**Matteo Morini**
Computational Social Scientist, Data Scientist
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## Bio

Born 1974, Italian citizen. Swiss work permit.

## Research, corporate–transferable, and soft skills

In my capacity as data scientist, I'm involved in an ongoing team reconstruction effort, the aftermath of a buyout, with a challenger bank; I lead a growing team providing solutions to credit rating, pricing, anti-fraud and marketing analytics business demands, in form of credit scoring, reserve price estimations, anomaly detection, funnel-analytic econometric and behavioural models based on socio-economic and alternative data. I also hold advisory positions for deeptech startups and, on occasion, I provide consultancy on data analytics – imaging and signal processing in particular – to the biotech and bioinformatics research industry.

My transferable research interests revolved around both classic, orthodox topics, and cutting-edge fields, both in computer science and socio-economic research. The former include data-driven quantitative output based on classical evolutionary algorithms (i.e. neural networks, genetic algorithms and genetic programming, classifier systems), and machine learning (graph-based semi-supervised learning in particular); the latter skill set includes econometrics, computational economics, novel applications of operational research. Complex systems, the overarching research area, lie at the interdisciplinary intersection of the two; graph theory/complex networks and agent-based modelling are illustrative of my methodological approach.

I have led a large EU-funded project end-to-end, from securing grant money all the way down to multi-site deployment of production-grade software; managed distinctly heterogeneous medium-sized task forces, and conducted individual desk research.

I have succesfully completed demanding cross-domain collaborations, often spanning multiple countries and time zones, in diverse areas: a cutting-edge ML effort on networked data labelling; a data-driven research on industrial conglomerates in Japan; a computationally-heavy exploration of language formation, and an agent-based modelling of research hierarchies driving scientific discovery.

My vision of data science is both wide and deep: I have acquired ample experience in multiple subfields and had the opportunity to get actively involved in every stage of the analytics pipeline, from surveying potential data sources down to a convenient visual presentation of results, including devising appropriate storytelling skills.

I am considered a patient and empathic person, communicative and extrovert in very diverse environments, and a good listener; when required, I don't pull back from challenging circumstances and can take care of solving conflicts, keeping groups focused, morale high, and keep the group committed to timely delivery. The Voltairean motto "Perfect is the enemy of good" underpins most of my managing decisions.

Having spent more than a decade lecturing postgraduate students, and being routinely involved in delivering both specialist and non-technical speeches, I am a natural in knowledge transfer and when it comes to keeping an audience captivated.

## Research interests

Complex Systems, Complex Networks, Agent-Based Modeling, Machine Learning, Computational Economics, Econometrics, Operational Research, Data Mining.

# Education

**2017** PhD in Computer Science, on *"Des Outils pour Comprendre les Dynamiques des Réseaux Sociaux"*. École Doctorale d'Informatique et Mathématiques, Ecole Normale Supérieure, Lyon, France.

**2001** MS in Economics. Università degli Studi, Torino, Italy.

# Employment history

## Current positions

**2023-present** Banca CF+, Data Scientist, Milan, Italy. *Credit risk, anti-fraud modelling leader. Incumbent-challenger models. Monitoring. Machine learning, black- and glass-box explanation. Tech stack including Python, GitHub, Code-fresh CD/CI deployment pipeline, Kubernetes microservice orchestration; AWS datalake; lifecycle management via MLflow.*

**2022-present** Batonics AB, Data Science Advisor, Stockholm, Sweden. *Supporting the developement of a VC fund scouting platform; algorithmic detection of non-conventional investable opportunities.*

**2020-present** Yodh Research s.a., Partner, Lugano, Switzerland. *Consulting on ML solutions: computational biology, imaging.*

## Previous positions

**2020-2023** Credimi s.p.a., Data Scientist, Milan, Italy. *Credit risk, anti-fraud modelling. Explainable machine learning, regulatory glass-box approach. Tech stack including Python, GitHub, Codefresh CD/CI deployment pipeline, Kubernetes microservice orchestration; AWS datalake. Hiring supervision, mentoring.*

**2018-2020** Universität Koblenz-Landau, E-Government Research Group at the Institut für Wirtschafts- und Verwaltungsinformatik, postdoctoral researcher, Koblenz, Germany. *Research position in which – owing to my multidisciplinary experience – I liaised between the business-oriented and the fundamental research computer science teams. My research topics included big data analysis, including mining data for socio-economic modelling and natural language processing, also involving large-scale distributed computing efforts.*

