Magali Champion

Assistant professor in Statistics

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Born August 11, 1988 (France)

Education

2014 **Ph.D. in Applied Mathematics**, Université Toulouse III, France.
- Title: Contributions to gene regulatory networks modeling and inference
- Advisors: Sébastien Gadat, Christine Cierco-Ayrolles and Matthieu Vignes

2011 **M.Sc. in Applied Mathematics**, Université Toulouse III, France.

2009 **B.Sc. in Pure Mathematics**, Université Toulouse III, France.

2006 **Baccalauréat (High School diploma)**, Lycée Théophile Gautier, Tarbes, France.

Experience

From 01/22 to 07/22 **Guest researcher**, Seminar for Statistics, ETH Zürich, Switzerland.

Since 09/18 **Assistant professor in Statistics**, Laboratoire MAP5, IUT de Paris - Rives de Seine, Université Paris Cité, France.

2016-2018 **Postdoctoral researcher**, Laboratoire MAP5, Université Paris Descartes, France.

2015-2016 **Postdoctoral researcher**, Stanford Center of Biomedical Informatics Research, Stanford University, USA.

2014-2015 **Teaching and research assistant**, Institut de Mathématiques de Toulouse, INSA de Toulouse, France .

2011-2014 **Ph.D. student**, Institut de Mathématiques de Toulouse, Université Toulouse III and Unité Mathématiques et Informatique Appliquées, INRA de Toulouse, France.

Research activities

Research themes

- **Statistical learning:** network inference, graphical models, clustering, high dimension, penalized linear regressions, sparsity
- **Computational biology:** cancer, multi-omics data integration, gene regulatory networks, non-invasive prenatal diagnosis

List of publications and preprints

International journals papers

[1] M. Champion, J. Chiquet, P. Neuvial, M. Elati, F. Radvanyi & E. Birmelé. Identification of deregulation mechanisms specific to cancer subtypes. *Journal of Bioinformatics and Computational Biology*, **19**(01):2140003, doi:10.1142/S0219720021400035, 2021.

[2] M. Champion, K. Brennan, A. Gentles, T. Croonenborghs, N. Pochet & O. Gevaert. Module analysis captures pancancer genetically and epigenetically deregulated cancer driver genes for smoking and antiviral response. *EBioMedicine*, **27**:156-166, doi:10.1016/j.ebiom.2017.11.028, 2018.

[3] M. Champion, V. Picheny & M. Vignes. Inferring large graphs using ℓ_1-penalized likelihood. *Statistics and Computing*, **28**(4):905-921, doi:10.1007/s11222-017-9769-z, 2017.

[4] R. Dubey, A.M. Lebensohn, Z. Bahrami-Nejad, C. Marceau, M. Champion, O. Gevaert, B.I. Sikic, J.E. Carette & R. Rohatgi. Chromatin-remodeling complex SWI/SNF controls multidrug resistance by transcriptionally regulating the drug efflux pump ABCB1. *Cancer Research* **76**(19):5810-5821, doi: 10.1158/0008-5472.CAN-16-0716, 2016.

[5] M. Champion, G. Chastaing, S. Gadat & C. Prieur. $\mathbb{L}_2$-Boosting for sensitivity analysis with dependent inputs. *Statistica Sinica* **25**:1477-1502, doi:10.5705/ss.2013.310, 2015.

[6] M. Champion, C. Cierco-Ayrolles, S. Gadat & M. Vignes. Sparse regression and support recovery with $\mathbb{L}_2$-Boosting algorithms. *Journal of Statistical Planning and Inference*, **155**(C):18-40, doi:10.1016/j.jspi.2014.07.006, 2014.

Conference proceedings papers

[7] M. Champion, J. Chiquet, P. Neuvial, M. Elati, F. Radvanyi & E. Birmelé. Identification of deregulated transcription factors in specific bladder cancer subtypes. *Proceedings of the 12th International Conference on Bioinformatics and Computational Biology*, **70**:1-10, doi:10.29007/v7qj, 2020.

Preprints

[8] C. Champion, M. Champion, M. Blazère, R. Burcelin & J.M. Loubes. ℓ_1-spectral clustering algorithm: a spectral clustering method using ℓ_1-regularization. Submitted (available on HAL).

[9] M. Pacault, C. Verebi, M. Champion, L. Orhant, A. Perrier, E. Girodon, F. Leturcq, D. Vidaud, C. Férec, T. Bienvenu, R. Daveau & J. Nectoux. Non-Invasive Prenatal Diagnosis of Single Gene Disorders with enhanced Relative Haplotype Dosage Analysis for diagnosis implementation. Submitted.

