



# Kevin Scaman

RESEARCH SCIENTIST IN MACHINE LEARNING, OPTIMIZATION AND GRAPH THEORY

✉ kevin.scaman@inria.fr | 🏠 scaman.wordpress.com | 🎓 Kevin Scaman

## Experience

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### Inria Paris

RESEARCH SCIENTIST, INRIA STARTING FACULTY POSITION

- Research scientist in Machine Learning, optimization and networks.

*Paris, France*

*Jan. 2021 - present*

### Huawei Noah's Ark lab

PRINCIPAL RESEARCH SCIENTIST

- Research scientist in Machine Learning with applications to telecommunication networks.
- From 2018 to 2020, leading a research project on structured data analysis.
- In 2020, leading a research team of four people on optimization for Machine Learning.

*Paris, France*

*Jan. 2018 - Dec. 2020*

### Microsoft Research - Inria Joint Center

POSTDOCTORAL RESEARCHER

- Worked on distributed optimization and community detection algorithms.
- Work supervised by Laurent Massoulié and in collaboration with Francis Bach (INRIA) and Sébastien Bubeck (Microsoft Research).
- Visited Sébastien Bubeck in Seattle for two months to work on lower bounds for distributed optimization.

*Palaiseau, France*

*Jan. 2017 - Dec. 2017*

### Ecole Centrale Paris / ENS Paris-Saclay

TEACHING ASSISTANT

- During my PhD, I served as teaching assistant (TPs and TDs) for a total of 78 hours:
  - Probability theory ("Approximation methods in probability theory", License 1 ENS Cachan).
  - Statistics (first year students, Ecole Centrale Paris).
  - Machine Learning ("Introduction to machine learning", Master 2 MVA).

*Paris, France*

*Sept. 2013 - Sept. 2016*

### Microsoft Engineering Center

SOFTWARE ENGINEER

- Worked as a web developer for the Xbox Music website (music.xbox.com).

*Paris, France*

*Mar. 2016 - Jun. 2016*

### Microsoft Engineering Center

RESEARCH INTERN

- Worked on intelligent customer support system for Xbox.

*Paris, France*

*Jul. 2012 - Dec. 2012*

### MIT, Center for Biological and Computational Learning

RESEARCH INTERN

- Worked on classification methods for large scale object recognition.

*Boston, USA*

*Apr. 2011 - Aug. 2011*

## Education

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### ENS Paris-Saclay

PHD IN MACHINE LEARNING APPLIED TO SOCIAL NETWORKS AND DIFFUSION PROCESSES

- Worked on the topic "Analysis and control of diffusion processes in networks", supervised by Nicolas Vayatis.

*Cachan, France*

*Jul. 2013 - Dec. 2016*

### Télécom ParisTech / École Polytechnique

DOUBLE DEGREE PROGRAM IN ENGINEERING AND APPLIED MATHEMATICS (MVA)

- Master's program "Mathematics, Vision and Learning" (MVA). Machine learning classes applied to various fields including vision, biology and text classification. Master's degree awarded with **High Honors**.

*Paris, France*

*Sept. 2011 - Aug. 2012*

### École Polytechnique

ENGINEERING DEGREE WITH A MAJOR IN APPLIED MATHEMATICS

- Engineering degree with a major in Applied Mathematics in one of France's most prominent universities for science.

*Paris, France*

*Sept. 2011 - Aug. 2012*

## Skills

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**Programming** Python, Pytorch, Matlab, C#, Java, C++, Typescript, LaTeX.

**Languages** French (native), English (fluent).

**Personal interests** Climbing, piano, music composition.

## Honors & Awards

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### RESEARCH AWARDS

2018 **NeurIPS 2018 best paper award**, 4 best papers / 4865 submissions. *Montréal, Canada*

### COMPANY AWARDS

2019 **Huawei individual gold medal award**, Among the highest company-wise honors. *Paris, France*

2018 **Outstanding contributions individual award**, Internal conference award to showcase achievements. *Shenzhen, China*

2018 **Huawei future star**, Awarded by other team members to promote local talents. *Paris, France*

2018 **Huawei quality star**, Awarded to promote research transferred into products. *Paris, France*

### RESEARCH GRANTS

2020 **Huawei CSTT project on optimization for ML**, Budget of 3M€ for three years, four permanent researchers and two contractors (interns or research engineers). *Paris, France*

## Invited talks

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09/09/21 **Demi-heure de sciences**, Apprentissage profond géométrique: du voyageur du commerce au repliement de protéines. *Inria Paris, France*

06/05/19 **Séminaire Parisien d'Optimisation**, Optimal algorithms for non-smooth distributed optimization in networks. *Institut Henri Poincaré, France*

30/11/18 **AI workshop @ Huawei**, KONG: Kernels for ordered-neighborhood graphs. *Montréal, Canada*

20/09/18 **Huawei Noah's Ark forum**, New results in distributed optimization and consensus learning. *Paris, France*

08/06/18 **ROADEF SMAI-MODE day on optimization in networks**, New results in distributed optimization and consensus learning. *Institut Henri Poincaré, France*

