

Gabriele Farina

Curriculum Vitae – December 2020

Personal information

CITIZENSHIP	Italian	US VISA	F-1 Student
EMAIL	gfarina@cs.cmu.edu	WWW	gfarina.me

Education

8/2016 – NOW



Ph.D. Student in Computer Science at [Carnegie Mellon University](#). I am currently in my fifth year.

I am fortunate to be advised by [Tuomas Sandholm](#), and to be part of the [Electronic Marketplaces Lab](#).

▷ Research interests: artificial intelligence, optimization, economics and computation, algorithms.

▷ I am supported by a [Facebook Research fellowship](#).

9/2013 – 7/2016



B.Sc. in Automation and Control Engineering at [Politecnico di Milano](#).

The program had a strong focus on computer science, control theory, and mathematical models, with additional courses in electronics and mechanics.

I was fortunate to be advised by [Nicola Gatti](#).

Highly-refereed conference papers

Decision Making, Optimization, and Computational Game Theory

1. G. Farina and T. Sandholm (2021). Model-Free Online Learning in Unknown Sequential Decision Making Problems and Games. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate: 21%.)
2. G. Farina, C. Kroer and T. Sandholm (2021). Faster Game Solving via Predictive Blackwell Approachability: Connecting Regret Matching and Mirror Descent. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate: 21%.)
3. G. Farina, R. Schmucker and T. Sandholm (2021). Bandit Linear Optimization for Sequential Decision Making and Extensive-Form Games. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate: 21%.)
4. G. Farina and T. Sandholm (2020). Polynomial-Time Computation of Optimal Correlated Equilibria in Two-Player Extensive-Form Games with Public Chance Moves and Beyond. In: *Neural Information Processing Systems (NeurIPS)*. (Acceptance rate: 20.0%.)
5. A. Celli*, A. Marchesi*, G. Farina and N. Gatti (2020). No-Regret Learning Dynamics for Extensive-Form Correlated Equilibrium. In: *Neural Information Processing Systems (NeurIPS)*. (Oral paper, acceptance rate: 1.1%. **Best paper award**.)
6. G. Farina, C. Kroer and T. Sandholm (2020). Stochastic Regret Minimization in Extensive-Form Games. In: *International Conference on Machine Learning (ICML)*. (Acceptance rate 21.8%.)
7. G. Farina, T. Bianchi and T. Sandholm (2020). Coarse Correlation in Extensive-Form Games. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 20.6%.)
8. G. Farina, C. K. Ling, F. Fang and T. Sandholm (2019). Efficient Regret Minimization Algorithm for Extensive-Form Correlated Equilibrium. In: *Neural Information Processing Systems (NeurIPS)*. (Spotlight)

paper, acceptance rate 2.5%.)

9. G. Farina, C. K. Ling, F. Fang and T. Sandholm (2019). Correlation in Extensive-Form Games: Saddle-Point Formulation and Benchmarks. In: *Neural Information Processing Systems (NeurIPS)*. (Acceptance rate 21%.)
10. G. Farina, C. Kroer and T. Sandholm (2019). Optimistic Regret Minimization for Extensive-Form Games via Dilated Distance-Generating Functions. In: *Neural Information Processing Systems (NeurIPS)*. (Acceptance rate 21%.)
11. G. Farina, C. Kroer and T. Sandholm (2019). Regret Circuits: Composability of Regret Minimizers. In: *International Conference on Machine Learning (ICML)*. (Acceptance rate: 22.6%.)
12. G. Farina, C. Kroer, N. Brown and T. Sandholm (2019). Stable-Predictive Optimistic Counterfactual Regret Minimization. In: *International Conference on Machine Learning (ICML)*. (Acceptance rate: 22.6%.)
13. G. Farina, C. Kroer and T. Sandholm (2019). Online Convex Optimization for Sequential Decision Processes and Extensive-Form Games. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 16.2%.)
14. A. Marchesi, G. Farina, C. Kroer, N. Gatti and T. Sandholm (2019). Quasi-Perfect Stackelberg Equilibrium. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 16.2%.)
15. G. Farina, N. Gatti and T. Sandholm (2018). Practical Exact Algorithm for Trembling-Hand Equilibrium Refinements in Games. In: *Neural Information Processing Systems (NeurIPS)*. (Acceptance rate 21%.)
16. G. Farina*, A. Celli*, N. Gatti and T. Sandholm (2018). Ex ante correlation and collusion in zero-sum multi-player extensive-form games. In: *Neural Information Processing Systems (NeurIPS)*. (Acceptance rate 21%.)
17. C. Kroer, G. Farina and T. Sandholm (2018). Solving Large Sequential Games with the Excessive Gap Technique. In: *Neural Information Processing Systems (NeurIPS)*. (Spotlight paper, acceptance rate 3.5%.)
18. G. Farina, A. Marchesi, C. Kroer, N. Gatti and T. Sandholm (2018). Trembling-Hand Perfection in Extensive-Form Games with Commitment. In: *International Joint Conference on Artificial Intelligence (IJCAI)*. (Acceptance rate 20%.)
19. C. Kroer, G. Farina, and T. Sandholm (2018). Robust Stackelberg Equilibria in Extensive-Form Games and Extension to Limited Lookahead. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 25%.)
20. G. Farina, C. Kroer and T. Sandholm (2017). Regret Minimization in Behaviorally-Constrained Zero-Sum Games. In: *International Conference on Machine Learning (ICML)*. (Acceptance rate 25%.)
21. C. Kroer, G. Farina and T. Sandholm (2017). Smoothing Method for Approximate Extensive-Form Perfect Equilibrium. In: *International Joint Conference on Artificial Intelligence (IJCAI)*. (Acceptance rate 26%.)
22. G. Farina and N. Gatti (2017). Extensive-Form Perfect Equilibrium Computation in Two-Player Games. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 25%)
23. G. Farina and N. Gatti (2016). Ad Auctions and Cascade Model: GSP Inefficiency and Algorithms. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 26%.)