**2008-2019** University of Torino, Department of Economics and Statistics, tenured research scientist, Torino, Italy. *In this position I multitasked in multiple capacities, spanning from data wrangling/analytics to knowledge transfer, to pure research. I brought novel computational approaches into my field of research, leaving behind standard econometric approaches in favor of algorithmic simulations (far-from-equilibrium dynamics in economics) and graph theoretical metrics, disseminated into a wide body of publications.*

**2008** University of Milan, Department of Information Technologies, *"Simulation and Optimization Models for EMS Management"* fellowship, Milano, Italy. *Regional emergency medical services were in need of an overhaul, with shrinking budgets and strict requirements to rationalize expenditure; on this assignment, I developed a model of (heli)ambulance services, providing decision-makers with a tool to experiment with alternate scenarios.*

**2004** Exystence Thematic Institute for Complexity and Innovation, member of the Regional Innovation Systems and Complexity WG, ARC Systems Research, Vienna, Austria. I *provided guidance in the project modelling effort, including Agent-Based formalization, calibration and validation, based on data and empirical evidence provided.*

**2001-2008** LABORatorio – Centre for Employment Studies Riccardo Revelli – Collegio Carlo Alberto Foundation, researcher, on a series of grants with the Università degli Studi di Torino. Since **2006**, on an ISI (Institute for Scientific Interchange Foundation) Progetto Lagrange scholarship. Moncalieri, Italy. *In this challenging position I complemented mainstream econometrics and simulation-based approaches into large scale analysis of economic administrative data. The diversity of sources required integrating and harmonizing data from legacy and current systems. The resulting published works present novel and compelling evidence of bounded rationality in economic behaviour.*

**2001-2004** EU-FP5 "Penelope Project", leader (Agent-Based supply chain simulator), Torino, Italy; Barcelona, Spain; Saarbrücken, Germany; Athens, Greece. *As a freelance consultant, in a leading capacity I provided industrial partners with a production-grade supply chain optimization solution. Optimized production plans were computed by a combination of simulated processes evaluation and evolutionary algorithms (Agent-Based models and Genetic Algorithms).*

## Visiting and other positions

**2018** Visiting scholar, National Institute of Informatics, Tokyo, Japan

**2016** Santa Fe Institute CSSS, Santa Fe, NM

**2014–present** Member of the board of directors, Vice president (**2015–2022**), Swarm Development Group

## Teaching Activities

**2018–2020** Computer Science for Socio-Economic Research, University of Turin, Italy.

**2016–2020** Agent-Based Models, Master in Data Science for Complex Systems, Collegio Carlo Alberto, Turin, Italy.

**2013–2016** Modelling Complex Systems, Master in Economics and Complexity, Collegio Carlo Alberto, Turin, Italy.

## Major Ongoing Collaborations

**2017–present** "Graph-based Semi-Supervised Learning", originally based at the ENS Lyon, with Sarah De Nigris; graph partitioning by biased random walks.

**2016–present** "Devising Null Models of Lexicostatistics and Glottochronology", based at the Santa Fe Institute, with David Wolpert, William Croft, Richard Blythe, et al.; Agent-Based modelling of language evolution.

**2016–present** "Temporal Evolution of Scientific Communities", based at the ENS Lyon, with Patrick Flandrin; graph-based reconstruction of the history of science, with a scientometrics approach.

**2015–present** "Agent-Based Modeling of Research Hierarchies Driving Scientific Discovery", based at the Harvard Medical School, with Alex Lancaster.

**2015–present** "Japanese Business Networks", based at the ENS Lyon, with Jean-Pascal Bassino; finding evidence of the unbreakable ties and the nature of "Big-6" keiretsu-style industries in Japan.

## CS skills

I develop novel algorithms and metrics (graph-based semi-supervised learning through enhanced diffusion regimes, and bridging measures of network centralities are examples of the former and the latter, respectively) from the ground up, and also am a proficient user of the standard Python statistics / machine learning libraries. In developing network-based algorithms, metrics and visualizations, I rely on Python, Java, C, C++, Objective C, Fortran; (non-)relational database solutions (e.g. Postgre/MySQL, MongoDB); my toolkit includes R, Gephi, the Swarm, Repast, Mason libraries; I prefer working under UNIX major flavours, GNU/Linux in particular. In coding Agent-Based Models, I tend to start proto-typing in NetLogo, then move to a middle-ground object-oriented language (Python being my current choice), if needed also implementing distributed computing (e.g. Spark), eventually down to a lower-level language (C++). I can also take care of calibration and validation, and ETL. I also had experienced working with the SAS suite (Base/STAT) on legacy data projects.