R-packages

- $\ell_1$spectral: An ℓ_1-Version of the Spectral Clustering (C. Champion & M. Champion). Available on CRAN.
- LIONS: Identification of deregulation mechanisms specific to cancer subtypes (M. Champion, J. Chiquet, P. Neuvial, M. Elati & E. Birmelé). Available on GitHub.
- PancancerAMARETTO: Multi-omics data fusion for cancer module discovery (M. Champion, K. Planey & O. Gevaert). Available on Bitbucket.
- GADAG: A Genetic Algorithm for Learning Directed Acyclic Graphs (M. Champion, V. Picheny & M. Vignes). Available on CRAN.

Scientific talks

Contributions to international conferences

2022 M. Pacault, C. Verebi, M. Champion, L. Orhant, A. Perrier, C. Férec, T. Bienvenu, R. Daveau & J. Nectoux. Non-invasive prenatal diagnosis of monogenic diseases by enhanced relative haplotype dosage analysis. European Human Genetics Conference (ESHG), Vienna, Austria.

2020 M. Champion, J. Chiquet, P. Neuvial, M. Elati, F. Radvanyi & E. Birmelé. Identification of deregulated transcription factors in specific bladder cancer subtypes. 12th International Conference on Bioinformatics and Computational Biology (BICOB), San Francisco, United States. *Canceled due to Coronavirus.*

2018 M. Champion, K. Brennan, T. Croonenborghs, A. Gentles, N. Pochet & O. Gevaert. Module Analysis Captures Pancancer Genetically and Epigenetically Deregulated Cancer Driver Genes for Smoking and Antiviral Response. Intelligent Systems for Molecular Biology (ISMB), Boston, United States.

2017 M. Champion, J. Chiquet, P. Neuvial, M. Elati & E. Birmelé. Identification of deregulated transcription factors in specific subtypes of cancer. 16th International Conference on Bioinformatics (InCoB), Shenzhen, China.

2016 M. Champion & O. Gevaert. Pancancer module analysis captures major oncogenic pathways and identifies master regulator of immune response. Keystone symposia on Molecular and Cellular Biology: The Cancer Genome, Banff, Canada.

2015 M. Champion & O. Gevaert. Multi-omics data fusion for cancer data. 14th Annual International Conference on Critical Assessment of Massive Data Analysis (CAMDA), Dublin, Ireland.

2014 M. Champion, G. Chastaing, S. Gadat & C. Prieur. $\mathbb{L}_2$-Boosting on Generalized Hoeffding Decomposition for Dependent Variables. SIAM Conference on Uncertainty Quantification, Savannah, United States.

2011 M. Champion, J. Vandel, C. Cierco-Ayrolles, S. Gadat & M. Vignes. An $\mathbb{L}_2$-Boosting algorithm for sparse multivariate regression : application to gene network recovery. NIPS Machine Learning for Computational Biology Workshop, Sierra Nevada, Spain.

Presentations at other conferences with peer-review

2022 M. Pacault, C. Verebi, M. Champion, L. Orhant, A. Perrier, C. Férec, T. Bienvenu, R. Daveau & J. Nectoux. Non-invasive prenatal diagnostic of monogenic diseases by relative haplotype dosage. 11th Meeting of Human and Medical Genetics, Rennes, France.

J. Nectoux, C. Verebi, R. Daveau, A. Launois, L. Orhant, G. Leroy, M. Champion, D. Bouvet, C. Saint-Martin, C. Ciangura, & C. Bellané-Chantelot. Non-invasive prenatal determination of the fetal genotype for pregnant women suffering from monogenic diabetes MODY-GCK : feasibility study on 24 patients. 11th Meeting of Human and Medical Genetics, Rennes, France.

2019 M. Pacault, C. Férec & M. Champion. Non Invasive Prenatal Diagnosis of Single Gene Disorders using long read technologies. Scientific days from the Biological-Health doctoral school, Angers, France.

2017 M. Champion, V. Picheny & M.Vignes. GADAG : an R-package for inferring Directed Acyclic Graphs by penalized maximum likelihood. 6th R meeting, Anglet, France.

M. Champion, V. Picheny & M.Vignes. Inferring Directed Acyclic Graphs by penalized maximum likelihood. 49th Statistics days of the French Statistical Society, Avignon, France.

2016 M. Champion, J. Chiquet, P. Neuvial & E. Birmelé. Identification of deregulated transcription factors in bladder cancer. Colloquim CARTABLE for Network Learning, Toulouse, France.

M. Champion & O. Gevaert. Pancancer module analysis captures major oncogenic pathways and identifies master regulator of immune response. Stanford Cancer Institute Trainees Symposium, Stanford, United States.

2015 M. Champion & O. Gevaert. Multi-omics data fusion for cancer data. StatMathAppli conference, Fréjus, France.

2014 M. Vignes, M. Champion & V. Picheny. Statistical causal inference in a complex system - an hybrid convex-genetic algorithm. Joint New Zealand Statistical Association (NZSA) and Operations Research Society of New Zealand (ORSNZ) conference, Wellington, New Zealand.

2013 M. Champion, C. Cierco-Ayrolles, S. Gadat & M. Vignes. Convex optimization for learning Gene Regulatory Network. StatMathAppli conference, Fréjus, France.