Kidney Exchange

24. G. Farina, J.P. Dickerson and T. Sandholm (2017). Operation Frames and Clubs in Kidney Exchange. In: *International Joint Conference on Artificial Intelligence (IJCAI)*. (Acceptance rate 26%.)
25. T. Sandholm, G. Farina, J.P. Dickerson, R. Leishman, D. Stewart, R. Formica, C. Thiessen and S. Kulkarni (2017). A Novel KPD Mechanism to Increase Transplants When Some Candidates Have Multiple Willing Donors. In: *American Transplantation Congress (ATC)*.

Algorithms and Complexity

26. R. Silva*, G. Farina*, F. S. Melo, M. Veloso (2019). A theoretical and algorithmic analysis of configurable MDPs. In: *International Conference on Automated Planning and Scheduling (ICAPS)*.
27. M. Cairo, G. Farina and R. Rizzi (2016). Decoding Hidden Markov Models faster than Viterbi via online matrix-vector (max, +)-multiplication. In: *Conference on Artificial Intelligence (AAAI)*. (Acceptance rate 26%.)

* Equal contribution.

Journal papers

28. G. Farina and N. Gatti (2017). Adopting the cascade model in ad auctions: efficiency bounds and truthful algorithmic mechanisms. In: *Journal of Artificial Intelligence Research (JAIR)*.