## Selected publications and presentations

*Books, book chapters, journal articles, working papers and technical reports*

*"Swarms Dynamics Approach to Behavioral Economy: Theoretical Tools and Price Sequences"*, Networks and Heterogeneous Media, American Institute of Mathematical Sciences, Volume 15, Number 3, September **2020**, doi:10.3934/nhm.2020022, (with N. Bellomo, S. De Nigris, D. Knopoff, P. Terna)

*"Rethinking Macroeconomics with Endogenous Market Structure"*, Cambridge University Press, ISBN 978-11-0869701-9, **2019** (with M. Mazzoli, P. Terna)

*"Personal Income Tax Reforms: a Genetic Algorithm Approach"*, European Journal of Operational Research, Volume 264, Issue 3, pp. 994-1004, doi:10.1016/j.ejor.2016.07.059, Elsevier Publishing, **2018** (with S. Pellegrino)

*"Business Cycle in a Macromodel with Oligopoly and Agents' Heterogeneity: an Agent-Based Approach"*, Italian Economic Journal, available online, doi:10.1007/s40797-017-0058-y, Springer, **2017** (with P. Terna, M. Mazzoli)

*"Detecting Global Bridges in Networks"*, Journal of Complex Networks, Volume 4, Issue 3, pp. 319-329, doi:10.1093/comnet/cnv022, **2016**, Oxford University Press (with P. Jensen, T. Venturini, A. Vespignani, M. Jacomy, J.-P. Cointet, P. Mercklé, M. Karsai, E. Fleury)

*"Agent-based Dynamic Optimization of Fiscal Systems"*, in *"Agent-based Models of the Economy. From Theories to Applications"*, Palgrave Macmillan, London, **2015** (with S. Pellegrino)

*"The Emergence of Cooperation"*, in *"Agent-based Models of the Economy. From Theories to Applications"*, Palgrave Macmillan, London, **2015**

*"Agent-based Models of the Economy. From Theories to Applications"*, Palgrave Macmillan, London, ISBN 978-1-349-67406-0, **2015** (with R. Boero, M. Sonnessa, P. Terna)

*"Employment Security and Employability: A Contribution to the Flexicurity Debate"*, European Foundation for the Improvement of Living and Working Conditions Report, ISBN 978-92-897-0828-9, **2008** (with F. Devicienti, A. Maida, A. Poggi, P. Vesan)

*"Modelli per la complessità, la simulazione ad agenti in economia"*, il Mulino, Bologna, ISBN 978-88-15-10988-0, **2006** (with P. Terna, R. Boero, M. Sonnessa, eds.)


### Conference Papers

**Sep 23-28 2018:** CSS2018, Thessaloniki, Greece, *"Graph Semi-Supervised Learning through Bridgeness-Biased Random Walks"*, (with S. De Nigris)

**Feb 6-8, 2018:** BIFI2018, Complexity, Networks and Collective Behaviour, Zaragoza, Spain, *"A Simple Model of Coevolution for Macroscopic and Microscopic Levels"*, (with S. De Nigris)

**Nov 29-31, 2017:** Complex Networks 2017, Lyon, France, *"The Evolution of Japanese Business Networks in ASEAN Countries Since the 1960s"*, in Complex Networks & Their Applications VI, Proceedings of Complex Networks **2017**, pp. 1065 -1075 (with J.-P. Bassino, P. Jensen)

**Jul 10-13, 2017:** IC2S2, International Conference on Computational Social Science, Gesis, Leibniz Institute for the Social Sciences, Cologne, Germany, *"A Mesoscale Description of Networks' Dynamics Through Continuous Partitioning"* (with P. Jensen, E. Fleury, M. Karsai)

**May 11, 2017:** Trajectoires et dynamiques des réseaux: approches quantitatives, ENS Lyon, France, *"Emergence d'un nouveau domaine scientifique : les ondelettes"* (with P. Jensen, P. Flandrin)

