

Matteo Borrotti

RESEARCH INTERESTS

Machine Learning, Design of Experiments, Computational and Applied Statistics, Stochastic Optimization Algorithms (focus on: Bio-Inspired Algorithms), Multi-Objective Optimization and Complex Systems.

EDUCATION

University of Bologna, Bologna, Italy
Department of Statistical Science

Ph.D. in Methodological Statistics for Scientific Research, March 2011

- Thesis Title: “An Evolutionary Approach to the Design of Experiments for Combinatorial Optimization with an Application to Enzyme Engineering”
- Advisor: Prof. Alessandra Giovagnoli
- Additional Title: Doctor Europaeus

The Microsoft Research-University of Trento Centro for Computational and System Biology, Trento, Italy

II Level International Master, Computational and System Biology, October 2007

Ca' Foscari University of Venice, Italy
Department of Statistics

MSc, Statistics for Business Management, March 2006

Ca' Foscari University of Venice, Italy
Department of Statistics

BA, Statistics and Computer Sciences for Business Management, July 2003

RESEARCH AND PROFESSIONAL EXPERIENCE

Energia Crescente S.r.l., Milan, Italy,
December, 2015 - present

Data Scientist

- Research Topics: Machine Learning (Classification and Clustering), Computational Statistics and Business Intelligence.

Institute of Applied Mathematics and Information Technology, Milan, Italy,
December, 2015 - present
National Research Council (CNR)

Affiliated Researcher

- Research Topics: Multi-objective Optimization, Sequential Design of Experiments and Bayesian Design of Experiments.

Institute of Applied Mathematics and Information Technology, Milan, Italy,
July, 2014 - November 2015
National Research Council (CNR)

Researcher

- Research Topics: Computer Experiments, Sequential Design of Experiments, Multi-objective Optimization, Computational Statistics.

European Centre for Living Technology, Venice, Italy
Department of Environmental Science, Informatics and Statistics, Venice, Italy

January, 2011 - June, 2014
Ca' Foscari University of Venice

Postdoctoral researcher

- Research Topics: Statistical Modelling, Design of Experiments, Optimal Design of Experiments and Multi-objective Optimization Algorithms.

Institut de Recherches Interdisciplinaires et de Développements en Intelligence Artificielle (IRIDIA), Brussels, Belgium
Université libre de Bruxelles January, 2009 - July, 2009

Visiting researcher

- Research Topics: Ant Colony Optimization and Stochastic Local Search Algorithms

GlaxoSmithKline, Harlow, UK
Department of Bioinformatics July, 2007 - September, 2007

Visiting researcher

- Research Topics: Statistical Methods to Study the Allosteric Modulator Action at a Receptor

Greta Associati, Venice, Italy
March, 2006 - February 2007

Junior Researcher

- Research Topics: Methodological aspects of back - calculation for time series PEEIs

TEACHING
EXPERIENCE

University of Milano-Bicocca, Italy
Accademic Year 2017-2018

Lecturer of the course "Data Mining"

Università Cattolica del Sacro Cuore, Italy
Accademic Year 2016-2017 / 2017-2018

Lecturer of the course "Pattern Recognition" at the I Level Master in Data Science for Management

Ca' Foscari University of Venice, Italy
Department of Economics Accademic Year 2012-2013

Tutor of the course "Statistica I" and "Statistica II"

Lecturer of the course "Optimization methods for Carbon Management" at the I Level Master in Sustainability and Carbon Footprint Management

Ca' Foscari University of Venice, Italy
Department of Economics Accademic Year 2011-2012

Lecturer of the course "Statistics I"

Tutor of the course "Statistics I" and "Statistics II"

Ca' Foscari University of Venice, Italy
Department of Economics Accademic Year 2010-2011

Lecturer of the course "Statistics II"

Tutor of the course "Statistics II"

University of Bologna, Bologna, Italy
Department of Economics and Business Management Accademic Year 2008-2009

Tutor of the courses:

- "Qualitative Methods for Economics Analysis"
- "Statistics"

