

Samy Jelassi

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Employment

Harvard University, Research fellow, Center of Mathematical Sciences and Applications 2023 - Present
Hosts: Boaz Barak and Sham Kakade
Research topics: LLM architectures, Optimization, Long-context, RL with LLMs.

Education

Princeton University, PhD, Operations Research Department. 2017 – 2023
Advised by Boris Hanin
Thesis: Algorithmic and architectural implicit biases in deep learning

ENS Cachan, Master of Arts in Applied Mathematics with distinction. 2015 – 2017
Advised by Francis Bach
Thesis: Variance-Reduced Gradient Descent Methods

ENS Lyon, Bachelor in Computer Science with distinction. 2014 – 2015

Lycée Louis-le-Grand, Classes Préparatoires aux Grandes Écoles. 2011 – 2014
University-level preparation for the competitive entrance to French Engineering Schools

Internships

Google Research (NYC), hosted by Srinadh Bhojanapalli and Sashank Reddi 2022

Google Deepmind (London), hosted by Bernardo Avila Pires and Rémi Munos 2021

Facebook AI Research (NYC), hosted by Aaron Defazio 2020

Selected works

Let's (not) just put things in Context: Test-time Training for Long-context LLMs 2025
R. Bansal, A. Zhang, R. Tiwari, L. Madaan, S. Duvvuri, F. Devvrit, D. Brandfonbrener, D. Alvarez-Melis, P. Bhargava, M. Kale, **S. Jelassi**
submitted

Echo chamber: RL post-training amplifies behaviors learned in pretraining 2025
R. Zhao*, A. Meterez*, S. Kakade, C. Pehlevan, **S. Jelassi**[†], E. Malach[†]
COLM 2025, <https://arxiv.org/abs/2504.07912>

Mixture of Parrots: Experts improve memorization more than reasoning 2025
S. Jelassi, C. Mohri, D. Brandfonbrener, A. Gu, N. Vyas, N. Anand, D. Alvarez-Melis, Y. Li, S. Kakade, E. Malach
ICLR 2025, **oral presentation (top 10%)** at the "Mathematics of modern machine learning" workshop, NeurIPS 2024, <https://arxiv.org/abs/2410.19034>

Repeat after me: Transformers are better than state space models at copying 2024
S. Jelassi, D. Brandfonbrener, S. Kakade, E. Malach
International Conference on Machine Learning (ICML) 2024, <https://arxiv.org/abs/2402.01032>

Conference papers

Let Me Think! A Long Chain-of-Thought Can Be Worth Exponentially Many Short Ones 2025
P. Mirtaheri*, E. Edelman*, **S. Jelassi**, E. Malach, E. Boix-Adsera
NeurIPS 2025, <https://arxiv.org/abs/2505.21825>

