math.univ-mlv.fr/SMDC2011>

5. Parametric and nonparametric mixture models and their applications , university of Pau, 23-24, June 2008

<http://lma-umr5142.univ-pau.fr/live/Seminaires/Conf-congr-old>

6. Workshop on missing data models, Marne-la-Vallée university, 13-14, January 2005

<http://congres-math.univ-mlv.fr/a14fe87d/index.html>

SEMINARS

1. Department of Statistics, Penn State University, November 6th 2014. Invited by David Hunter (head of the department).
2. ISyE department, GeorgiaTech, September 13th 2012.
3. Department of Biostatistics, Emory University, September 14th 2012.

INVITED TALKS

1. XXVII-th Journées de Statistique, Laval (Québec), May 1996. *Consistency of the ODQ order determination criterion for stable ARMA processes.*
2. Franco-Tunisian congress, Toulouse, May 1996. *Consistency of the ODQ order determination criterion for stable ARMA processes.*
3. SMAI, Toulouse, september 1996. *Statistics of hidden Markov chains with finite state space. The nonstationnary case.*
4. XXVIII-th Journées de Statistique, Carcassonne, May 1997. *Parameters estimation of an hidden Markov chain using a simulated annealing approach.*
5. Spatial Computational Statistics Workshop, Aussois, January 1998. *On hidden Multivariate Markov Models identification.*
6. XXXI-th Journées de Statistique, Grenoble, May 1999. *On a sequentially learning Hastings-Metropolis algorithm.*
7. TMR Second on Spatial and Computational Statistics, Crete, June 1999. *A Hastings-Metropolis algorithm with learning proposal.*

8. XXXII-th Journées de Statistique, Fès (Marocco), May 2000. *Criterion for the comparison Hastings-Metropolis algorithms based on the Entropy*
9. XXXV-th Journées de Statistique, Lyon, June 2003, *Statistical inference for partially hidden Markov processes.*
10. XXXVI-th Journées de Statistique, Montpellier, May 2004, *Semiparametric estimation of a two component mixture model.*
11. XXXVII-th Journées de Statistique, Pau, June 2005, *Semiparametric estimation of a two component mixture model where a component is known.*
12. International workshop on missing data models, Pau, June 2008, *Semiparametric two-component mixture model when a component is known : an asymptotically normal estimator.*
13. Congress of the SMAI , Guidel, 23-27, May 2011, *Estimation of a semiparametric contaminated regression model.*

COLLABORATIONS IN FRANCE

- Dominique Bakry (UPS, Toulouse) : hidden Markov models (HMMs).
- Laurent Bordes (university of Pau) : mixture and HMMs.
- Cristina Butucea (Paris-Est university) : mixture and convolution models.
- Didier Chauveau (university of Orléans) : MCMC and EM algorithms.
- Céline Delmas (INRA) : mixture models and microarray analysis.
- Gersende Fort (CNRS-Telecom ParisTech) : adaptive MCMC algorithms.
- Xavier Milhaud (UPS, Toulouse) : model selection, HMMs.
- Eric Moulines (Telecom ParisTech) : adaptive MCMC algorithms.
- Stéphane Mottelet (university of technology of Compiègne) : inverse problems.
- Nadia Oudjane (EDF-Clamart) : Monte Carlo methods.
- Pierre Priouret (University Paris 6) : adaptive MCMC algorithms.
- Denys Pommeret (University Luminy-Marseille) : Test.

INTERNATIONAL COLLABORATIONS

- Paolo Giudici (university of Pavia, Italy) : graphical models and HMM.
- David Hunter (PennState university, USA) : semiparametric mixture models.
- Tobias Rydén (university of Lund, Sweden) : graphical models and HMM.
- Pierre Tarrès (university of Oxford, UK) : two armed bandit algorithm.
- David McDowell (GeorgiaTech university, USA) : extreme value and microstructure.
- Jagan Padbiri (GeorgiaTech university, USA) : extreme value and microstructure.
- Rodrigue Nguyepe Zumpe (GeorgiaTech university, USA) : mixture of regressions.
- Hajo Holzmann (Marburg University, Germany) : mixture of regression.

- Yufeng Tu (Trident University, USA) : flight delays modeling.

VISITING POSITIONS

- Atlanta, USA : Materials Science and Engineering. Invited by David McDowell (2012).
- Oxford, UK : Mathematical institute university of Oxford. Invited by Pierre Tarrès (2 weeks ; January, 2006).
- Stanford, US : department of Statistics, Stanford university. Invited by Susan Holmes (2 weeks ; october, 2005).
- Cambridge, UK : department of signal, Cambridge university. Invited by Arnaud Doucet and Christophe Andrieu (2 weeks ; september, 1999).
- Lund, Sweden : center of Mathematical Science, university of Lund. Invited by Tobias Rydén (3 weeks ; January, 1998).
- Pavia, Italy : department of Economy of the Pavia university. Post-doc (1 year ; 1997-98).