**Jul 30-Aug 3, 2016:** SwarmFest2016, University of Vermont, Burlington, VT, *"Agent-Based Modeling of Research Hierarchies Driving Scientific Discovery"* (with A. Lancaster)

**Jul 11-13, 2016:** Complex Networks, From Theory to Interdisciplinary Applications, Satellite meeting of StatPhys26, Marseille, France, *"Detecting Global Bridges in Networks"*

**Nov 25, 2015:** Journée Data Science - Social Science, Science des données et humanités numeriques, Institut des Systèmes Complexes Paris-Île de France (ISC-PIF), Paris, France, *"Bridgeness and Scientometrics"*

**Oct 29-Nov 1, 2015:** The Computational Social Sciences Society of the Americas, CSSSA 2015, Santa Fe, NM, *"A Simple Model of Coevolution for Macroscopic and Microscopic Levels"* (with P. Jensen)

**Sep 15-18, 2015:** Historical Network Research Conference, Lisbon, Portugal, *"The Evolution of Japanese Business Networks in ASEAN Countries since the 1960s"* (with J.-P. Bassino, P. Jensen)

**July 10-12, 2015:** SwarmFest2015, University of South Carolina, Columbia, SC, *"A Simple Model of Coevolution for Macroscopic and Microscopic Levels"* (with P. Jensen)

**September 22-26, 2014:** ECCS14, European Conference on Complex Systems, Lucca, Italy, *"Bridgeness: A Novel Centrality Measure to Detect Global Bridges"* (with P. Jensen, T. Venturini, A. Vespignani, M. Jacomy, J.-P. Cointet, P. Mercklé, M. Karsai, E. Fleury)

**June 29-July 1, 2014:** SwarmFest2014, University of Notre Dame, IN, *"Taking Genetic Algorithms and Personal Income Tax Reforms One Step Beyond: Enter Agents"* (with S. Pellegrino)

**June 2, 2014:** TopoNets'14, NetSci'14 Satellite, University of California, Berkeley, CA, *"A New Measure to Detect Global Bridges"* (with P. Jensen, T. Venturini, A. Vespignani, M. Jacomy, J.-P. Cointet, P. Mercklé, M. Karsai, E. Fleury)

**July 8-9, 2013:** SwarmFest2013, Complex Adaptive Systems Laboratory, UCF Orlando, FL, *"Doing more with less? An Agent-Based Tale of Emergency Medical Services and Shrinking Budgets in Piedmont, Italy"* (with M. Bortolin)

**October 23-24, 2009:** NAACSOS 2009, North American Association for Computational Social and Organizational Sciences, Arizona State University, Tempe, AZ, *"Minimal Group Phenomena in Harvesting Games"* (with U. Merlone, P. Terna)


## Editorial/Refereeing activities

Winter Simulation Conference, Computational Social Science Society of the Americas, KI - Künstliche Intelligenz, Simulation&Games, SIMULTECH, SwarmFest, Mind&Society, Italian Journal of Public Economics, Bureau for Research in Innovation, Complexity and Knowledge (BRICK), Journal of Economic Interaction and Coordination, Journal of Buniness Research, Collective Intelligence.


## Languages

Italian: native language
English and French: full professional proficiency
Spanish: limited working proficiency


**My Erdős Number is 3**, by the route Erdős-Lovász-Karsai detailed below:

*1.* Erdős, P.; Lovász, L.; Simmons, A.; Straus, E. G., *Dissection graphs of planar point sets. A survey of combinatorial theory.* Proc. Internat. Sympos., Colorado State Univ., Fort Collins, Colo., 1971, pp. 139–149, North-Holland Publishing Co., Amsterdam-London, 1973 **(MR0363986)**
*2.* Ódor, Gergely; Czifra, Domonkos; Komjáthy, Júlia; Lovász, László; Karsai, Márton, *Switchover phenomenon induced by epidemic seeding on geometric networks.* Proc. Natl. Acad. Sci. USA118(2021), no.41, Paper No. e2112607118 **(MR4389153)**
*3.* Jensen, P.; Morini, M.; Karsai, M.; Venturini, T.; Vespignani, A.; Jacomy, M.; Cointet, J.-P.; Mercklé, P.; Fleury, E., *Detecting global bridges in networks.* J. Complex Netw.4(2016), no.3, 319–329 **(MR3605511)**