Refereed workshop papers

Decision Making, Optimization, and Computational Game Theory

29. G. Farina and A. Celli and N. Gatti and T. Sandholm. Faster Algorithms for Optimal Ex-Ante Coordinated Collusive Strategies in Extensive-Form Zero-Sum Games. In: *AAAI-21 Workshop on Reinforcement Learning in Games (AAAI21-RLG)*.
30. G. Farina and T. Sandholm (2021). Model-Free Online Learning in Unknown Sequential Decision Making Problems and Games. In: *AAAI-21 Workshop on Reinforcement Learning in Games (AAAI21-RLG)*.
31. G. Farina, C. Kroer and T. Sandholm (2021). Faster Game Solving via Predictive Blackwell Approachability: Connecting Regret Matching and Mirror Descent. In: *AAAI-21 Workshop on Reinforcement Learning in Games (AAAI21-RLG)*.
32. G. Farina, R. Schmucker and T. Sandholm (2021). Bandit Linear Optimization for Sequential Decision Making and Extensive-Form Games. In: *AAAI-21 Workshop on Reinforcement Learning in Games (AAAI21-RLG)*.
33. G. Farina and T. Sandholm (2020). Polynomial-Time Computation of Optimal Correlated Equilibria in Two-Player Extensive-Form Games with Public Chance Moves and Beyond. In: *AAAI-21 Workshop on Reinforcement Learning in Games (AAAI21-RLG)*.
34. A. Celli, A. Marchesi, G. Farina and N. Gatti (2020). No-Regret Learning Dynamics for Extensive-Form Correlated Equilibrium. In: *AAAI-21 Workshop on Reinforcement Learning in Games (AAAI21-RLG)*.
35. G. Farina and A. Celli and N. Gatti and T. Sandholm (2020). Faster Algorithms for Optimal Ex-Ante Coordinated Collusive Strategies in Extensive-Form Zero-Sum Games. In: *Cooperative AI workshop at NeurIPS 2020 (CoopAI)*.
36. G. Farina and T. Sandholm (2020). Polynomial-Time Computation of Optimal Correlated Equilibria in Two-Player Extensive-Form Games with Public Chance Moves and Beyond. In: *Cooperative AI workshop at NeurIPS 2020 (CoopAI)*.
37. A. Celli, A. Marchesi, G. Farina and N. Gatti (2020). No-Regret Learning Dynamics for Extensive-Form Correlated Equilibrium. In: *Cooperative AI workshop at NeurIPS 2020 (CoopAI)*.
38. G. Farina and T. Sandholm (2020). Polynomial-Time Computation of Optimal Correlated Equilibria in Two-Player Extensive-Form Games with Public Chance Moves and Beyond. In: *INFORMS 2021, Contributed talk*.
39. G. Farina, C. Kroer and T. Sandholm. Faster Game Solving via Predictive Blackwell Approachability: Connecting Regret Matching and Mirror Descent. In: *INFORMS 2021, Contributed talk*.
40. G. Farina, R. Schmucker and T. Sandholm (2020). Counterfactual-Free Regret Minimization for Sequential Decision Making and Extensive-Form Games. In: *AAAI-20 Workshop on Reinforcement Learning in Games (AAAI20-RLG)*.
41. G. Farina, C. Kroer and T. Sandholm (2020). Composability of Regret Minimizers. In: *AAAI-20 Workshop on Reinforcement Learning in Games (AAAI20-RLG)*.
42. G. Farina, C. Kroer, N. Brown and T. Sandholm (2020). Stable-Predictive Optimistic Counterfactual Regret Minimization. In: *AAAI-20 Workshop on Reinforcement Learning in Games (AAAI20-RLG)*.
43. G. Farina, C. Kroer and T. Sandholm (2020). Optimistic Regret Minimization for Extensive-Form Games via Dilated Distance-Generating Functions. In: *AAAI-20 Workshop on Reinforcement Learning in Games (AAAI20-RLG)*.
44. G. Farina, C. K. Ling, F. Fang and T. Sandholm (2020). Efficient Regret Minimization Algorithm for Extensive-Form Correlated Equilibrium. In: *AAAI-20 Workshop on Reinforcement Learning in Games (AAAI20-RLG)*.

45. G. Farina, C. K. Ling, F. Fang and T. Sandholm (2020). Correlation in Extensive-Form Games: Saddle-Point Formulation and Benchmarks. In: *AAAI-20 Workshop on Reinforcement Learning in Games (AAAI20-RLG)*.
46. G. Farina, C. Kroer and T. Sandholm (2019). Compositional Calculus of Regret Minimizers. In: *Smooth Games Optimization and Machine Learning Workshop at NeurIPS'19 (SGOML'19)*.
47. G. Farina, C. K. Ling, F. Fang and T. Sandholm (2019). Power of Correlation in Extensive-Form Games. In: *International Workshop on Strategic Reasoning at IJCAI 2019 (SR 2019)*.
48. G. Farina, C. Kroer and T. Sandholm (2019). Optimistic Regret Minimization for Extensive-Form Games via Dilated Distance-Generating Functions. In: *International Workshop on Strategic Reasoning at IJCAI 2019 (SR 2019)*.
49. G. Farina, A. Marchesi, C. Kroer, N. Gatti and T. Sandholm (2019). Trembling-Hand Perfection in Stackelberg Sequential Games. In: *Games, Agents and Incentives Workshop at AAMAS 2019 (GAIW 2019)*.
50. A. Marchesi, G. Farina, C. Kroer, N. Gatti and T. Sandholm (2019). Computing a Quasi-Perfect Stackelberg Equilibrium. In: *Games, Agents and Incentives Workshop at AAMAS 2019 (GAIW 2019)*.
51. G. Farina*, A. Celli*, N. Gatti and T. Sandholm (2019). Ex ante coordination in team games. In: *AAAI-19 Workshop on Reinforcement Learning in Games (AAAI19-RLG)*.
52. C. Kroer, G. Farinaq and T. Sandholm (2019). Solving Large Sequential Games with the Excessive Gap Technique. In: *AAAI-19 Workshop on Reinforcement Learning in Games (AAAI19-RLG)*.
53. G. Farina, C. Kroer and T. Sandholm (2019). Composability of Regret Minimizers. In: *AAAI-19 Workshop on Reinforcement Learning in Games (AAAI19-RLG)*.
54. A. Marchesi, G. Farina, C. Kroer, N. Gatti and T. Sandholm (2019). Quasi-Perfect Stackelberg Equilibrium. In: *AAAI-19 Workshop on Reinforcement Learning in Games (AAAI19-RLG)*.
55. G. Farina, C. Kroer and T. Sandholm (2019). Online Convex Optimization for Sequential Decision Processes and Extensive-Form Games. In: *AAAI-19 Workshop on Reinforcement Learning in Games (AAAI19-RLG)*.
56. G. Farina, N. Gatti and T. Sandholm (2019). Practical Exact Algorithm for Trembling-Hand Equilibrium Refinements in Games. In: *AAAI-19 Workshop on Reinforcement Learning in Games (AAAI19-RLG)*.
57. C. Kroer, G. Farina and T. Sandholm (2019). Solving Large Sequential Games with the Excessive Gap Technique. In: *Smooth Games Optimization and Machine Learning workshop at NeurIPS'18 (SGOML'18)*.
58. G. Farina, N. Gatti and T. Sandholm (2018). Practical Exact Algorithm for Trembling-Hand Equilibrium Refinements in Games. In: *AAMAS-IJCAI Workshop on Agents and Incentives in Artificial Intelligence (AI3)*.
59. G. Farina, C. Kroer and T. Sandholm (2017). Regret Minimization in Behaviorally-Constrained Zero-Sum Games. In: *Algorithmic Game Theory workshop at IJCAI (AGT@IJCAI)*.

