Antoine Dedieu

Senior Research Scientist at Google DeepMind

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Education

2016–2018 **Massachusetts Institute of Technology**.
Master of Science in *Operations Research*. Advised by Prof. Rahul Mazumder. Research areas: *Optimization*, *Machine Learning*, *Statistics*. Coursework includes: *Linear Optimization*, *Statistical Learning*, *Dynamic Programming* and *Bayesian Modeling*. GPA: 5.0/5.0.

2013–2016 **École Polytechnique**.
France's premiere university for science and engineering. Master in *Probability, Statistics and Finance*. Coursework includes: *CS* and *Economics*. Ranked in the top 5% of the class. GPA: 3.96/4.

2011–2013 **Lycée Sainte-Geneviève**, *Preparatory program*.
Intensive two-year preparation program. *Maths, CS and Physics* track. GPA: 3.98/4.

Publications

Conference Articles

23. Improving Transformer World Models for Data-Efficient RL [PDF]
Outstanding paper award at ICLR 2025 World Model Workshop.
International Conference on Machine Learning (ICML), 2025.
A. Dedieu*, J. Ortiz*, X. Lou, C. Wendelken, W. Lehrach, S. Guntupalli, M. Lázaro-Gredilla, K. Murphy

22. DMC-VB: A Benchmark for Representation Learning for Control with Visual Distractors [PDF]
Neural Information Processing Systems (Neurips), 2024.
A. Dedieu*, J. Ortiz*, W. Lehrach, S. Guntupalli, C. Wendelken, A. Humayun, S. Swaminathan et al.

21. Diffusion Model Predictive Control [PDF]
Transactions on Machine Learning Research, 2024.
G. Zhou, S. Swaminathan, R. Raju, S. Guntupalli, W. Lehrach, J. Ortiz, **A. Dedieu** et al.

20. Learning Cognitive Maps from Transformer Representations for Efficient Planning in Partially Observed Environments
ICML, 2024. **A. Dedieu**, W. Lehrach, G. Zhou, D. George, M. Lázaro-Gredilla [PDF]

19. Schema-learning and rebinding as mechanisms of in-context learning and emergence [PDF]
Spotlight at Neurips, 2023. S. Swaminathan, **A. Dedieu**, R. V. Raju, M. Shanahan, M. Lázaro-Gredilla, D. George

18. Learning noisy-OR Bayesian Networks with Max-Product Belief Propagation [PDF]
ICML, 2023. **A. Dedieu**, G. Zhou, M. Lázaro-Gredilla, D. George

17. Graphical Models with Attention for Context-Specific Independence and an Application to Perceptual Grouping.
ArXiv, 2021. G. Zhou, W. Lehrach, **A. Dedieu**, M. Lázaro-Gredilla. [PDF]

16. Perturb-and-max-product: Sampling and learning in discrete energy-based models. [PDF]
Neurips, 2021. M. Lázaro-Gredilla, **A. Dedieu**, D. George

15. Sample-Efficient L0-L2 Constrained Structure Learning of Sparse Ising Models. [PDF]
Association for the Advancement of Artificial Intelligence (AAAI), 2021.
A. Dedieu, M. Lázaro-Gredilla, D. George

14. Query Training: Learning a Worse Model to Infer Better Marginals in Undirected Graphical Models with Hidden Variables. [PDF]
AAAI, 2021. M. Lázaro-Gredilla, W. Lehrach, N. Gothoskar, G. Zhou, **A. Dedieu**, D. George.

13. Improved error rates for sparse (group) learning with Lipschitz loss functions. [PDF]
ArXiv, 2021. **A. Dedieu**.

12. An error bound for Lasso and Group Lasso in high dimensions. [PDF]
ArXiv, 2019. **A. Dedieu**.

11. Learning higher-order sequential structure with cloned HMMs. [PDF]
ArXiv, 2019. **A. Dedieu**, N. Gothoskar, S. Swingle, W. Lehrach, M. Lázaro-Gredilla, D. George.

10. Error bounds for sparse classifiers in high-dimensions. [PDF]
Artificial Intelligence and Statistics, 2019. **A. Dedieu**.

9. Hierarchical Modeling and Shrinkage for User Session Length Prediction in Media Streaming. [PDF]
Conference on Information and Knowledge Management, 2018. **A. Dedieu**, R. Mazumder, Z. Zhu, H. Vahabi.

Journal Articles

8. PGMax: Factor Graphs for Discrete Probabilistic Graphical Models and Loopy Belief Propagation in JAX. [PDF]
Journal of Machine Learning Research (JMLR), 2025.
G. Zhou, **A. Dedieu**, N. Kumar, M. Lázaro-Gredilla, S. Kushagra, D. George.