FUNDED RESEARCH : ANR PROGRAM

Program ANR BigMC (Issues in large scale Monte Carlo), Jan 2009 to Dec 2012.

Fund amount : 180 000 euros.

<http://perso.telecom-paristech.fr/~gfort/BigMC/ProgramBigMC.html>

Partners : Telecom ParisTech, University Paris Dauphine, École des Ponts ParisTech

Scientific program in 4 tasks :

Task n°1 (coordinator R. Douc) : study of new Population Monte Carlo methods in high dimension.

Task n°2 (coordinator G. Fort) : proposition and study of Markov chain Monte Carlo strategies in high dimensional statistical problems.

Task n°3 (coordinator C. P. Robert) : simulation problem from approximated target distributions.

Task n°4 (coordinator B. Jourdain) : applications to diffusions and molecular dynamics simulation problems.

One month visiting position for Prof. Y. Atchadé, university of Michigan, funded by the PRES (Pôle d'Enseignement Et de Recherche) Paris-Est.

MASTERS AND PH. D. STUDENTS

1. Vincent Dortet Bernadet, title of the Doctoral dissertation : *Contribution to the study of statistical models with latent variables* , co-advisoring with X. Milhaud, september 2001.
2. Audrey Leeman, *Convergence of the Hastings-Metropolis algorithm. Sensitivity with respect to the instrumental distribution*, June 2002.
3. Fatiha Benakli, *Central limit theorem for α -mixing random variables*, June 2003.
4. Thimothée Mbogtjama, *Convergence of the Robbins-Monro algorithm*, June 2005.
5. Marieme Ba, *Mixture models and EM algorithm*, June 2005.
6. Cécilia Lavannant, *Importance Sampling variance reduction using a (weighted) nonparametric estimator of the target density*, June 2006.
7. Diouf Kora Sally, *Particle filters*. Chapter 7 in the book by O. Cappé, E. Moulines and T. Rydén, June 2008.

REVIEWS WRITTEN

Article(s) for journals : *Annals of Statistics*; *Bernoulli*; *Comptes Rendus de l'académie des Sciences*; *ESAIM P&S*; *Journal of the Royal Statistical Society, Series B*; *J. Statist. Planning and Inference*; *Maghreb Math. Rev.*; *Scand. J. Statist.*; *Statistica Sinica*; *Statistics*; *Stoch. Process. Appl.*

UNDERGRADUATE/GRADUATE/MASTER COURSES TAUGHT

Language programming : Excel, Tableau, R, SAS, Scilab, S+, etc.

(**UG** = undergraduate, **G**=graduate, **M**=Master)

Georgia Institute of Technology (ISyE) :

Times Serie Analysis, spring semester, **G**, 2013

Paris-Est Marne-la-Vallée university (192 hours/year) :

Stochastic Processes, 24 hours, **M**, 2006–2009

Stochastic Models and Applications, 18 hours, **M**, 2007–2009

Integration and Measure Theory, 36 hours, **G**, 2011

Mathematical Statistics, 18 hours, **M**, 2002–2009

Applied Statistics and Data Mining (with SAS), 40 hours, **M**, 1999–2005

Probability, 45 hours, **G**, 2000–2006

Probability, 36 hours, **UG**, 2008–2011

Calculus, 60 hours, **UG**, 2003–2009

Linear Algebra, 36 hours, **UG**, 2006–2009

Analysis for physicists, 36 hours, **UG**, 2002–2004

Differential Calculus, 36 hours, **UG**, 2003–2005

École des Ponts ParisTech (school of engineering) :

Introduction to Statistics (with Scilab), 28 hours, **M**, 2002–2006

École Supérieure d'Ingénierie Électronique et Électrotechnique (school of engineering) :

Analysis, 2×30 hours, **UG** , 2007–2009

Analysis, 45 hours, **G**, 2008–2009

HONORS AND ADMINISTRATION

CNRS Research Fellow, 2 years (Atlanta, GeorgiaTech)

Paris-Est Research Fellow, 6 months during 2010-2011

CNRS Research Fellow, 6 months during 2009-2010 (Telecom ParisTech)

CNRS Research Fellow, 6 months during 2004-2005 (Stanford)

Prime of Scientific Excellence (PSE), 2006-10. Applicant for the PSE in 2011

Member of selection committee for the University of Technology of Compiègne, 2011

Member of selection committee for the university of Orléans, 2009

Member of selection committee for the University of Technology of Compiègne, 2005-07

Vice president of selection committee for the university of Marne-la-Vallée, 2002-06

Official of the Library of Mathematics, 2002-2006

Elected member of the Marne-la-Vallée/Créteil council of departement, 2005-08