

David Alvarez-Melis

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RESEARCH INTERESTS

- Themes Structured learning, statistical divergences, interpretability, unsupervised learning.
Methods Optimal transport, convex/submodular optimization, semi-definite programming.
Applications Low-resource machine translation, word embeddings, generative models.

EDUCATION

- 2014 – 2019 (expected) **Massachusetts Institute of Technology**, Ph.D in Computer Science.
◦ Area: Machine Learning, minor in Mathematical Optimization.
◦ Advisor: Tommi S. Jaakkola.
◦ Thesis: *Extending Optimal Transport to Structured Domains: Algorithms and Applications*
◦ Thesis Committee: Tommi Jaakkola, Stefanie Jegelka, Justin Solomon.
- 2011 – 2013 **Courant Institute, New York University**, M.S. in Mathematics.
◦ Thesis: *The Matrix Multiplicative Weights Algorithm for Domain Adaptation*.
◦ Advisor: Dr. Mehryar Mohri.
- 2006 – 2011 **Instituto Tecnológico Autónomo de México**, B.S. in Applied Mathematics.
◦ Thesis: *The Lax-Milgram Theorem, Generalizations and Applications*.
◦ Advisor: Dr. Carlos Bosch Giral.
◦ Mención Honorífica (*summa cum laude*), top 1% of class, valedictorian.

RESEARCH AND WORK EXPERIENCE

- 2014 – **Research Assistant, MIT CSAIL**, Cambridge, MA, USA.
◦ Supervisor: Tommi Jaakkola.
◦ Recent Projects: structured optimal transport, robustly interpretable machine learning.
- 05 – 08/2018 **Research Intern, Microsoft Research**, New York, NY, USA.
◦ Mentors: Hanna Wallach, Jenn Wortman Vaughan, Hal Daumé III.
◦ Project: Robust and human-like interpretability for machine learning.
- 05 – 08/2016 **Research Intern, Microsoft Research**, Redmond, WA, USA.
◦ Mentors: Scott Yih, Ming-Wei Chang, Kristina Toutanova, Chris Meek.
◦ Project: Multi-hop relation prediction for knowledge base question answering.
- 2013 – 2014 **Supplemental Researcher, IBM Research**, TJ Watson Center, NY, USA.
◦ Mentors: Michael Picheny & Ken Church (speech recognition group).
◦ Data mining, statistical modeling and machine learning for speech recognition data.
- 2009 – 2010 **Statistical Analyst, LasQuinceLetras Solutions**, Mexico City, Mexico.
◦ Designed and carried out statistical learning methods on large survey datasets.

TEACHING AND ADVISING EXPERIENCE

- 2018 **Co-Supervisor, MSc Thesis**, Charlotte Bunne (MIT/ETH).
- Spring 2015 **Teaching Assistant, 6.036: Introduction to Machine Learning**, MIT.
- Spring 2013 **Adjunct Instructor (TA), MATH-UA.121: Calculus I**, NYU.
- Fall 2012 **Adjunct Instructor (TA), MATH-UA.9: Algebra and Calculus**, NYU.
- Spring 2012 **Grader, MATH-UA.326: Analysis II**, NYU.
- 2010 – 2011 **Teaching Assistant, Calculus I**, ITAM.
- Spring 08/09 **Teaching Assistant, Economics III (Intermediate Microeconomics)**, ITAM.

FELLOWSHIPS AND AWARDS

- 2018 **Facebook Fellowship Finalist**, (30/800 applicants).
- 2018 **Hewlett Packard Graduate Fellowship**, One-term PhD award.
- 2018 **AI2 Key Scientific Challenges program award**, \$10K unrestricted award..
- 2011, 2014 **Fellowship for graduate studies abroad**, *CONACYT*.
- March 2012 **Alumni Research Prize, Second Place**, *ITAM*, Category: Undergrad Thesis.
- 2012 – 2013 **Award for Graduate Studies Abroad**, *Mexican Ministry of Education*.
- October 2011 **Sotero Prieto Prize, Second Place**, *Mexican Mathematical Society*, Yearly award for the best undergraduate theses in mathematics in the country.
- 2006 – 2009 **Academic Excellence Scholarship**, *ITAM*, For undergraduate studies.

