Emmanouil-Vasileios (Manolis) Vlatakis-Gkaragkounis – FODSI Post-Doc Fellow at UC Berkeley

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EDUCATION

University California, Berkeley, CA
FODSI Post-Doc Fellow in Simons Institute of Theory in Computing, *2022-2024*

Principal Investigator: Michael I. Jordan

Columbia University, New York, NY
Doctor of Philosophy in Theoretical Computer Science, *2018-2022*

Thesis: Beyond Worst-Case Analysis of Optimization in the Era of Machine Learning
Advisors: Mihalis Yannakakis & Rocco Servedio

Master of Science & Philosophy in Computer Science, *2016-2018*

Thesis: Smoothed Analysis of Complexity in Optimization
Advisor: Mihalis Yannakakis & Rocco Servedio
GPA: 4.0/4.0

National Technical University of Athens, Athens, Greece
Diploma of Electrical and Computer Engineering *2010-2016*

Diploma Thesis: Learning Algorithms on Social Choice Models
Advisor: Dimitris Fotakis, (Corelab)
GPA: 9.78/10 (top 1%)

RESEARCH INTERESTS

Smoothed & Probabilistic Complexity Analysis, Applied/Theoretical Machine Learning, Game Theory, Optimization, Statistical Inference, Differential Privacy & Quantum Algorithms.

FELLOWSHIPS HONORS AND AWARDS

Invited to Special Issue at Association for Computing Machinery (ACM) Showcase For the publication "Algorithms and Complexity for Computing Nash Equilibria in Adversarial Team Games"	*2023*
Post-Doctoral Foundations of Data Science Institute Fellowship For the participation at Simons Institute, UC Berkeley.	*2022-2024*
Simons Research Fellowship For the participation in Spring Semester Workshop of "Learning in Games"	*2021*
Simons Research Fellowship For the participation in Spring Semester Workshop of "Learning in Games"	*2021*
The Onassis Foundation Scholarship for Graduate studies	*2016-2019*
The Limmat Foundation & George Kontaxis Graduation Award-Bequest School of Electrical and Computer Engineering Graduation Fellowship (**Top Gratuated Student Award of 2016 class**)	*2016*
Christos Papakyriakopoulos & Nikos Kritikos Awards-Bequests For excellence in Mathematics in the school of Electrical and Computer Engineering	*2010-2012*
Scholarship from State Scholarships Foundation (Greece) For excellence in undergraduate studies (Top class student Award)	*2011*
Eurobank EFG Group Fellowship For excellence in university entrance exams	*2010*
Honors by the Hellenic Mathematical Society For competing and excelling in the annual nation-wide mathematical contest	*2004-2010*
Bronze Medal in NASA Fundamental Aeronautics International Student Competition For my aeronautical study/proposal about Next Generation Supersonic Aircraft Design	*2009*

MENTORING EXPERIENCE	Throughout my academic journey, I have had the pleasure of guiding, mentoring, and collaborating with several diligent students. Some of them include:

✓ **Lena Fotaki**
Thesis: Set Multidimensional Scaling Algorithms for Natural Language Embeddings
Current Position: Software Engineer, Exclusive

✓ **Angeliki Giannou**
Thesis: The stochastic asymptotic stability of discrete FTRL dynamics
Current Position: PhD Candidate, D. Papailiopoulos's group, University of Wisconsin-Madison

✓ **Foivos Kalogiannes**
Thesis: Min-Max Optimization in Two-Team Zero-Sum Games
Current Position: PhD Candidate, I. Panageas' group, University of California, Irvine

✓ **Francisca Vasconcelos**
Thesis: Quadratic Speedups in the Area of Quantum Game Theory
Current Position: PhD Candidate, M. Jordan' group, University of California, Berkeley

✓ **Rohan Chauhan**
Thesis: Riemannian Extra-Gradient and EigenGame Application
Current Position: Undergraduate Student, University of California, Berkeley

SERVICE EXPERIENCE

✓ Selected as an Invited Speaker for the Mentoring Tutorial at EC 2023, *Summer 2023*
addressing prevalent errors in students' paper presentations.

