Ferran Alet
www.alet-etal.com
alet@mit.edu

Research Agenda

I am interested in machines that learn to discover the structure of our world. At the same time, I take inspiration from methods in mathematics and the physical sciences to build better ML methods. To accomplish these goals, I leverage techniques from meta-learning, learning to search, and program synthesis.

Education

2018-present	**MIT - CSAIL**, *PhD candidate on Computer Science*, Cambridge, US.
	Advisors: Leslie P. Kaelbling, Tomás Lozano-Pérez and Josh Tenenbaum.
	Thesis title: learning to encode and discover structure
	MIT Outstanding Direct Mentor Award
2016-2018	**MIT - CSAIL**, *MSc on Computer Science*, GPA: 5.0, Cambridge, US.
2015-2016	**MIT - MechE**, *Visiting student*, Cambridge, US.
	Advisor: Alberto Rodriguez. Planning and Machine Learning for robotic manipulation.
2011-2016	**UPC - CFIS**, *2 Degrees*: *Mathematics & Engineering Physics*, Barcelona, Spain.
	Valedictorian of 2-degree program promotion, first of starting promotion in Math degree.

Selected research works

NeurIPS '21	**Alet** et al., Tailoring: encoding inductive biases by optimizing unsupervised objectives at prediction time.
	Spotlight at the Physical Inductive Biases workshop.
ICLR '20	**Alet***, Schneider* et al., Meta-learning curiosity algorithms.
ICML '19	**Alet** et al., Graph Element Networks : adaptive, structured computation and memory.
	Oral (4.5% of all submissions.)
CoRL '18	**Alet** et al., Modular meta-learning.

Selected CS awards

2016,2017	Amazon Robotics Challenge (ARC)	1st *('17) and* 3rd *('16) in stowing*
	Designed and built high level planner of team MIT-Princeton.	
2011-2015	SWERC-ACM (programming contest)	*Silver(6th),Gold(2nd),Gold(3rd),Gold(1st),Gold(1st)*
	Most decorated pariticipant in regional's history(France, Italy, Israel, Portugal, Spain & Switzerland)	
2011	IOI - International Olympiad in Informatics	*Bronze Medal*

Mentoring and Teaching

2021	**Outstanding Direct Mentor Award**.
	Given to 2 PhDs across all of MIT

2018-now	**Mentor**, 6 grads and 11 undergrads.
	3 have applied to grad school so far; attending MIT, Stanford & CMU

Mentored Masters Thesis:
Shreyas Kapur: Simulator-based modular few-shot inference and action [with Josh Tenenbaum]
Dylan Doblar: Feedback in sequential prediction models
Martin Schneider: Program synthesis approaches to improving generalization in RL
Erica Weng: Modular graph-structured models for prediction and control
Paolo Gentili: Active learning using meta-learned priors

Other mentoring:
Jan Olivetti: Planning in belief space with meta-learned priors for molecule prediction
Javier Lopez-Contreras : program synthesis & learning theory
Adarsh K. Jeewajee: Graph element networks for neural scene representation
Max Thomsen: GNNs for robotic gripper design [with Maria Bauza]
Catherine Wu: Energy-based models for trajectory prediction [with Yilun Du]
Nurullah Giray Kuru: Tailoring for model-based RL
Margaret Wu: Unsupervised approaches to program synthesis
Edgar Moreno: Library-learning for program synthesis
Shengtong Zhang: Tailoring and adversarial examples
Patrick John Chia: Compositional neural scene representation
Catherine Zeng: Modular meta-learning and reinforcement learning
Scott Perry: Energy-based models

2020	**Guest lecture**, *UPC*, Meta-learning class.
2019	**Teacher Assistant**, *Introduction to Machine Learning*.
	Primary mentor of non-CS PhDs applying ML to Science. Assisting in lab sessions & OHs.

Most Important Fellowships and Grants

2020	**Grant for Modular Meta-learning**, GoodAI.
	Obtained funding from the company to expand my work on modular meta-learning.
2016-2018	**Merit Graduate Scholarship**, 'La Caixa' foundation.
	Most prestigious graduate scholarship in Spain, providing full funding for two years.
2011-2016	**Merit Undergrad Program & Scholarship**, CFIS.
	Only 40 students around Spain enter this merit program that allows you to complete two degrees. Within them, I was one of only 4 to have full funding for both degrees.

Work Experience

Summer 2017	**Google Research**, *Internship*, Zurich, Switzerland.
	Designed & built 1st Unsupervised Learning prototype to create Youtube ads from raw videos.
Summer 2015	**Google Research**, *Internship*, Zurich, Switzerland.
	Machine Learning research to improve Google's handwriting recognizer using LSTMs.

