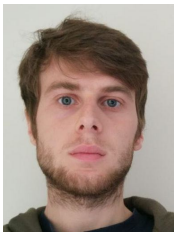
Matteo Castiglioni

Curriculum Vitae et Studiorum



Personal Information

Date of Birth	June 21, 1994
Place of Birth	Tradate, Varese
Citinzenship	Italian
Email	matcasti00@gmail.com

Work Information

University	Politecnico di Milano
Department	Dipartimento di Elettronica, Informazione e Bioingegneria (DEIB)
Address	Via Golgi 39, 20133, Milano (MI), Italy
Email	matteo.castiglioni@polimi.it
Webpage	https://castiglionimatteo.github.io

Experience

2022 **Postdoctoral Researcher**, *Politecnico di Milano*, Milano.

Education

2018–2022 **PhD in Computer Science and Engineering**, *Politecnico di Milano*, Milano,
Advisor: Prof. Nicola Gatti.

2016–2018 **MSc in Computer Science and Engineering**, *Politecnico di Milano*, Milano,
Thesis: Leadership in singleton congestion games : what is hard and what is easy
Advisor: Prof. Nicola Gatti.
Mark *110 cum laude/110*

2013–2016 **BSc in Computer Science and Engineering**, *Politecnico di Milano*, Milano.
Mark *110/110*

Research Interests

My current research focuses on *Artificial Intelligence*, especially Algorithmic Game Theory, Social Influence, and Online Learning.

Algorithmic Game Theory: I am intrested in the computational complexity of finding equilibria, and the development of efficient algorithm to compute them. In particular, my research focuses on leader-follower games, Bayesian persuasion, contract theory, and auctions.

Social Influence: I am intrested in the study of the diffusion of information in social networks, the development of algorithms to maximize the influence and their computational complexity. My research focuses on the study of social influence and election manipulation.

Online Learning: I am intrested in online learning. In particular, my research focuses on the design of no-regret algorithms for game theory problems.

PhD thesis

Title: *Reducing the Gap between Theory and Applications in Algorithmic Bayesian Persuasion*

Advisors: Prof. Nicola Gatti

Description: My work focuses on the following question: is it possible to influence the behavior of self-interested agents through the strategic provision of information? This 'sweet talk' is ubiquitous among all sorts of economics and non-economics activities. In this work, we model these multi-agent systems as games between an informed sender and one or multiple receivers. We study the computational problem faced by an informed sender that wants to use his information advantage to influence rational receivers with the partial disclosure of information. In particular, the sender faces an information structure design problem that amounts to deciding 'who gets to know what'. Bayesian persuasion provides a formal framework to model these settings as asymmetric-information games. In recent years, much attention has been given to Bayesian persuasion in the economics and artificial intelligence communities due also to the applicability of this framework to a large class of scenarios like online advertising, voting, traffic routing, recommendation systems, security, and product marketing. However, there is still a large gap between the theoretical study of information in games and its applications in real-world scenarios. This work contributes to close this gap along two directions. First, we study the persuasion problem in real-world scenarios, focusing on voting, routing, and auctions. Then, we relax stringent assumptions that limit the applicability of the Bayesian persuasion framework in practice. In particular, the classical model assumes that the sender has perfect knowledge of the receiver's utility. We remove this assumption initiating the study of an online version of the persuasion problem. This is the first step in designing adaptive information disclosure policies that deal with the uncertainty intrinsic in all real-world applications.

Master thesis

Title: *Leadership in singleton congestion games: what is hard and what is easy*

Supervisors: Prof. Nicola Gatti

Description We study the problem of computing Stackelberg equilibria in congestion games, focusing on the case where each player can choose a single resource (a.k.a. singleton congestion games) and one of them acts as leader. In par- ticular, we address the cases where the players either have the same action spaces (i.e., the set of resources they can choose is the same for all of them) or different ones, and where their costs are either monotonic functions of the resource congestion or not. We show that, in the case where the players have different action spaces, the cost the leader incurs in a Stackelberg equilibrium cannot be approxi- mated in polynomial time up to within any polynomial factor in the size of the game unless P = NP, independently of the cost functions being mono- tonic or not. We show that a similar result also holds when the players have nonmonotonic cost functions, even if their action spaces are the same. We also improve an algorithm for the computation of a socially optimal equi- librium in singleton congestion games with the same action spaces without leadership, and extend it to the computation of a Stackelberg equilibrium for the case where the leader is restricted to pure strategies. For the cases in which the problem of finding an equilibrium is hard, we show how, in the optimistic setting where the followers break ties in favor of the leader, the problem can be formulated via mixed-integer linear programming techniques, which computational experiments show to scale quite well.