✓ Co-organizer of the semester Equilibrium Computation & Machine Learning Reading Group,
a part of the 'Learning and Games' workshop at the Simons Institute *Spring 2022*

✓ Local Organizer for 'Mihalisfest', a 3-day Workshop on Computer Science, celebrating the 70th
birthday anniversary of Mihalis Yannakakis *Summer 2023*

✓ Local Organizer of 3-day Workshop on Computer Science
for 70th Birthday Anniversary of Mihalis Yannakakis (Mihalisfest) *Summer 2023*

✓ Local Organizer of 3-day Workshop on Computer Science
for 70th Birthday Anniversary of Chistos Papadimitriou (Papafest) *Summer 2019*

✓ Local Committee: *WINE '19* *December 2019*

✓ Program Committee/Reviewer/Sub-reviewer for the following:
- *Conferences:* WINE/AAMAS/NeurIPS/ICML/ICLR/AISTATS/SODA/COLT/ALT/STOC
- *Journals:* ⋆ Transactions of Machine Learning Research (TMLR) ⋆ Mathematics of Operational Research (MOR) ⋆ Probability in the Engineering and Informational Sciences

TEACHING EXPERIENCE

TA for Graduate Courses:

- Online Mini-Course: Introduction to Game Dynamics & Optimization	*Spring 2021*
- Columbia-4252: Introduction to Computational Learning Theory	*Fall 2018*
- NTUA: Algorithmic Game Theory	*Fall 2016*

TA for Undergraduate Courses:

- NTUA: Discrete Stochastic Processes	*Spring 2015, 2016*
- NTUA: Pattern Recognition	*Fall 2014,2015*
- NTUA: Algorithms & Complexity	*Fall 2014,2015*
- NTUA: Introduction to Computer Programming	*Fall 2013, 2014*

PROGRAMMING SKILLS

Statistical Packages: Matlab (signal, image and sound processing)
Languages: C/C++, Python (**Pytorch**), Java, Unix shell scripts, MPI parallelization library.
Linux Kernel: Extension of QEMU Paravirtualization API

LANGUAGES

Greek (native) • English (fluent) • French (advanced) • German (intermediate)

PERSONAL INTERESTS

Dance: Volunteer Folk Dance Teaching • Cretan/Tango Dance
Music: Amateur Byzantinze Chantor • Traditional Cretan Poetry
Sports: Swimming • Hiking
Voluntary blood donor

Smoothed Complexity of SWAP in Local Graph Partitioning
(joint work with X. Chen, C. Guo, M. Yannakakis)
35th ACM-SIAM Symposium on Discrete Algorithms (**SODA**) *2024*

Exploiting Hidden Structures in Non-convex Games for Convergence to Nash Equilibrium
(joint work with L. Flokas, I. Sakos, P. Mertikopoulos, G. Piliouras)
37th Conference on Neural Information Processing Systems (**NeurIPS**) *2023*

Stochastic Methods in Variational Inequalities: Ergodicity, Bias and Refinements
(joint work with A. Giannou, Y. Chen, Q. Xie)
37th Conference on Neural Information Processing Systems (**NeurIPS**) *2023*

Quadratic Speedup in Finding Nash Equilibria of Quantum Zero-Sum Games
(joint work with F. Vasconcelos, P. Mertikopoulos, G. Piliouras, U. Vazirani, M. Jordan)
7th Conference on Quantum Techniques in Machine Learning (QTML) **Oral** *2023*

The Computational Complexity of Multi-player Concave Games and Kakutani Fixed Points
(joint work with C. Papadimitriou, M. Zampetakis)
24th ACM Conference on Economics and Computation (EC) *2023*