To backtrack or not to backtrack: When sequential search limits model reasoning	2025
T. Qin, D. Alvarez-Melis, S. Jelassi* , E. Malach*	
COLM 2025, https://arxiv.org/abs/2504.07052	
Universal length generalization with turing programs	2025
K. Hou, D. Brandfonbrener, S. Kakade, S. Jelassi* , E. Malach*	
ICML 2025, https://arxiv.org/abs/2407.03310	
The Role of Sparsity for Length Generalization in Transformers	2025
N. Golowich, S. Jelassi , D. Brandfonbrener, S. Kakade, E. Malach	
ICML 2025, https://arxiv.org/abs/2502.16792	
LoRA Soups: Merging LoRAs for Practical Skill Composition Tasks	2025
A. Prabhakar, Y. Li, K. Narasimhan, S. Kakade, E. Malach, S. Jelassi	
International Conference on Computational Linguistics (COLING) 2025, Industry track.	
https://arxiv.org/abs/2410.13025	
Q-Probe: A Light Approach to Reward Maximization for Language Models	2024
K. Li, S. Jelassi , H. Zhang, S. Kakade, M. Wattenberg, D. Brandfonbrener	
International Conference on Machine Learning (ICML) 2024, https://arxiv.org/abs/2402.14688	
Vision transformers provably learn spatial structure	2022
S. Jelassi , M. Sander, Y. Li	
Conference on Neural Information Processing Systems (NeurIPS) 2022, https://arxiv.org/abs/2210.09221	
Towards understanding how momentum improves generalization in deep learning	2022
S. Jelassi , Y. Li	
International Conference on Machine Learning (ICML) 2022, https://arxiv.org/abs/2207.05931	
Oral presentation (top 5%) at “Overparameterization: Pitfalls & Opportunities” workshop, ICML 2021.	
Auction learning as a two-player game	2021
J. Rahme, S. Jelassi , S. M. Weinberg	
International Conference on Learning Representations (ICLR) 2021, https://arxiv.org/abs/2006.05684	
A Permutation-Equivariant Neural Network Architecture For Auction Design	2021
J. Rahme, S. Jelassi , J. Bruna, S. M. Weinberg	
AAAI Conference on Artificial Intelligence 2021, https://arxiv.org/abs/2003.01497	
Extragradient with player sampling for faster Nash equilibrium finding	2020
S. Jelassi , C. Domingo-Enrich, D. Scieur, A. Mensch, J. Bruna	
International Conference on Machine Learning (ICML) 2020, https://arxiv.org/abs/1905.12363	
A mean-field analysis of two-player zero-sum games	2019
C. Domingo-Enrich, S. Jelassi , A. Mensch, G. M. Rotskoff, J. Bruna	
Conference on Neural Information Processing Systems (NeurIPS) 2019, https://arxiv.org/abs/2002.06277	
Towards closing the gap between the theory and practice of SVRG	2019
O. Sebbouh, N. Gazagnadou, S. Jelassi , F. Bach, R. M. Gower	
Conference on Neural Information Processing Systems (NeurIPS) 2019, https://arxiv.org/abs/1908.02725	
Global convergence of neuron birth-death dynamics	2019
G. Rotskoff, S. Jelassi , J. Bruna, E. Vanden-Eijnden	
International Conference on Machine Learning (ICML) 2019, https://arxiv.org/abs/1902.01843	
Smoothed analysis of low-rank approach for smooth semidefinite programs	2019
T. Pumir*, S. Jelassi* , N. Boumal	

Oral presentation (top 3%) at the Conference on Neural Information Processing Systems (NeurIPS) 2018,
<https://arxiv.org/abs/1806.03763>

Journal papers

Adaptivity without Compromise: A Momentumized, Adaptive, Dual Averaged Gradient Method for Stochastic Optimization 2022

A. Defazio, **S. Jelassi**

Journal of Machine Learning Research 2022, <https://arxiv.org/abs/2101.11075>

Depth separation beyond radial functions 2022

L. Venturi, **S. Jelassi**, T. Ozuch, J. Bruna

Journal of Machine Learning Research 2022, <https://arxiv.org/abs/2102.01621>

Preprints

Depth Dependence of μ P Learning Rates in ReLU MLPs 2023

S. Jelassi, B. Hanin, Z. Ji, S. Reddi, S. Bhojanapalli, S. Kumar

<https://arxiv.org/abs/2305.07810>

Length generalization in arithmetic transformers 2023

S. Jelassi, S. d'Ascoli, C. Domingo-Enrich, Y. Wu, Y. Li, F. Charton

<https://arxiv.org/abs/2306.15400>

Teaching

COS 485 Neural Networks: Theory and Applications, Teaching Assistant, Spring 2023.

ORF 350: Analysis of Big Data, Head Teaching Assistant, Spring 2019, 2021, 2022.

ECE 435/535, Machine Learning and Pattern Recognition, Teaching Assistant, Fall 2018, 2019, 2021.

ORF 409: Introduction to Monte Carlo Simulation, Teaching Assistant, Fall 2020.

Service

Reviewer, NeurIPS 2019-24, ICML 2020 & 2023, ICLR 2025, STOC 2025, JMLR.

Organizer, New Technologies in Mathematics Seminar at Harvard CMSA, Fall 2023 & Spring 2024.

Talks

Understanding RL with Verifiable Rewards through Distribution Sharpening 2025

Foundations of Post-training workshop, COLT 2025.

Mixture of Parrots: Experts improve memorization more than reasoning 2024

Mathematics of Modern Machine Learning workshop, NeurIPS 2024.

Algorithmic and architectural implicit biases in deep learning 2022

EPFL, Caltech, University of Toronto

Towards understanding how momentum improves generalization in deep learning 2022

International Conference on Machine Learning (ICML) 2021, 2022

Smoothed analysis of some machine learning problems 2019

Google Montreal

Smoothed analysis of the low-rank approach for smooth semidefinite program 2018

Plenary oral presentation at the Conference on Neural Information Processing Systems (NeurIPS) 2018.