7. Solving L1-regularized SVMs and related linear programs: Revisiting the Effectiveness of Column and Constraint Generation. [PDF]
JMLR, 2022. **A. Dedieu**, R. Mazumder, H. Wang.

6. Subset Selection with Shrinkage: Sparse Linear Modeling when the SNR is low. [PDF]
Operations Research, 2022. R. Mazumder, P. Radchenko, **A. Dedieu**.

5. Learning Sparse Classifiers: Continuous and Mixed Integer Optimization Perspectives. [PDF]
JMLR, 2021. **A. Dedieu**, H. Hazimeh, R. Mazumder.

4. Clone-structured graph representations enable flexible learning and vicarious evaluation of cognitive maps. [PDF]
Nature Communications, 2021. D. George, R. Rikhye, N. Gothoskar, J. Guntupalli, **A. Dedieu**, M. Lázaro-Gredilla.

3. Learning attention-controllable border-ownership for objectness inference and binding. [PDF]
ArXiv, 2020. **A. Dedieu**, R. Rikhye, M. Lázaro-Gredilla, D. George.

2. A detailed mathematical theory of thalamic and cortical microcircuits based on inference in a generative vision model. [PDF]
ArXiv, 2021. D. George, M. Lázaro-Gredilla, W. Lehrach, **A. Dedieu**, G. Zhou.

Thesis

1. Sparse learning: statistical and optimization perspectives. [PDF]
Massachusetts Institute of Technology, 2018. **A. Dedieu**.

Work Experience

2024– **Senior Research Scientist**, *Google DeepMind*, San Francisco Area.

2022–2024 **Research Scientist**, *Google DeepMind*, San Francisco Area.
- Building sample-efficient model-based agents that can learn new tasks on new environments
- Proposing new approaches for world modeling to learn environment dynamics
- Addressing challenging planning problems, which current LLM struggle with.
- Built novel generative probabilistic models and solving the associated learning and inference problems.
- Proposed novel transformers architecture to address inherent limitations of vanilla transformers.

2021–2022 **Senior Research Scientist**, *Vicarious AI*, San Francisco Area.

2018–2021 **Researcher**, *Vicarious AI*, San Francisco Area.
- Created a pipeline for box detection with Recursive Cortical Networks (RCNs), used 1M+ times in production.
- Created novel computational algorithms to improve the internal cutting-edge RCN vision model performance. Findings led to 40% gains in speed and accuracy on robots.
- Built new biologically-inspired probabilistic graphical models for central machine learning problems.

2017–2018 **Graduate Student Researcher**, *Pandora - MIT*, Boston.
- Predicted user session length through a new hierarchical Bayesian modeling framework.

2016 **Equity Derivative Structurer**, *Société Générale*, Paris.

2013–2014 **Teacher Assistant and Examiner**, *Jiao Tong University*, Shanghai.

Google Scholar

As of Aug. 28, 2025. Number of citations: **822**. h-index: 11. i10-index: 13. [Profile]

Selected open source projects

DMC-VB: A Benchmark for Representation Learning for Control with Visual Distractors [GitHub]

PGMax: Loopy belief propagation for factor graphs on discrete variables in JAX [GitHub]

Max-product noisy-OR [GitHub]

Perturb-and-max-product: Sampling and learning in discrete energy-based models [GitHub]

Sample-Efficient L0-L2 Constrained Structure Learning of Sparse Ising Models [GitHub]

Solving large-scale L1-regularized SVM and cousins [GitHub]

Subset Selection with Shrinkage [GitHub]

Poster presentations

July 2025	International Conference on Machine Learning [Recorded talk] .
Dec. 2024	Neural Information Processing Systems.
July 2024	International Conference on Machine Learning.
Dec. 2023	Neural Information Processing Systems.
July 2023	International Conference on Machine Learning [Recorded talk] .
Dec. 2021	Neural Information Processing Systems.
Feb. 2021	Association for the Advancement of Artificial Intelligence [Recorded talk] .
April 2019	Artificial Intelligence and Statistics.

Patents

US patent US2021/0125030A1, issued April 29, 2021. [Link]
Method and system for query training.
M. Lázaro-Gredilla, W. Lehrach, N. Gothoskar, G. Zhou, **A. Dedieu**, D. George.

External panel

Mar. 2024	AI unveiled: Navigating Opportunities, Risks, and Governance [Event] .
Sep. 2023	Unleashing the Future of Generative AI [Event] .

Technical skills and Languages

Computing	PYTHON, R, C++, SQL, GitHub
Languages	**French**: mother tongue. **English**: fluent. **Spanish**: fluent. **Chinese**: two years