Algorithms and Complexity for Computing Nash Equilibria in Adversarial Team Games
(joint work with P. Kalogiannes, I. Anagnostides, Y. Panageas)
24th ACM Conference on Economics and Computation (EC) *2023*

Efficiently Computing Nash Equilibria in Adversarial Team Markov Games
(joint work with P. Kalogiannes, I. Anagnostides, S. Stavroulakis, V. Chatziafratis, Y. Panageas)
11th International Conference on Learning Representations (ICLR) **Oral** *2023*

Teamwork makes von Neumann work: Min-Max Optimization in Two-Team Zero-Sum Games
(joint work with P. Kalogiannes, Y. Panageas)
11th International Conference on Learning Representations (ICLR) *2023*

First-Order Algorithms for Min-Max Optimization in Geodesic Metric Spaces
(joint work with T. Lin, M. Jordan)
36th Conference on Neural Information Processing Systems (**NeurIPS**) **Oral** *2022*

On the convergence of policy gradient methods to Nash equilibria in general stochastic games
(joint work with A. Giannou, K. Lotidis, P. Mertikopoulos)
36th Conference on Neural Information Processing Systems (**NeurIPS**) *2022*

Near-Optimal Statistical Query Lower Bounds for Agnostically Learning Intersections of Half-spaces with Gaussian Marginals
(joint work with D. Hsu, R. Servedio, C. Sanford)
35th Annual Conference on Learning Theory (**COLT**) *2022*

On the Rate of Convergence of Regularized Learning in Games:
From Bandits to Optimism and Beyond (joint work with A. Giannou, P. Mertikopoulos)
35th Conference on Neural Information Processing Systems (**NeurIPS**) *2021*

Solving Min-Max Optimization with Hidden Structure via Gradient Descent Ascent
(joint work with L. Flokas, G. Piliouras)
35th Conference on Neural Information Processing Systems (**NeurIPS**) *2021*

Reconstructing of weighted voting schemes from power indices
(joint work with H. Benett, A. De, R. Servedio)
34th Annual Conference on Learning Theory (**COLT**) *2021*

On the Approximation Power of Two-Layer Networks of Random ReLUs
(joint work with D. Hsu, R. Servedio, C. Sanford)
34th Annual Conference on Learning Theory (**COLT**) *2021*

Survival of the strictest: Stable and unstable equilibria under regularized learning
with partial information (joint work with A. Giannou, P. Mertikopoulos)
34th Annual Conference on Learning Theory (**COLT**) *2021*

Optimal Private Median Estimation under Minimal Distributional Assumptions
(joint work with C. Tzamos, I. Zadik)
34th Conference on Neural Information Processing Systems (**NeurIPS**) Spotlight *2020*

No-regret learning and mixed Nash equilibria: They do not mix
(joint work with L. Flokas, T. Lianeas, P. Mertikopoulos, G. Piliouras)
34th Conference on Neural Information Processing Systems (**NeurIPS**) Spotlight   *2020*

Smoothed Complexity of Local Max-Cut and Binary Max-CSP
(joint work with X. Chen, C. Guo, M. Yannakakis, X. Zhang)
51st ACM Symposium on Theory of Computing (**STOC**)   *2019*

**Poincaré Recurrence, Cycles and Spurious Equilibria in Gradient-Descent-Ascent
for Non-Convex Non-Concave Zero-Sum Games**
(joint work with L. Flokas, G. Piliouras)
33th Conference on Neural Information Processing Systems (**NeurIPS**) Spotlight   *2019*

Efficiently avoiding saddle points with zero order methods: No gradients required
(joint work with L. Flokas, G. Piliouras)
33th Conference on Neural Information Processing Systems (**NeurIPS**)   *2019*

JOURNAL
MANUSCRIPTS
UNDER REVIEW

Chaos persists in large-scale multi-agent learning despite adaptive learning rates
(joint work with L. Flokas, G. Piliouras)
Submitted to Mathematics of Operations Research Journal (**MOR**)

