Carles Domingo-Enrich

Contact Data

Phone and email: +1 929 334 5312, cd2754@nyu.edu
Nationality: Spanish, on OPT status attached to F-1 visa
Website: https://cdenrich.github.io

Education

May 2024 Sept 2019	PhD in **Computer Science** at the **Courant Institute of Mathematical Sciences, New York University**. Advisor: Joan Bruna. Topics of research: diffusion models, generative modeling, theory of deep learning, hypothesis testing, optimization for continuous games.
Sept 2014 - May 2019	Bachelor's degrees in **Mathematics** and **Engineering Physics** at **Universitat Politècnica de Catalunya (UPC)**, Barcelona. Student at CFIS (Interdisciplinary Higher Education Center). Final grades: 8.63/10 (Math.), 8.98/10 (Eng. Physics)

Research and Work Experience

Current Sept 2024	Senior Researcher at **Microsoft Research** New England in Cambridge, MA, working on generative AI models
Aug 2024 Oct 2022	Visiting Researcher (part-time) at **Meta FAIR Labs** in New York City, NY, working with Ricky T. Q. Chen and Brandon Amos.
May-Aug 2022	Intern at **Microsoft Research** New England in Cambridge, MA (remote), working with Lester Mackey.
May-Aug 2021	Intern at **IBM Research AI** in Yorktown Heights, NY (remote), working with Youssef Mroueh.
2020-2022	TA for the courses DS-GA 1014 Optimization and Computational Linear Algebra for Data Science (Fall 2020), and CSCI-GA 3033-079 Special Topic: Mathematics of Deep Learning (Spring 2022). TA and grader for the course DS-GA 1005 Inference and Representation (Fall 2021).
Sept '18-May '19	Student intern at NYU, Courant Institute of Mathematical Sciences
May-Aug 2018	Data scientist intern at Gauss & Neumann (SEM firm) in Barcelona
Jul-Sept 2017	Summer research intern at Nokia Bell Labs in Paris (Nokia Paris-Saclay)

Publications and preprints

- **Domingo-Enrich, C.**, Drozdzal, M., Karrer, B., Chen, R.T.Q. Adjoint matching: fine-tuning flow and fiffusion generative models with memoryless stochastic optimal control. arXiv preprint Sept. 2024
- Pooladian, A.-A., **Domingo-Enrich, C.**, Chen, R.T.Q., Amos, B. Neural optimal transport with Lagrangian costs. UAI, 2024.
- **Domingo-Enrich, C.**, Han, J., Amos, B., Bruna, J., Chen, R.T.Q. Stochastic optimal control matching. arXiv preprint Dec. 2023.
- Jelassi, S., d'Ascoli, S., **Domingo-Enrich, C.**, Wu, Y., Li, Y., Charton, F. Length generalization in arithmetic transformers. arXiv preprint Jun. 2023.

- Cabannes, V., **Domingo-Enrich, C.** Open problem: learning with variational objectives on measures. arXiv preprint Jun. 2023.
- **Domingo-Enrich, C.**, Pooladian, A.-A. An explicit expansion of the Kullback-Leibler divergence along its Fisher-Rao gradient flow. TMLR 2023.
- Pooladian, A.-A.*, Ben-Hamu, H.*, **Domingo-Enrich, C.***, Amos, B., Lipman, Y., Chen, R.T.Q. Multisample flow matching: straightening flows with minibatch couplings. ICML 2023. *Equal contribution
- **Domingo-Enrich, C.**, Dwivedi, R., Mackey, L. Compress then test: powerful kernel testing in near-linear time. AISTATS 2023.
- **Domingo-Enrich, C.** Computing the variance of shuffling stochastic gradient algorithms via power spectral density analysis. arXiv preprint Jun. 2022.
- **Domingo-Enrich, C.**, Mroueh, Y. Auditing differential privacy in high dimensions with the kernel quantum Rényi divergence. arXiv preprint May 2022.
- **Domingo-Enrich, C.**, Schiff, Y., Mroueh, Y. Learning with stochastic orders. ICLR 2023 (**spotlight**, $\sim 8\%$ of submissions).
- **Domingo-Enrich, C.**, Bruna, J. Simultaneous transport evolution for minimax equilibria on measures. arXiv preprint Feb. 2022.
- **Domingo-Enrich, C.** Depth and feature learning are provably beneficial for neural network discriminators. COLT 2022.
- **Domingo-Enrich, C.**, Mroueh, Y. Tighter sparse approximation bounds for ReLU neural networks. ICLR 2022 (**spotlight**, $\sim 5\%$ of submissions).
- **Domingo-Enrich, C.**, Bietti, A., Gabrié, M., Bruna, J., Vanden-Eijnden E. Dual training of energy-based models with overparametrized shallow neural networks. arXiv preprint July 2021.
- **Domingo-Enrich, C.**, Mroueh Y. Separation results between fixed-kernel and feature-learning probability metrics. NeurIPS 2021 (**oral**, $< 1\%$ of submissions).
- **Domingo-Enrich, C.**, Bietti, A., Vanden-Eijnden, E., Bruna, J. On energy-based models with overparametrized shallow neural networks. ICML 2021 (**long talk**, $\sim 3\%$ of submissions).
- **Domingo-Enrich, C.**, Pedregosa, F., Scieur, D. Average-case acceleration for bilinear games and normal matrices. ICLR 2021.
- **Domingo-Enrich, C.**, Jelassi, S., Mensch, A., Rotskoff, G., Bruna, J. A mean-field analysis of two-player zero-sum games. NeurIPS 2020.
- Jelassi, S.*, **Domingo-Enrich, C.***, Scieur, D., Mensch, A., Bruna, J. Extragradient with player sampling for faster Nash equilibrium finding. ICML 2020. *Equal contribution.
- Domingo-Ferrer, J., Ricci, S., **Domingo-Enrich, C.** Outsourcing scalar products and matrix products on privacy-protected unencrypted data stored in untrusted clouds. Information Sciences, vol. 436-437, pp. 320-342, April 2018.