Publications

Conference Papers

Castiglioni M., Marchesi A., Gatti N.
Designing Menus of Contracts Efficiently: the Power of Randomization
The 23rd ACM Conference on Economics and Computation, EC 2022, Boulder, USA

Castiglioni M., Celli A., Kroer C.
Online Learning with Knapsacks: the Best of Both Worlds
The 39th International Conference on Machine Learning, ICML 2022, Baltimora, USA

Bernasconi M., Cacciamani F., Castiglioni M., Marchesi A., Gatti N., Trovò F.
Safe Learning in Tree-Form Sequential Decision Making: Handling Hard and Soft Constraints
The 39th International Conference on Machine Learning, ICML 2022, Baltimora, USA

Bacchiocchi F., Castiglioni M., Marchesi A., Romano G., Gatti N.
Public Signaling in Bayesian Ad Auctions
The 31st International Joint Conference on Artificial Intelligence, IJCAI 2022, Vienna, Austria

Romano G., Castiglioni M., Marchesi A., Gatti N.
The Power of Media Agencies in Ad Auctions: Improving Utility through Coordinated Bidding
The 31st International Joint Conference on Artificial Intelligence, IJCAI 2022, Vienna, Austria

Castiglioni M., Marchesi A., Gatti N.
Bayesian Persuasion Meets Mechanism Design: Going Beyond Intractability with Type Reporting
The 21st International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2022, Virtual conference

Castiglioni M., Romano G., Marchesi A., Gatti N.
Signaling in Posted Price Auctions
The 36th AAAI Conference on Artificial Intelligence, AAAI 2022, Virtual conference

Castiglioni M., Ferraioli D., Gatti N., Marchesi A., Romano G.
Efficiency of Ad Auctions with Price Displaying
The 36th AAAI Conference on Artificial Intelligence, AAAI 2022, Virtual conference

Castiglioni M., Marchesi A., Celli A. Gatti N.
Multi-Receiver Online Bayesian Persuasion
The 38th International Conference on Machine Learning, ICML 2021, Virtual conference

Castiglioni M., Marchesi A., Gatti N.
Bayesian Agency: Linear Versus Tractable Contracts
The 22nd ACM Conference on Economics and Computation, EC 2021, Virtual conference

Castiglioni M., Celli A., Marchesi A., Gatti N.
Signaling in Bayesian Network Congestion Games: the Subtle Power of Symmetry
The 35th AAAI Conference on Artificial Intelligence, AAAI 2021, Virtual conference

Castiglioni M., Gatti N.
Persuading Voters in District-based Elections
The 35th AAAI Conference on Artificial Intelligence, AAAI 2021, Virtual conference

Castiglioni M., Celli A., Marchesi A., Gatti N.
Online Bayesian Persuasion
34th Conference on Neural Information Processing Systems, NeurIPS 2020, Virtual conference

Castiglioni M., Ferraioli D., Gatti N.
Election Control in Social Networks via Edge Addition or Removal
34th AAAI Conference on Artificial Intelligence, AAAI 2020, New York, USA

Castiglioni M., Celli A., Gatti N.
Persuading Voters: It's Easy to Whisper, It's Hard to Speak Loud
34th AAAI Conference on Artificial Intelligence, AAAI 2020, New York, USA

Castiglioni M., Marchesi A., Gatti N.
Be a Leader or Become a Follower:The Strategy to Commit to with Multiple Leaders
28th International Joint Conference on Artificial Intelligence, IJCAI 2019, Macao, China

Marchesi A., Castiglioni M., Gatti N.
Leadership in Congestion Games: Multiple User Classes and Non-Singleton Actions
28th International Joint Conference on Artificial Intelligence, IJCAI 2019, Macao, China

Journal Papers

Castiglioni M., Marchesi A., Gatti N.
Bayesian Agency: Linear Versus Tractable Contracts
Artificial Intelligence Journal, 2022

Castiglioni M., Ferraioli D., Gatti N., Landriani G.
Election Manipulation on Social Networks: Seeding, Edge Removal, Edge Addition
Journal of Artificial Intelligence Research, 2021

Castiglioni M., Marchesi A., Gatti N.
Committing to Correlated Strategies with Multiple Leaders
Artificial Intelligence Journal, 2021

Castiglioni M., Marchesi A., Gatti N., Coniglio S.
Leadership in singleton congestion games: What is hard and what is easy
Artificial Intelligence Journal, 2019

Awards

National Doctoral Scholarship
Three-years doctoral scholarship sponsored by the Ministry of Education, Universities and Research.