Curvature-Independent Last-Iterate Convergence for Games on Riemannian Manifolds
(joint work with Y. Cai, A. Oikonomou T. Lin, M. Jordan)
Submitted to Journal of Machine Learning Research (**JMLR**)

Pattern Search Multidimensional Scaling
(joint work with G. Paraskevopoulos, E. Tzinis, A. Potamianos)
Submitted to EURO Journal on Computational Optimization (**EURO**)

The Computational Complexity of Multi-player Concave Games and Kakutani Fixed Points
(joint work with C. Papadimitriou, M. Zampetakis)
Submitted to Games and Economic Behavior Journal (**GEB**)

Algorithms and Complexity for Computing Nash Equilibria in Adversarial Team Games
(joint work with P. Kalogiannes, I. Anagnostides, Y. Panageas)
Submitted to Games and Economic Behavior (**GEB**)

WORKING
MANUSCRIPTS

Smoothed Analysis of Hidden Monotone Games and Applications in Neural Kelly auctions
(joint work with M. Jordan)
The Influencer's Problem: Optimal Revenue Dynamic Linear Contracts
(joint work with G. Guruganesh, I. Cohen, J. Schneider, J. Wang, M. Weinberg, Y. Kolumbus)
Statistical inference for model parameters in overparametrized networks
(joint work with R. Chohan, M. Jordan)
Bounded-∃Q: The Computational Complexity of Tenth Hilbert's Problem
(joint work with M. Christ, M. Yannakakis)
Breaking the Efficiency Frontiers for Online Learning of Quantum States
(joint work with F. Vasconcelos, K. Tarun, U. Vazirani, M. Jordan)
TangoTek: AI-supported Tango Music Composing
(joint work with M. Strofalis, P. Liang, M. Jordan)
Langrangian in High Resolution ODE for Games
(joint work with A. Wibisono, N. Wadia, , M. Jordan)

REFERENCES
AVAILABLE ON
REQUEST

Michael Jordan	Professor, UC Berkeley *(PostDoc advisor)*
Mihail Yannakakis	Professor, Columbia University *(PhD advisor)*
Rocco Anthony Servedio	Professor, Columbia University *(PhD advisor)*
Christos Papadimitriou	Professor, Columbia University *(Research collaborator)*
Xi Chen	Professor, Columbia University *(Research collaborator)*
Georgios Piliouras	Professor, Singapore University *(Research collaborator)*,
Panayotis Mertikopoulos	Principal Researcher, CNRS *(Research collaborator)*,
Dimitris Fotakis	Associate Professor, NTUA *(Bsc advisor, course instructor)*

Quadratic Speedup in Finding Nash Equilibria of Quantum Zero-Sum Games
⋆ 7th Conference on Quantum Techniques in Machine Learning (**QTML**) - (**CERN**) *November 2023*

The Computational Complexity of Multi-player Concave Games and Kakutani Fixed Points
⋆ 24th ACM Conference on Economics and Computation (**EC**) *July 2023*
⋆ 9th Canadian Discrete and Algorithmic Mathematics(**Un. Winippeg**) *June 2023*
⋆ TCS Seminar of Computation and Reasoning Laboratory at NTUA *December 2022*

The Milonga Night Problem
⋆ Games, Learning, and Networks Workshop (IMS) (**N. Univ. of Singapore**) *April 2023*

Smoothed Complexity of SWAP in Local Graph Partitioning
⋆ Seminar in TCS Lunch (**Columbia University**) *March 2023*

First-Order Algorithms for Min-Max Optimization in Geodesic Metric Spaces
36th Conference on Neural Information Processing Systems (**NeurIPS**) **Oral** *November 2022*

