OSCAR DAVIS

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https://github.com/olsdavis

EDUCATION

PhD in Computer Science, University of Oxford — Oct 2023 – Jul 2026
- Funded by Project CETI and Intel.
- Specialising in Generative Modeling, supervised by Prof M. Bronstein and Dr I. Ceylan.

MSc in Advanced Computer Science, University of Oxford — Oct 2022 – Aug 2023
- GPA: 80% on coursework and 83% on dissertation; degree obtained with distinction.
- *Tony Hoare Prize* for the best dissertation of the course (see "MSc Dissertation" below for detail).

BSc in Computer Science, EPFL — Sep 2019 – Jul 2022
- Overall GPA: 5.45/6 (90%).
- Swiss Study Foundation Scholarship for excellent academic results.
- **3rd Year Exchange at Imperial College, London**: 1st class honours, with scholarship.

EXPERIENCE

Research Intern at Microsoft Research, Cambridge — Nov 2023 – Feb 2024
- Engineering work on Diffusion Models, Latent Diffusion Models, VAEs, simple video models, Neural ODEs.
- Theoretical analyses of Diffusion Models via SDEs, PDEs. *(Patent coming soon!)*

Various Teaching Assistant positions
- Graph Representation Learning (Oxford, October – December 2023, 2024); OOP/Java (EPFL, February – July 2021).

RESEARCH

Fisher Flow Matching for Generative Modeling over Discrete Data — May 2024
Davis, O., Kessler, S., Petrache, M., Ceylan, I., Bronstein, M., Bose, AJ.
NeurIPS 2024, Vancouver. Preprint: arxiv.org/abs/2405.14664.

MSc Dissertation, *Information Theory for GNNs, with Dr. I. Ceylan and Prof. M. Bronstein* — Feb 2023 – Aug 2023
- Developed a formal information-theoretic framework to fully characterise informational bottlenecks in Graph Neural Networks, including over-smoothing and over-squashing. The analysis involved advanced concepts in information theory, and linear algebra. Received the Tony Hoare Prize for the best dissertation of the course.

BSc Research Project, *DeFi analysis, with Dr A. Gervais* — Jan 2022 – Aug 2022
- Analysed DeFi markets on the Ethereum and BNB Chain blockchains, quantified offered financial security.
- Created a program in Go using a custom GPU version of Bellman-Ford in CUDA to detect real-time arbitrage opportunities, and to quantify historically how much more assets could have been extracted, scanning $864\times$ more markets than previous SOTA within 1.5 ± 1.2 seconds, outperforming past arbitrage by on average 0.06 ETH and up to 4.4 ETH.

OTHER ACHIEVEMENTS

- French Scientific Baccalaureate obtained with High Honours, and with 100% in (Advanced) Mathematics.
- Participated to the 2017 French Mathematics Olympiads and obtained a distinction in the Bordeaux academy.
- Restored and mastered audio, and composed an original piece for *The Grey Part of Blue* (T. Gimeno).
- Produced, mixed and mastered *Gabarit* (Rod), and mixed *Bouteille à la mer* (Rod) with SodaSound.
- President of the Oxford University French Society (2023 – 2024).
- G-Research Grant for PhD students and postdocs in quantitative fields.

SKILLS

Proficient in	Python (PyTorch, PyG, NumPy, Matplotlib), Java, Scala (Spark, Akka), Go, C
Languages	Fluent in French, English and Russian, conversational in German
Music	Piano (ABRSM 8), guitar (self-taught, beginner), composition, arrangement, sound-engineering