PARTICIPATION TO
INTERNATIONAL
RESEARCH
PROJECTS

- *FIDEAS - Fabbrica Intelligente*
Collaboration for the national project funded by *Regione Lombardia*. 2014-2015.
- *Str.A.T.E.G.A - Strategie e automazioni tecnologiche per l'efficienza e la gestione ambientale*
Collaboration for the national project funded by *Agenzia Provinciale per l'Incentivazione delle Attività Economiche* of Trento (Italy).
- *iNSPiRE - Development of Systematic Packages for Deep Energy Renovation of Residential and Tertiary Buildings including Envelope and Systems*
Collaboration for the research project funded by *EU commision, EeB.NMP.2012-2*. 2012-2014.
- *DICE - Design of Informative Combinatorial Experiments*
Collaboration for the research project funded by *Fondazione di Venezia*. 2009-2012.
- *Evolutionary Statistical Methods*
Collaboration for the national project PRIN 2007 funded by the Italian Government.
- *PACE - Programmable Artificial Cell Evolution*
Collaboration for the European research project, EU integrated project in FP6-IST-FET, Complex Systems Initiative. 2004-2008.

CONFERENCE
SERVICE

- Member of the Program Committee of the *XII Workshop on Artificial Life and Evolutionary Computation (WIVACE 2017)*, 19-21 September 2017, Venice, Italy.
- Steering Committee and Chair of the *1st Workshop on Computer-aided and Bio-chemical Strategies for the Design of Stochastic Experiments*, 31 July 2014, Milan, Italy.
- Organiser of the *1st COBRA Summer School, BioChemITSchool2012*, 9-21 September 2012, San Candido, Italy.
- Local Organiser of the *International Conference in Model Oriented Data Analysis (mODa9)*, 14-18 June 2010, Bertinoro, Italy.

REFEREE SERVICE

- Expert Systems and Applications (2015-2017), Optimization (2015), Statistics and Computing (2015), Computational Statistics and Data Analysis (2012), Neural Computing and Applications (2011), European Journal of Operational Research (2011), XI Conference of the Italian Association for Artificial Intelligence (2009).

SCIENTIFIC PAPERS

Omar, M. H. E., and Borrotti, M., Customer churn prediction based on eXtreme Gradient Boosting classifier, *accepted*, 2018.

Borrotti, M., Sambo, F., Mylona, K., and Gilmour, S., A multi-objective coordinate-exchange two-phase local search algorithm for multi-stratum experiments, *Statistics and Computing*, Vol. 27, pp. 469–481, 2017.

Borrotti, M., Lanzarone, E., Manganini, F., Ortelli, S., Pievatolo, A., and Tonetti, C., Defect minimization and feature control in electrospinning through design of experiments, *Journal of Applied Polymer*, Vol 134, 2017.

Piccolomini, A. A., Fiabon, A., Borrotti, M., and De Lucrezia, D., Optimization of thermophilic trans-isoprenyl diphosphate synthase expression in *Escherichia coli* by response surface methodology, *Biotechnology and Applied Biochemistry*, Vol. 64, pp. 70-78, 2017.

Borrotti, M., Minervini, G., De Lucrezia, P., and Poli, I., Naïve Bayes ant colony optimization for designing high dimensional experiments, *Applied Soft Computing*, Vol. 49, pp. 459–468, 2016.

Borrotti, M., and Pievatolo, A., A multi-objective Bayesian sequential design based on Pareto optimality, *Advances in Model-Oriented Design and Analysis, Contributions to Statistics*, pp . 47-54, Springer-Verlag, 2016.

Borrotti, M., Pievatolo, A., Degiorgi, A., Critelli, I., and Colledani, M., A computer-aided methodol-

ogy for the optimization of electrostatic separation processes in recycling, *Applied Stochastic Models in Business and Industry*, Vol. 32, pp. 133–148, 2016.

Coccon, F., Bossi, G., Borrotti, M., P. Torricelli, and P. Franzoi, A land-use perspective for wildlife strike risk assessment at airports: the Attraction Risk Index, *PlosOne*, Vol. 10, 2015.

De March, D., Borrotti, M., Sartore, L., Slanzi, D., Podestà, L., and Poli, I., A predictive approach based on neural network models for building automation systems, In S. Bassis et al. (Eds.), *Advances in Neural Networks: Computational and Theoretical Issues, Smart Innovation Systems and Technology*, Vol. 37, pp. 253-262, 2015.