Kidney Exchange

60. G. Farina, J.P. Dickerson and T. Sandholm (2017). Multiple Willing Donors and Organ Clubs in Kidney Exchange. In: *Algorithmic Game Theory workshop at IJCAI (AGT@IJCAI)*.
61. G. Farina, J.P. Dickerson and T. Sandholm (2017). Inter-Club Kidney Exchange. In: *Workshop on AI and OR for Social Good (AIORSocGood) at AAAI-17*.

Algorithms and Complexity

62. G. Farina and L. Laura (2015). Dynamic subtrees queries revisited: the Depth First Tour Tree. In: *International Workshop on Combinatorial Algorithms (IWOCAL)*. (Acceptance rate: 33%).
63. G. Farina (2015). A linear time algorithm to compute the impact of all the articulation points. In: *Young Researcher Workshop on Automata, Languages and Programming (ICALP-YR)*.

Submissions and working papers

64. G. Farina and A. Celli and N. Gatti and T. Sandholm. Faster Algorithms for Optimal Ex-Ante Coordinated Collusive Strategies in Extensive-Form Zero-Sum Games. *Working paper*.
65. R. Schmucker, G. Farina, J. Faeder, F. Fröhlich, A. S. Saglam and T. Sandholm. Combination Treatment Optimization Using a Pan-Cancer Pathway Model. *Working paper*.
66. G. Farina, N. Gatti and T. Sandholm. Trembling Linear Programs: Algorithm and Application to Equilibrium Refinements. *Working paper*.

Talks

(beyond paper presentations at conferences)

- Deepmind (Nov. 2020). “*Speeding up equilibrium computation in sequential games: from predictive convergence to Nash equilibrium, to optimal team coordination*”.
- Jiantao Jiao’s lab at Berkeley (Oct. 2020). “*Faster algorithms for equilibrium finding in sequential games*”.

Contributions to community

- Peer review: JMLR (2021), Czech Science Foundation (2020), NeurIPS (2020), EC (2020, 2019), COLT (2020), IJCAI (2019), AAAI (2021, 2020, 2019), JAIR (2019).
- I was named in the top 10% reviewers at NeurIPS 2020.
- I contributed to OpenSpiel, a game theory library developed by DeepMind Technologies.
- I contributed a patch to fix a glitch in the pivot column selection routine of the rational simplex implementation of Glpk, a prominent open-source linear programming library.