Beyond Worst-Case Analysis in Optimization
⋆ MihalisFest (**Columbia University**) *August 2023*
⋆ Fellows' Meeting (**Simons Institute**) *September 2022*
⋆ Seminar in M. Jordan Reading Group (**S.A.I.L**) *September 2022*

Building Optimization beyond Minimization: A Journey in Game Dynamics
⋆ Computer Science Short talk venue (**Boston University**) *January 2022*
⋆ Colloquium in Algorithms & Randomness Center (ARC) (**Georgia Tech**) *February 2022*
⋆ Seminar in Algorithms & Complexity (**U. Waterloo**) *February 2022*
⋆ Seminar in Algorithms, Combin. & Optimization (**Univ. California in Irvine**) *February 2022*
⋆ Seminar in Algorithms & Complexity (**Aarhus University**) *March 2022*
⋆ Seminar in TCS Lunch (**Purdue University**) *April 2022*
⋆ Workshop in Algorithms, Economics and Learning (**Naxos**) *Summer 2022*

Teamwork makes von Neumann work: Min-Max Optimization in Two-Team Zero-Sum Games
⋆ The New York Colloquium on Algorithms and Complexity (**NYCAC**) *February 2021*
⋆ Fellows' Meeting (**Simons Institute**) *February 2022*

On the Rate of Convergence of Regularized Learning in Games:
From Bandits to Optimism
⋆ 35th Conference on Neural Information Processing Systems (**NeurIPS**) *December 2021*

Solving Min-Max Optimization with Hidden Structure via Gradient Descent Ascent
⋆ 35th Conference on Neural Information Processing Systems (**NeurIPS**) *December 2021*

Reconstructing of weighted voting schemes from power indices
⋆ 34th Annual Conference on Learning Theory (**COLT**) *July 2021*

On the Approximation Power of Two-Layer Networks of Random ReLUs
⋆ 34th Annual Conference on Learning Theory (**COLT**) *July 2021*

Survival of the strictest: Stable and unstable equilibria under regularized learning
with partial information
⋆ 34th Annual Conference on Learning Theory (**COLT**) *July 2021*
⋆ Informs Annual Meeting *October 2021*
⋆ Columbia University TCS Lunch Student Seminar *December 2021*

Optimal Private Median Estimation under Minimal Distributional Assumptions
⋆ Columbia University TCS Lunch Seminar *July 2020*
⋆ 34th Conference on Neural Information Processing Systems (**NeurIPS**) **Spotlight** *December 2020*
⋆ Athens Colloquium of Cryptography and Security (**AtheCRYPT**) *March 2022*

No-regret learning and mixed Nash equilibria: They do not mix
⋆ 34th Conference on Neural Information Processing Systems (**NeurIPS**) **Spotlight** *December 2020*
⋆ Informs Annual Meeting *October 2021*

Smoothed Complexity of Local Max-Cut and Binary Max-CSP
⋆ 51st ACM Symposium on Theory of Computing (**STOC**) *July 2019*
⋆ TCS Seminar of Computation and Reasoning Laboratory at NTUA *September 2019*

Public Science Presentations in Economist Youth Summits
⋆ **Success is (obviously) not a matter of age: A World in Transition** *March 2019*
⋆ **Intelligence is the ability to adapt to change** *March 2018*

Poincaré Recurrence, Cycles and Spurious Equilibria in Gradient-Descent-Ascent
for Non-Convex Non-Concave Zero-Sum Games
⋆ The New York Colloquium on Algorithms and Complexity (**NYCAC**) *November 2019*
⋆ TCS Seminar of Computation and Reasoning Laboratory at NTUA *December 2019*
⋆ 33th Conference on Neural Information Processing Systems (**NeurIPS**) **Spotlight** *December 2019*

Efficiently avoiding saddle points with zero order methods: No gradients required
⋆ Optimization and Machine Learning Seminar organized by Corelab at NTUA *January 2019*
⋆ 33th Conference on Neural Information Processing Systems (**NeurIPS**) *December 2019*