Antoine Dedieu

Researcher at Vicarious AI

☎ *857-316-9411*
✉ *antoine@vicarious.com*
🖥 *antoine-dedieu.github.io*

▬▬ Research interest

My primary research interest lie (a) at the intersection of optimization, machine learning and statistics (b) at the interface between probabilistic graphical models and cognitive sciences.

▬▬ 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

Journal Articles

14. Learning attention-controllable border-ownership for objectness inference and binding. [PDF]
Submited, 2021. A. Dedieu, R. V. Rikhye, M. Lázaro-Gredilla, D. George.

13. A detailed mathematical theory of thalamic and cortical microcircuits based on inference in a generative vision model. [PDF]
Submited, 2020. D. George, M. Lázaro-Gredilla, W. Lehrach, A. Dedieu, G. Zhou.

12. Learning Sparse Classifiers: Continuous and Mixed Integer Optimization Perspectives. [PDF]
Journal of Machine Learning Research (accepted, 2021). A. Dedieu, H. Hazimeh, R. Mazumder.

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

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

9. Solving large-scale L1-regularized SVMs and cousins: the surprising effectiveness of column and constraint generation. [PDF]
Journal of Machine Learning Research (major revisions, 2019). A. Dedieu, R. Mazumder.

8. Subset Selection with Shrinkage: Sparse Linear Modeling when the SNR is low. [PDF]
Operations Research (major revisions, 2020). R. Mazumder, P. Radchenko, A. Dedieu.

Thesis

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

Articles in highly selective conference proceedings

6. Symbolic Recurrent Computations with Markov Attention Models for Compositional Object Modeling
Submitted, 2021. G. Zhou, A. Dedieu, W. Lehrach, M. Lázaro-Gredilla.

5. Sparse (group) learning with Lipschitz loss functions: a unified analysis. [PDF]
Submitted, 2021. A. Dedieu.

4. 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

3. 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.

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

1. 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.

Work Experience

2018– **Researcher**, *Vicarious AI*, SAN FRANCISCO.
- Created a pipeline for box detection with Recursive Cortical Networks (RCNs), used $1M+$ times in production.
- Creating novel computational algorithms to improve the internal cutting-edge RCN vision model performance. Findings led to 30% gains in speed and accuracy on robots.
- Building new biologically-inspired probabilistic graphical models for central machine learning problems. Findings published in top journals/conferences.

2017–2018 **Graduate Student Researcher**, *Pandora - MIT*, BOSTON.
- 9-month research project, advised by Prof. Mazumder (MIT) and Zhu (Pandora).
- Predicted user session length through a new hierarchical Bayesian modeling framework.

2016 **Equity Derivative Structurer**, *Société Générale*, PARIS.
- 6-month internship. Built a machine learning pricer for structured products. Reached 0.2% MAE.

2015 **Web Developer**, *Option*, SANTIAGO.
- 3-month internship. Developed a form builder tool for a social network.

2013–2014 **Teacher Assistant and Examiner**, *Jiao Tong University*, SHANGHAI.
- 6-month internship. Mentored top Chinese undergraduate students enrolled in a French Preparatory program.

Google scholar

Total number of citations (as of May 19, 2021): 78.

Presentations

Feb. 2021 Sample-efficient L0-L2 constrained structure learning of sparse Ising models.
Association for the Advancement of Artificial Intelligence

April 2019 Error bounds for sparse classifiers in high-dimensions.
Artificial Intelligence and Statistics

Sept. 2018 Hierarchical Modeling and Shrinkage for User Session Length Prediction in Media Streaming .
Conference on Information and Knowledge Management

May 2018 Sparse learning: statistical and optimization perspectives.
Massachusetts Institute of Technology

April 2018 Hybrid Column-and-Constraint Generation for large-scale sparse Support Vector Machines.
Vicarious AI

Patents

US patent US2021/0125030A1, filed Oct.22,2020 and issued Apr.29,2021. [PDF]
Method and system for query training. M. Lázaro-Gredilla, W. Lehrach, N. Gothoskar, G. Zhou, A. Dedieu, D. George.

Technical skills and Languages

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

Personal interests

Sports Tennis ten years (captain of a Ecole Polytechnique team), rugby and football (competitions).
Travel China, Russia, Japan, Indonesia, Bolivia, Peru, Cuba, Mexico, Eastern and Southern Europe.