Slanzi, D., Borrotti, M., Orlando, D., De March, D.s, Giove, S., and Poli, I., Qualitative Particle Swarm Optimization (Q-PSO) for energy efficient building designs, In C. Pizzuti et al. (Eds.), *Advances in Artificial Life and Evolutionary Computation, Communications in Computer and Information Science*, Vol. 445, pp. 13–25, Springer-Verlag, 2014.

Zennaro, P., Kehrwald, N.M., McConnel, J.R., Schüpbach, S., Maselli, O., Marlon, J., Vallelonga, P., Leuenberger, D., Zangrando, R., Spolaor, M., Borrotti, M., Barbaro, E., Gambaro, A., and Barbante, C., Fire in ice: two millennia of northern hemisphere fire history from the Greenland NEEM ice core, *Climate of the Past*, Vol. 10, pp. 1905–1925, 2014.

Borrotti, M., De March, M., Slanzi, D., Poli, I., Designing lead optimisation of MMP-12 Inhibitors, *Computational and Mathematical Methods in Medicine*, Vol. 2014, pp. 1–8, 2014.

Sambo, F., Borrotti, M., and Mylona, K., Coordinate-exchange two-phase local search: an optimal algorithm for D-efficient and I-efficient second-order split-plot designs, *Computational Statistics and Data Analysis*, Vol. 71, pp. 1193–1207, 2014.

Ferrari, D., Borrotti, M., and De March, D., Response improvement in complex experiments by co-information composite likelihood optimization, *Statistics and Computing*, Vol. 24, pp. 351–363, 2014.

Ferrari, D., and Borrotti, M., Maximum entropy design in high dimensions by composite likelihood modeling, In D. Uciński et al. (Eds.), *Advances in Model-Oriented Design and Analysis, Contributions to Statistics*, pp. 73–80, Springer-Verlag, 2013.

Borrotti, M., and Poli, I., Naïve Bayes ant colony optimization for experimental design, In R. Kruse et al. (Eds.), *Synergies of Soft Computing and Statistics for Intelligent Data Analysis, Advances in Intelligent Systems and Computing*, Vol. 190, pp. 489–497, Springer-Verlag, 2013.

Zemella, G., De March, D. Borrotti, M, and Poli, I., Optimised design of energy efficient building façades via evolutionary neural networks, *Energy and Buildings*, vol. 43, pp. 3297–3302, 2011.

Borrotti, M., *An Evolutionary Approach to the Design of Experiments for Combinatorial Optimization with an Application to Enzyme Engineering*, PhD thesis, Department of Statistical Science, University of Bologna, Italy, 2011.

Borrotti, M., De Lucrezia, D., Minervini, G., and Poli, I., A model based ant colony design for the protein engineering problems, In M. Dorigo et al. (Eds.), *ANTS 2010, Lecture Notes in Computer Science*, Vol. 6263, pp. 352–359, Springer-Verlag, 2010.

Pizza, F., Contardi, S., Baldi Antognini, A., Zagoraïou, M., Borrotti, M., Mostacci, B., Mondini, and S., Cirignotta, F., Sleep quality and car accidents in adolescents, *Journal of Clinical Sleep Medicine*, Vol. 6, No. 1, 2010.

TALKS AND
CONFERENCE
PRESENTATIONS

Borrotti, M., A model based algorithm for evolutionary design of experiments, *In F. Hutter et al. (Eds.), SLS-DS 2009, Technical Report N. TR/IRIDIA/2009-024, IRIDIA, 2009.*

Customer churn prediction based on eXtreme Gradient Boosting classifier, 49th Scientific meeting of the Italian Statistical Society, Palermo, 2018, *Contributed talk.*

Bayesian sequential design approach for multi-objectives applications, ENBIS Spring Meeting 2018, Florence, Italy, 2018, *Contributed talk.*

Sequential design of experiments and multi-objective optimization for the solutions of complex problems, 10th International Workshop on Bayesian Inference in Stochastic Process, BISP10, Milan, Italy, 2017, *Invited talk.*

A multi-objective Bayesian sequential design based on Pareto optimality, 11th *Workshops on Model-Oriented Data Analysis and Optimum Design*, mODa11, Hamminkeln-Dingden, Germany, 2016, *Invited talk.*