19/03/18 **Séminaire Parisien de Statistique**, Optimal Algorithms for Smooth and Strongly Convex Distributed Optimization in Networks. *Institut Henri Poincaré, France*

30/11/17 **INRIA/Technicolor workshop on scalable computing (WOS7)**, Optimal Algorithms for Smooth and Strongly Convex Distributed Optimization in Networks. *Rennes, France*

31/10/17 **Asilomar conference**, Optimal Algorithms for Smooth and Strongly Convex Distributed Optimization in Networks. *Pacific Groves, USA*

22/09/17 **Eurandom workshop on community detection and network reconstruction**, New results in distributed optimization and consensus learning. *Eindhoven, Netherlands*

12/05/17 **INRIA, Infine seminar**, Optimal convergence rates for distributed optimization. *Palaiseau, France*

26/04/17 **Télécom ParisTech, S2A seminar**, Optimal convergence rates for distributed optimization. *Paris, France*

24/03/17 **ENS, Dyogene – Rap seminar**, The effect of network topology on human and machine communications. *Paris, France*

11/01/17 **Theory Lunch at Microsoft Research**, Spectral bounds in random graphs and the long-term influence of information cascades. *Redmond, USA*

21/12/16 **Seminar of the Institute for Applied Mathematics**, From metric spaces to the analysis of large networks. *Bonn University, Germany*

09/06/16 **Modeling seminar at LPMA**, Spectral bounds in random graphs: Local Positive Correlation, percolation and the long-term influence of information cascades. *Paris VII University, France*

04/04/16 **Statistical Machine Learning in Paris (SMILE) seminar**, Information as a virus: Inference and control of diffusion processes on networks. *Paris, France*

# Collective responsibilities

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## REVIEWING ACTIVITIES

- Journals** Journal of Machine Learning Research, Mathematics of Operations Research, Journal of the Royal Statistical Society (series C), Communications in Mathematical Sciences, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Information Theory, IEEE Transactions on Network Science and Engineering, and Computational Social Networks.
- Conferences** COLT 2018, IEEE Conference on Decision and Control 2018, NeurIPS 2019, ICML 2020 and 2021.
- Workshops** Took part in program comitee of the Deep Learning for Graphs and Structured Data Embedding workshop (DL4G-SDE, <https://www.aminer.cn/dl4g-sde>) organized at the web conference 2019 in San Francisco, USA.

## MANAGEMENT AND GROUP ANIMATION

- 2018 **Group animation**, Organized a lecture group on discrepancy for ML. [Huawei](#)
- 2019 **Hiring process**, Organized the hiring process (for interns, students and permanent researchers) of a team of approximately ten people. [Huawei](#)
- Project supervision**, Lead a project on structured data analysis involving three permanent researchers, one 2018 - 2020 PhD student and one intern. The project also involved a collaboration with Milan Vojnovic from London School of Economics. [Huawei](#)
- Team supervision**, Lead a team of four researchers on optimization for ML (two in Paris on DL applications and two in London on multi-agent RL applications), for a budget of 3M€ for three years. I was responsible for 2019 - 2020 the **organization and scientific planning** of the team, including: definition and allocation of the budget, definition of short and long-term objectives, organization of the team, hiring of researchers and contractors, and finding potential collaborators and internal clients). [Huawei](#)

# Students supervision

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## PHD STUDENTS

- 2021 - 2024 **David Robin**, Paramétrisation efficace des réseaux de neurones profonds pour données structurées. [Inria Paris](#)
- 2021 - 2024 **Amaury Triboulin**, Symmetries en Apprentissage de la Machine pour des Données Structurées. [Inria Paris](#)
- 2018 - 2021 **George Dasoulas**, Representation learning for structured data, with applications to telecommunication networks (Ciffre PhD supervised by Michalis Vazirgiannis at Polytechnique). [Huawei](#)

## RESEARCH INTERNS

- 2020 **Avery Ma**, Hierarchical adversarial robustness of DL architectures (PhD student at the University of Toronto). [Huawei](#)
- 2019 **Sylvestre Rebuffi**, Graph neural networks for classification (3rd year PhD student at Oxford). [Huawei](#)
- 2016 **Luca Corinzia**, Activity shaping in social networks (M2 student at ENS Paris-Saclay). [ENS Paris-Saclay](#)
- 2015 **Xavier Lioneton**, Clustering of twitter activity patterns (M2 student ENS Paris-Saclay). [ENS Paris-Saclay](#)
- 2015 **Matteo Sesia**, Network inference by observing SIS processes (M2 student ENS Paris-Saclay). [ENS Paris-Saclay](#)
- 2015 **Suzanne Schlich and Julie Tourniaire**, Structure and pattern analysis on information diffusion signals (1st year students at ENS Paris-Saclay). [ENS Paris-Saclay](#)
- 2014 **Patrick Saux and David Marchand**, Graph inference using observations on diffusion processes (1st year students at ENS Paris-Saclay). [ENS Paris-Saclay](#)

## INTERNATIONAL JOURNALS

- 2019 K. Scaman, F. Bach, S. Bubeck, Y. Lee and L. Massoulié. Optimal Convergence Rates for Convex Distributed Optimization in Networks. **JMLR**, 2019.
- 2018 R. Lemonnier, K. Scaman, and N. Vayatis. Spectral bounds in random graphs applied to spreading phenomena and percolation. **Advances in Applied Probability**, 2018.
- 2016 K. Scaman, A. Kalogeratos, and N. Vayatis. Suppressing Epidemics in Networks using Priority Planning. **IEEE Transactions on Network Science and Engineering**, 2016.