Service

2021-now	**Spanish Girls Olympiad in Informatics**.
	Problem setter to help the competition getting high-school girls interested in CS.
2020-now	**MIT**-**GAAP**, Program helping underrepresented minorities apply to grad school.
2020	**Harvard Science in the News**, Public lecture, introduction to ML and Robotics.
2019-now	**1st organizer of the MIT Embodied Intelligence Seminar**.
	Created the seminar for the group of 18 CV, NLP, and robotics labs at MIT CSAIL.
	Responsible for everything from deciding speakers to making the introductions.
2019	**Reviewer of graduate student applications**, *MIT CSAIL*.
2018-now	**MIT Embodied Intelligence Graduate Student Committtee**.
2016-now	**Reviewer**, Reviewed for CoRL, CVPR, ICML, ICLR, ICRA, IJCAI and NeurIPS.
2011-2016	**Class representative**.

Research

Invited talks

DLBCN w.	Learning to encode and discover inductive biases, December 2021.
UPC	Meta-learning : learning to leverage data at different time-scales, November 2020.
AI@MIT	Tailoring : encoding inductive biases by optimizing objectives at prediction time, November 2020.
MLMA w.	Building up knowledge through modularity, June 2020.
ICML GNN workshop	Growing from simple tasks to complex problems with GNNs, June 2020.
INRIA	Meta-learning curiosity algorithms, April 2020.
MIT ML Tea	Meta-learning and combinatorial generalization, November 2019.
UC Berkeley	Meta-learning structure, October 2019.
KR2ML w.	Graph Element Networks, September 2019.

Conference papers

NeurIPS '21	**Alet***, Doblar* et al., Noether networks : meta-learning useful conserved quantities.
NeurIPS '21	**Alet,** et al., Tailoring : encoding inductive biases by optimizing unsupervised objectives at prediction time.
	Spotlight at the Physical Inductive Biases workshop
ICML '21	**Alet***, Lopez-Contreras* et al., A large-scale benchmark for few-shot program induction and synthesis.
ICLR '20	**Alet***, Schneider* et al., Meta-learning curiosity algorithms.
NeurIPS '19	**Alet** et al., Neural Relational Inference with fast Modular Meta-learning.

ICML '19	**Alet** et al., Graph Element Networks : adaptive, structured computation and memory. **Oral** (4.5% of all submissions)
IROS '19	Bauza, **Alet** et al., Omnipush : accurate, diverse, real-world dataset of pushing dynamics with RGB-D video.
CoRL '18	**Alet** et al., Modular meta-learning.
IJCAI '18	**Alet** et al., Finding important entities in streaming data.
ICRA '18	Zeng et al., Robotic pick-and-Place of novel objects in clutter with multi-affordance grasping and cross-domain image matching. Amazon Robotics Best System Paper Award

Extended list of awards

Context: Catalonia (population of 7.5M) is a State in Spain(47M); similar to Massachusetts.

Other scholarships

2010	**Ross Mathematics Program**, Ohio State University. Often considered the best math program for precollege students. As one of its top students, I was awarded a full scholarship for coming back the following year.
2009-2011	**Youth and Science Program**, Catalunya Caixa. 3 year scholarship for introducing 50 young scientists to research($< 10\%$ acceptance).

Other CS awards

2015,2016	ACM ICPC	26th, 51th out of ~13.000 competing teams
2008-2011	Spanish Olympiad in Informatics	Silver, Silver, Gold ($1^{st} place$), Gold
2008	Iberoamerican Olympiad in Informatics	Silver (only participation)

Awards in Math and Physics

2011	1st UPF Engineering and Applied Mathematics Prize and	
	1st UPC Poincaré Prize	research thesis: "Generating Functions and Searching Automata"
2010,2011	Spanish Math Olympiad	Silver Medal, Silver Medal
2010,2011	Catalan Math Olympiad	Silver Medal, Gold Medal
2009-2011	Kangourou des Mathematiques	Prize A, Mention, Prize B
2011	Spanish Physics Olympiad	Bronze Medal
2011	Catalan Physics Olympiad	Gold Medal (1st place)

General Awards

2011	Selectivitat Prize	6th out of > 25.000 students in the examination for entering college
2011	EnginyCat Prize	given by the government to promising young scientists
2011	Extraordinary High School Prize	given to less than 1 in every 2.000 students

Languages

English	High Level	*TOEFL iBT*: 115/120(2015). Living in the US since 2015.
French	High Level	*Studied since from age 5 to 17*; DALF*(CEFR Level C1,2011)*
Spanish	Mother Tongue	
Catalan	Mother Tongue	