Bayesian sequential design for multi-objective process optimisation, 48^{èmes Journées de Statistique de la SFdS}, Montpellier, France, 2016, *Invited talk.*

Intelligent control system model-based optimisation for energy saving, 7th *Workshop of the ERCIM Working Group on Computing and Statistics*, ERCIM, Pisa, Italy, 2014, *Invited talk.*

Maximum entropy design in high dimensions by composite likelihood modeling. 10th *Workshops on Model-Oriented Data Analysis and Optimum Design*, mODa10, Lagów Lubuski, Polonia, 2013, *Poster contribution.*

Naïve Bayes Ant Colony Optimization for experimental design. 6th *International Conference on Soft Methods in Probability and Statistics*, SMPS, Konstanz, Germany, 2012, *Contributed talk.*

An Evolutionary Approach to the Design of Experiments for Combinatorial Optimization with an Application to Enzyme Engineering, Dipartimento di Scienze Statistiche, Università di Bologna, Italy, 2011, *Ph.D. defense.*

Improving complex experiments by co-information composite likelihood optimization. 4th *Workshop of the ERCIM Working Group on Computing and Statistics*, ERCIM, London, UK, 2011, *Invited talk.*

An evolutionary approach to experimental design for combinatorial optimization, *Designed Experiments: Recent Advances in Methods and Application*, DEMA, Cambridge, UK, 2011, *Invited talk.*

Comparison of different algorithms for optimizing the pseudo-likelihood surface in copula models, 3rd *Workshop of the ERCIM Working Group on Computing and Statistics*, ERCIM, London, UK, 2010, *Invited talk.*

An evolutionary approach for the design of experiments: an application of the ant colony algorithm,

- 8th *International Conference of Numerical Analysis and Applied Mathematics*, ICNAAM, Rhodes, Greece, 2010, *Invited talk,*
- 9th *Workshops on Model-Oriented Data Analysis and Optimum Design*, mODa9, Bertinoro, Italy, 2010, *Poster presentation.*

Application of combinatorial optimization methods to copula models involving large numbers of parameters, 19th *International Conference on Computational Statistics*, COMPSTAT, Paris, France,

2010, *Poster presentation*.

An evolutionary approach for the design of experiments,

- Institut de Recherches Interdisciplinaires et de Développements en Intelligence Artificielle (IRIDIA), *Université libre de Bruxelles*, Brussels, Belgium, 2009, *Invited seminar*,
- *2nd Workshop of the ERCIM Working Group on Computing and Statistics*, ERCIM, Limassol, Cyprus, 2009, *Invited talk*.

OTHER
CONTRIBUTIONS

Slanzi, D., Borrotti, M., Orlando, D., De March, D., Giove, S., and Poli, I., Qualitative Particle Swarm Optimization (Q-PSO) for energy efficient building designs, *9th Italian Workshop on Artificial Life and Evolutionary Computation*, Vietri sul Mare, Italy, 2014.

De March, D., Borrotti, M., Capacchione, V., Slanzi, D., Podestà, L., and Poli, I., A predictive approach based on neural network models for building automation systems, *24th Italian Workshop on Neural Network*, Vietri sul Mare, Italy, 2014.

Ferrari, D., De March, D., and Borrotti, M., Evolutionary optimization of combinatorial experiments via interaction information, *73rd Annual Meeting of the Institute for Mathematical Statistics*, Gothenburg, Sweden, 2010.

Ferrari, D., De March, D., and Borrotti, M., Adaptive design optimization of combinatorial experiments via interaction information, *3rd Workshop of the ERCIM Working Group on Computing and Statistics*, London, UK, 2010.

LANGUAGE AND IT
SKILLS

- Native Language: Italian.
- Other Language: English.

- Statistical Software and Packages: R (professional), Matlab (intermediate) and Eviews (intermediate).
- Languages: some experiences with C++ (beginner), Python (beginner, preliminary experience with scikit-learn and tensor flow), and SQL (beginner, experience in queries).
- Applications: Microsoft Office, OpenOffice.org and L^AT_EX
- Operating Systems: MacOS, Windows.

I authorise the use of my personal data in compliance with Italian Legislative Decree 196/03

May 21, 2018

Matteo Borrotti