Graduate coursework

As a student:

- Convex Optimization (Spring 2020). Instructor: **Yuanzhi Li**.
- Graduate Artificial Intelligence (Spring 2019). Instructors: **Zico Kolter** and **Nihar Shah**.
- Types and Programming Languages (Fall 2019). Instructor: **Frank Pfenning**.
- Modern Convex Optimization (Spring 2018). Instructor: **Javier Peña**.
- Convex Analysis (Spring 2018). Instructor: **Javier Peña**.
- Graduate Algorithms (Spring 2017). Instructor: **Gary Miller**.
- Advanced OS and Distributed Systems (Fall 2017). Instructor: **Dave Andersen**.

As a Teaching Assistant (TA):

- Convex Optimization (Fall 2021). Instructor: **Yuanzhi Li**.

Work experience

2017, 2018



Senior Enterprise Software and Optimization Engineer at Optimized Markets, Inc. I was responsible of designing, implementing, and validating an optimization-based algorithm to re-express the delivery of guaranteed and non-guaranteed advertising campaigns for a whole month of operation of a major client. The study was a success, with our devised parallel optimization-based allocator producing several hundreds million dollars in predicted yearly revenue surplus compared to the status quo.

2015

Google

Site Reliability Engineer (SRE) intern at the Google London office. During this 4-month internship, I built a fine-grained pipeline debugging tool for the **MillWheel** stream processing framework. I deeply enjoyed my project, and the challenges it presented, given the huge scale at which the stream computations run.

2013 – 2016

IOI team coach

I was one of the official trainers for the Italian International Olympiads in Informatics (IOI) team. I have taught several lectures on different topics in Algorithms and Data Structures. I also contributed to the preparation of the Italian national Olympiads in Informatics as part of the scientific committee from 2013 to 2015.

2013



I took part in a 2-week work experience at IBM's Research Laboratories in Hursley, UK, sponsored by the Bank of Italy for my performance in the Italian national Olympiads in Informatics. The task of our team was to design and implement a set of APIs aimed to integrate two internal products while respecting strong industry policies at all stages.

Competitions

Participation in *international* competitions

2011 – now

I like to participate in programming contests, including Codeforces, COCI, USACO, Google Code Jam.

2016

Our team was invited to the final round of **CH24** 2016, in Hungary.

2015

Our team was invited to the final round of **MARATHON24** 2015, in Poland.

2014

Member of one of the 30 finalist team in the final international round of **MARATHON24** 2014, in Gdynia, Poland. Our team reached the 13th place.

2013 Ch24

Member of one of the 30 finalist teams in the International **CH24** competition, Budapest, Hungary.

2013 IOI

International Olympiad in Informatics (IOI) held in Brisbane, Australia.

2012 IOI

International Olympiad in Informatics (IOI) held in Sirmione, Italy.

Participation in *national* competitions

2013

Italian national Olympiad in Mathematics, gold medal.

2012

Italian national Olympiad in Informatics, 4th place and gold medal.

2012, 2013

Italian national Team Olympiad in Mathematics, first place and gold medal.

2011, 2012

Italian national Olympiad in Mathematics, bronze and silver medal respectively.

2011

Italian national Olympiad in Operations Research, first place.

2010, 2011

Italian national Olympiad in Informatics, bronze and silver medal respectively.

Software and systems

I think that software built in academic settings is as important as software developed in industry, and that it should be developed with the same level of rigor that usually pertains to industrial code. I believe in tests, in reproducible builds, in continuous integration, and in relying on good tooling.

My internship in Google heavily defines the set of technologies I am familiar with. My primary languages are C++14 and Rust.

Programming languages

C++14	Expert-level experience with C++14 and its standard libraries.
RUST	Expert-level experience with the Rust programming language.
PYTHON	I'm fluent in Python, and have experience with Numpy, Scipy and Matplotlib.
JAVA, KOTLIN	I also have experience with Java and Kotlin.

Scientific libraries

PYLAB	Python's scientific stack (Numpy, Scipy, Matplotlib).
CVXPY	Convex optimization package.
EIGEN	Linear algebra library for C++.
GLPK	I am familiar with GLPK and its internals, including the <code>ssx_driver</code> (the rational simplex routines).
GUROBI, CPLEX	I have experience with Gurobi's and CPLEX's APIs.

Other libraries

I'm familiar with `GFLAGS`, `DOCOPT`, `GTEST` and `GLOG`.

Development and tooling

VAGRANT	I usually rely on Vagrant in order to define a reference target environment when writing code.
{A,M,T,UB}SAN	I am familiar with the address/memory/thread/undefined-behavior sanitizers that are usually shipped along with modern compilers, like gcc and clang.
BAZEL	I usually rely on Bazel as my build system.
OTHER	cpplint, clang-format, valgrind, gdb.