PUBLICATIONS

Most recent publications via [Google Scholar](#).

PREPRINTS

- [1] **D. Alvarez-Melis** and T. Broderick. “A translation of "The characteristic function of a random phenomenon" by Bruno de Finetti”. 2015.

CONFERENCE AND JOURNAL PUBLICATIONS

- [2] **D. Alvarez-Melis**, S. Jegelka, and T. S. Jaakkola. “Towards Optimal Transport with Global Invariances”. In: *International Conference on Artificial Intelligence and Statistics (AISTATS)*. 2019.
- [3] G.-H. Lee, **D. Alvarez-Melis**, and T. S. Jaakkola. “Towards Robust, Locally Linear Deep Networks”. In: *International Conference on Learning Representations (ICLR)*. 2019.
- [4] **D. Alvarez-Melis** and T. S. Jaakkola. “Towards Robust Interpretability with Self-Explaining Neural Networks”. In: *Advances in Neural Information Processing Systems (NeurIPS)*. 2018.
- [5] **D. Alvarez-Melis** and T. S. Jaakkola. “Gromov-Wasserstein Alignment of Word Embedding Spaces”. In: *Conference on Empirical Methods in Natural Language Processing (EMNLP)*. 2018. (**Oral Presentation**).
- [6] **D. Alvarez-Melis**, T. S. Jaakkola, and S. Jegelka. “Structured Optimal Transport”. In: *International Conference on Artificial Intelligence and Statistics (AISTATS)*. 2018. (**Oral Presentation**).
- [7] **D. Alvarez-Melis** and T. S. Jaakkola. “A causal framework for explaining the predictions of black-box sequence-to-sequence models”. In: *Conference on Empirical Methods in Natural Language Processing (EMNLP)*. 2017.
- [8] **D. Alvarez-Melis** and T. S. Jaakkola. “Tree-structured decoding with doubly-recurrent neural networks”. In: *International Conference on Learning Representations (ICLR)*. 2017.
- [9] **D. Alvarez-Melis** and M. Saveski. “Topic Modeling in Twitter: Aggregating Tweets by Conversations”. In: *International AAAI Conference on Web and Social Media (ICWSM)*. 2016.
- [10] T. B. Hashimoto, **D. Alvarez-Melis**, and T. S. Jaakkola. “Word Embeddings as Metric Recovery in Semantic Spaces”. In: *Transactions of the Association for Computational Linguistics (TACL)* 4 (2016). (**Oral Presentation at ACL’16**).

REFEREED WORKSHOP CONTRIBUTIONS

- [11] C. Bunne, **D. Alvarez-Melis**, S. Jegelka, and A. Krause. “Learning Generative Models Across Incomparable Spaces”. In: *NeurIPS Workshop on Relational Representation Learning*. 2018. (**Extended Contributed Talk + Best Paper Award**).
- [12] **D. Alvarez-Melis** and T. S. Jaakkola. “On the Robustness of Interpretability Methods”. In: *Proceedings of the 2018 ICML Workshop in Human Interpretability in Machine Learning*. 2018. (**Oral Presentation**).
- [13] G.-H. Lee, **D. Alvarez-Melis**, and T. S. Jaakkola. “Game-theoretic Interpretability for Temporal Modeling”. In: *Fairness, Accountability and Transparency in Machine Learning*. 2018.
- [14] **D. Alvarez-Melis** and J. Amores. “The Emotional GAN: Priming Adversarial Generation of Art with Emotion”. In: *NIPS Workshop on Machine Learning for Creativity and Design*. 2017.
- [15] **D. Alvarez-Melis**, T. S. Jaakkola, and S. Jegelka. “Structured Optimal Transport”. In: *NIPS Workshop on Optimal Transport for Machine Learning*. 2017. (**Extended Oral Presentation**).
- [16] T. B. Hashimoto, **D. Alvarez-Melis**, and T. S. Jaakkola. “Word, graph and manifold embedding from Markov processes”. In: *NIPS Workshop on Nonparametric Methods for Large Scale Representation Learning*. 2015.
- [17] C. Li, **D. Alvarez-Melis**, K. Xu, S. Jegelka, and S. Sra. “Distributional Adversarial Networks”. In: *International Conference on Learning Representations (ICLR), Workshop Track*. 2017.