M. Champion, C. Cierco-Ayrolles, S. Gadat & M. Vignes. Results on the L_2-Boosting algorithms for sparse regressions. 45th Statistics days of the French Statistical Society, Toulouse, France.

Invited talks at seminars and workgroups

Since 2011 More than 30 presentations performed online or in research labs in France, the United States and Switzerland

Teaching activities

Teaching experience

From 01/22 to 07/22 Guest Lecturer, ETH Zürich (21h)
- Students seminar in Statistics: Causality to Bachelor and Master students from ETH Zürich (role: instructor)

Since 2018 Assistant professor, IUT de Paris - Rives de Seine, Université Paris Cité (192h per year)
- Machine Learning in high dimension to Master students from Université Paris Cité (lectures)
- Parametric Tests to Undergraduate students from IUT de Paris (lectures and exercises)
- Linear model to Undergraduate students from IUT de Paris (lectures and exercises)
- Statistics with R to Undergraduate students from IUT de Paris (exercises)
- Statistical survey to Undergraduate students from IUT de Paris (role: instructor)
- Introduction to data mining to a professional audience from Université Paris Cité (lectures)
- Introduction to big data with R to a professional audience from Université Paris Cité (exercises)

2016-2018 Teaching assistant, ENAC Toulouse and Université Toulouse III (40h per year)
- Parametric statistics to Undergraduate students from ENAC Toulouse (lectures)
- Random simulation technics (Scilab) to Master students from Université Toulouse III (exercises)
- Statistical software SAS to Undergraduate students from Université Toulouse III (exercises)
- Statistics to Master students from Université Toulouse III (exercises)

2014-2015 Teaching assistant, INSA de Toulouse (42.5h per year)
- Analysis to Undergraduate students from INSA de Toulouse (exercises)

2011-2014 Teaching assistant, IUT de Toulouse, Université Toulouse III (64h per year)
- Mathematics to Undergraduate students from Université Toulouse III (lectures and exercises)
- Analysis to Undergraduate students from Université Toulouse III (lectures and exercises)
- Probability and statistics to Undergraduate students from IUT de Toulouse (exercises)

Supervised students

Semester thesis

2022 Julia Netzel, student in Master of Applied Mathematics, ETH Zürich on "Handling gender bias in NLP models" (4 months)

Bachelor thesis

2022 Michaël Vollenweider, student in Bachelor of Computational Science and Engineering, ETH Zürich on "Benchmark of gene regulatory network inference methods" (5 months)

Riccardo Fumagalli, student in Bachelor of Mathematics, ETH Zürich on "Identification of genes involved in the development of ER+ breast cancer" (3 months)

Student projects

2021 Gauthier Pervieux, Undergraduate student at IUT de Paris - Rives de Seine on "Etude statistique du cancer du sein" (2 months)

2020 Marina Atangana and Stellan Wea, Undergraduate students at IUT de Paris - Rives de Seine on "Analyses statistiques de données AirBnB" (2 months)

2016 Reyna Zhang, student in Master of Statistics, Stanford University on "Data fusion for predicting cancer survival" (2 months)

Teun de Planque and Christopher Elamri, students in Bachelor of Computer Science and Electrical Engineering, Stanford University on "Identifying genes with prognostic DNA methylation rates for breast cancer survival" (2 months)

High-school student internship

2015 Nabeel Mamoon, High-school student and winner of the *Stanford Institutes of Medicine Summer Research* program on "Analysis of statistical signatures in methylation-guided automated carcinoma diagnosis" (2 months at Stanford University)

Responsibilities

2019-2021 Director of the 2nd year program the Statistics and Computer Science (STID) department from IUT de Paris - Rives de Seine

Professional service

Seminars organization

2020-2022 Co-organiser of the MAP5 statistics seminar with J. El Methni

Editorial service

Since 2021 Associate editor of The International Journal of Biostatistics.

Since 2018 Reviews for the Journal of the Royal Statistical Society, Frontiers in Public Health and Annals of Applied Statistics.

Committee member

Panel member of Ph.D. thesis defense

2021 Juliana Pegoraro, Ph.D. in Applied Mathematics, Université Paris Cité, France

Hiring committee member

2021 Assistant professor position in Mathematical and Applied Statistics at University of Technology of Compiègne, France

Assistant professor position in Statistical learning at Université Paris I, France

2019 University lecturer position in English at IUT Paris - Rives de Seine, France

Computing and language skills

Software

- Mathematic: R, Matlab, Scilab, SAS, Maple, Python
- Others: LaTeX, Open Office, html

Languages

French (Native tongue), English (Fluent), German (Advanced) and Spanish (Intermediate)

Extra-curricular activities

Since 2022	International judge of Artistic Roller skating
Since 2019	National technical specialist of Artistic Roller skating
2007-2014	Volunteer trainer of Artistic Roller skating at Roller Artistique Hautes-Pyrénées (Laloubère, France)