TALKS

- Talk at TransferLab Seminar. Sept. 2024. *Stochastic Optimal Control Matching.*
- Talk at Microsoft Research New England. March 2024. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields.*
- Talk at Cornell Tech, Volodymyr Kuleshov's group. Feb. 2024. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields.*

- Talk at Google Deepmind. Jan. 2024. *Stochastic Optimal Control Matching*.
- Talk at Flatiron Institute. Jan. 2024. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Kempner Institute, Harvard University. Dec. 2023. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Meta FAIR Labs. Nov. 2023. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Nvidia's Fundamental Generative AI group, Sept. 2023. *Speeding up generative modeling and distribution testing*.
- Microsoft Research New England Seminar, Feb. 2023. *Speeding up generative modeling and distribution testing*.
- Yingzhen Li's group meeting, Imperial College, July 2022. *Separation results between fixed-kernel and feature-learning probability metrics* & *Depth and Feature Learning are Provably Beneficial for Neural Network Discriminators*.
- Joan Bruna & Jason Lee's joint group meeting, June 2022. *Depth and Feature Learning are Provably Beneficial for Neural Network Discriminators*.
- IBM Research AI seminar, June 2022. *Auditing Differential Privacy in High Dimensions with the Kernel Quantum Rényi Divergence*.
- MIT - IBM Watson AI Lab invited seminar, March 2022. *Depth and Feature Learning are Provably Beneficial for Neural Network Discriminators*.
- MIT - IBM Watson AI Lab invited seminar, Nov. 2021. *Tighter sparse approximation bounds for ReLU neural networks*.
- MIT - IBM Watson AI Lab invited seminar, July 2021. *Separation results between fixed-kernel and feature-learning probability metrics*.
- Weinan E's group meeting at Princeton, April 2020. *A mean-field analysis of two-player zero-sum games*.
- Princeton PACM Graduate Student Seminar, March 2020. *A mean-field analysis of two-player zero-sum games*.

Fellowships and achievements

Oct 2021	NeurIPS 2021 Outstanding Reviewer award
Jul 2018	**La Caixa Fellowship** for postgraduate studies in North America and the Asia-Pacific region. 55 fellowships were awarded among 446 Spanish applicants. The fellowship covers tuition of the PhD program and a stipend of around $30k/year for 24 months.
Jun 2014	**First student ever to achieve a perfect score (10/10)** in the general phase of the University Entrance Examinations of Catalonia (Proves d'Accés a la Universitat - PAU). These examinations have taken place every year for more than 30 years. The general phase consists of 5 tests that all students applying for a degree in a Catalan university must take. Newspaper article (in Spanish): *http://ccaa.elpais.com/ccaa/2014/06/27/catalunya/1403862593_090989.html*
2014	Bronze medal at the 2014 Spanish Mathematical Olympiad and silver medal at the 2014 Spanish Physics Olympiad.

Languages and computer skills

Languages: Catalan (mother tongue), Spanish (proficient), English (proficient, Cambridge English: Advanced, TOEFL 113), French (Upper intermediate, DELF B2), German (Intermediate, B1+, EOI - Official Language School of Catalonia)

Programming languages: Python, PyTorch, C++, MATLAB, OCaml, R, MySQL