THESES

- [18] **D. Alvarez-Melis**. “The Matrix Multiplicative Weights Algorithm for Domain Adaptation”. M.S. Thesis. New York University, 2013.
- [19] **D. Alvarez-Melis**. “El Teorema de Lax Milgram, Generalizaciones y Aplicaciones”. B.Sc. Thesis. Instituto Tecnológico Autónomo de México, 2011.

PROFESSIONAL ACTIVITIES AND SERVICE

- Reviewer ACL-IJCNLP 2015 (outstanding reviewer), IJCNLP 2017, ACL (2016 – 2018), TACL, UAI 2018, NeurIPS 2018 (reviewer award, registration waived), PLoS ONE, LXAI@NIPS 2018, AISTATS 2019, ICML 2019.
- Organizer **RIIAA** 2018 (student-run AI conference in Mexico City), riiaa.org.
- Other **MIT EECS Graduate Admissions Committee** (2017, 2019).
- Other **Orientation Co-Chair**, MIT Graduate Student Council.

TALKS

- Nov. 2018 *Structured Optimal Transport*, Phillippe Rigollet’s Group, MIT.
- Nov. 2018 *Optimal transport with additional information*, Harvard University.
- Nov. 2018 *Gromov-Wasserstein alignment of Word Embedding Spaces*, Jim Glass’ Group, MIT.
- Nov. 2018 *Gromov-Wasserstein alignment of Word Embedding Spaces*, EMNLP 2018.
- Aug. 2018 *Neural Networks and Continuous Representations for NLP*, RIIAA 2018.
- July 2018 *On The Robustness of Interpretability Methods*, WHI @ ICML 2018.
- April 2018 *Interpretability in NLP*, Guest Lecture at CMU ECE-739.

April 2018 *Structured Optimal Transport*, AISTATS 2018.
Jan. 2018 *Learning with structured data: interpretability and optimal transport*, OpenAI.
Dec. 2017 *Interpretability for complex models in ML and NLP*, Systems That Learn @ MIT.
Dec. 2017 *Structured Optimal Transport*, NIPS 2017 Optimal Transport in ML Workshop.
Nov. 2017 *Interpretability for black-box seq-to-seq models*, CompLang Seminar, MIT.
Oct. 2015 *Word Embeddings and Neural Networks in NLP*, DeepLearn Seminar, MIT.

PROFESSIONAL TRAINING

June 2017 **Machine Learning Summer School**, *Max-Planck-Institut*, Tübingen, Germany.
July 2014 **Regularization methods for Machine Learning**, *Univ. of Genova*, Italy.

COMPUTER SKILLS

Languages Python, Bash, Java, R, C++, Lua Libraries PyTorch, Torch, Theano, Scikit

LANGUAGES

Spanish Native
English Fluent *TOEFL (iBT) 113/120, IELTS 8.5/9, FCE, CAE both with Grade A.*
Italian Advanced *CILS-Tre Certificate.*
French Conversational *Mother's language, studied also at Alliance Française Bordeaux.*
German Basic *Completed levels A1 - A2 at Goethe Institut Mexiko.*
Dutch, Greek Beginner

PROFESSIONAL MEMBERSHIPS

AMS (2012–), SIAM (2013–), ACL (2016–), AAAS (2017–)

OTHER INTERESTS

Languages, architecture, classical guitar (Albéniz, Sor), Italian cinema, soccer.