## INTERNATIONAL CONFERENCES

- 2021 A. Durmus, E. Moulines, A. Naumov, S. Samsonov, K. Scaman and H.T. Wai. Tight High Probability Bounds for Linear Stochastic Approximation with Fixed Stepsize. **NeurIPS**, 2021.
- 2021 G. Dasoulas, K. Scaman and A. Virmaux. Lipschitz normalization for self-attention layers with application to graph neural networks. **ICML**, 2021.
- 2021 G. Dasoulas, G. Nikolentzos, K. Seaman, A. Virmaux and M. Vazirgiannis. Ego-based entropy measures for structural representations on graphs. **NeurIPS**, 2021.
- 2020 K. Scaman and C. Malherbe. Robustness Analysis of Non-Convex Stochastic Gradient Descent using Biased Expectations. **NeurIPS**, 2020.
- 2020 K. Scaman, L. Dos Santos, M. Barlier and I. Colin. A Simple and Efficient Smoothing Method for Faster Optimization and Local Exploration. **NeurIPS**, 2020.
- 2020 G. Dasoulas, L. Dos Santos, K. Scaman and A. Virmaux. Coloring graph neural networks for node disambiguation. **IJCAI**, 2020.
- 2019 I. Colin, L. Dos Santos and K. Scaman. Theoretical Limits of Pipeline Parallel Optimization and Application to Distributed Deep Learning. **NeurIPS**, 2019.
- 2018 K. Scaman, F. Bach, S. Bubeck, Y. Lee and L. Massoulié. Optimal algorithms for nonsmooth distributed optimization in networks. **NeurIPS (best paper award)**, 2018.
- 2018 M. Draief, K. Kutzkov, K. Scaman and M. Vojnovic. KONG: Kernels for ordered neighborhood graphs. **NeurIPS**, 2018.
- 2018 K. Scaman and A. Virmaux. Lipschitz regularity of deep neural networks: analysis and efficient estimation. **NeurIPS**, 2018.
- 2017 K. Scaman, F. Bach, S. Bubeck, Y. Lee, and L. Massoulié. Optimal algorithms for smooth and strongly convex distributed optimization in networks. **ICML**, 2017.
- 2017 R. Lemonnier, K. Scaman, and A. Kalogeratos. Multivariate Hawkes Processes for Large-scale Inference. **AAAI**, 2017.
- 2015 K. Scaman, R. Lemonnier, and N. Vayatis. Anytime influence bounds and the explosive behavior of continuous-time diffusion networks. **NeurIPS**, 2015.
- 2015 K. Scaman, A. Kalogeratos, and N. Vayatis. A greedy approach for dynamic control of diffusion processes in networks. **ICTAI**, 2015.
- 2014 R. Lemonnier, K. Scaman, and N. Vayatis. Tight bounds for influence in diffusion networks and application to bond percolation and epidemiology. **NeurIPS**, 2014.

## BOOK CHAPTERS

- 2018 Kalogeratos, K. Scaman, L. Corinzia and N. Vayatis. Information Diffusion and Rumor Spreading. **Cooperative and Graph Signal Processing, Academic Press**, 2018.
- 2017 Kalogeratos and K. Scaman. Algorithmes efficaces pour contenir des processus de contagion sur des réseaux. **Big Data et politiques publiques dans les transports, Economica**, 2017.

## WORKSHOP ARTICLES

- 2015 Kalogeratos, K. Scaman, and N. Vayatis. Learning to Suppress SIS Epidemics in Networks. **Networks in the Social and Information Sciences (NIPS workshop)**, 2015.
- 2014 K. Scaman, A. Kalogeratos, and N. Vayatis. Dynamic treatment allocation for epidemic control in arbitrary networks. **Diffusion Networks and Cascade Analytics (WSDM workshop)**, 2014.

## RESEARCH REPORTS AND PUBLICATIONS UNDER REVIEW

- 2022 M. Even, L. Massoulié and K. Scaman. Sample Optimality and All-for-all Strategies in Personalized Federated and Collaborative Learning. **Preprint available on ArXiv**, 2022.
- 2021 A. Ma, A. Virmaux, K. Scaman and J. Lu. Improving Hierarchical Adversarial Robustness of Deep Neural Networks. **Preprint available on ArXiv**, 2021.
- 2017 Kalogeratos, K. Scaman, L. Corinzia and N. Vayatis. A Spectral Method for Activity Shaping in Continuous-Time Information Cascades. **Preprint available on ArXiv**, 2017.

## PATENTS

- 2019 Patent on Malware detection using neural networks. . **Submitted to the European Patent Office**, 2019.
- 2019 Patent on graph classification using neural networks. . **Submitted to the European Patent Office**, 2019.