Teaching Activities

Game Theory, Politecnico di Milano, Milan.
M.Sc. in Mathematical Engineering.
Teaching assistant during the accademic years 2021-2022, 2020-2021.

Game Theory, Politecnico di Milano, Milan.
M.Sc. in Computer Science and Engineering.
Teaching assistant during the accademic years 2019-2020.

Industrial and Research Projects

2019 – 2021 **PRIN 2017 ALGADIMAR**, Ministry of Education, Universities and Research, Italy.
Description:Research project.

2019 – 2020 **BidMatic**, *AdsHotel*.
Description: Industrial project.

2019 – 2020 **RocketAvoid**, *Analisi & Valore and Marina Militare*.
Description:Industrial project.

Talks

Talks at International Conferences

July. 2022 **Designing Menus of Contracts Efficiently: the Power of Randomization**
The 23rd ACM Conference on Economics and Computation, EC 2022, Boulder, USA

May. 2022 **Bayesian Persuasion Meets Mechanism Design: Going Beyond Intractability with Type Reporting**
The 21st International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2022, Virtual conference

Jul. 2021 **Bayesian Agency: Linear Versus Tractable Contracts**
The 22nd ACM Conference on Economics and Computation, EC 2021, Virtual conference

Feb. 2021 **Signaling in Bayesian Network Congestion Games: the Subtle Power of Symmetry**
The 35th AAAI Conference on Artificial Intelligence, AAAI 2021, Virtual conference

Feb. 2021 **Persuading Voters in District-based Elections**
The 35th AAAI Conference on Artificial Intelligence, AAAI 2021, Virtual conference

Dec. 2020 **Online Bayesian Persuasion**
34th Conference on Neural Information Processing Systems, NeurIPS 2020, Virtual conference

Feb. 2020 **Election Control in Social Networks via Edge Addition or Removal**
34th AAAI Conference on Artificial Intelligence, AAAI 2020, New York, USA

Aug. 2019 **Leadership in Congestion Games: Multiple User Classes and Non-Singleton Actions**
28th International Joint Conference on Artificial Intelligence, IJCAI 2019, Macao, China

Talks at International Workshops

Dec. 2020 **Online Bayesian Persuasion**
ALGADIMAR annual Meeting 2020, Virtual

Editorial Activities

International Conferences

2020 **Program Committee Member**, *AAAI conference on Artificial Intelligence, AAAI*.

2022 **Program Committee Member**, *International Conference on Machine Learning, ICML*.

2022 **Program Committee Member**, *International Joint Conference on Artificial Intelligence, IJCAI*.

2022 **Program Committee Member**, *Conference on Neural Information Processing Systems, NeurIPS*.

Students Supervision

MSc Students
- Giulia Landriani
- Giovanni Vignocchi
- Kevin Mussi
- Samuele Milanesi
- Edoardo Disarò
- Gabriele Aquaro
- Carlo Vitellio
- Francesco Bacchiocchi

Qualifications

TOEIC, Mark 940/990, Milan
Certificate of English language

Languages

Italian	Native	*Mother Tongue*
English	Fluent	*Daily practice, all work performed in English*

Skills

Programming Languages	Python, Java, C, Matlab, Ampl

Autorizzo al trattamento dati ai sensi del GDPR 2016/679 del 27 aprile 2016 (Regolamento Europeo relativo alla protezione delle persone fisiche per quanto riguarda il trattamento dei dati personali). Autorizzo la pubblicazione del Curriculum Vitae sul sito istituzionale del Politecnico di Milano (sez. Amministrazione Trasparente) in ottemperanza al D. Lgs n. 33 del 14 marzo 2013 (e s.m.i.).