Email: edouard.fouche@kit.edu
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Find me on: (@edouardfouche)
LinkedIn
Google Scholar
GitHub
Instagram

EXPERTISE

Data Science / Data Mining
Machine Learning
Algorithms
Visualization

PROGRAMMING

Python (~6 years)
Scala (~4 years)
R (~3 years)
Also: Java, SQL, Bash, C, Web…

SOFTWARE

Git, Linux, Database Systems, LateX, Adobe & MS Office Suite

SOFT SKILLS

Scientific Writing
Leadership
Agile Methodology
Cultural Awareness
Self-improvement

LANGUAGES

French (Native)
English (Fluent, C2)
German (Fluent, C2)
Spanish (Basic, A2)

PERSONAL INTERESTS

Photography (Analog/Digital), Hiking, Travelling, Cooking, Blogging, Roller Derby (Coach and Board at Roller Derby Karlsruhe)

Dr.-Ing. Edouard Fouché

Senior Researcher & Lecturer

Experience

2020-now **Senior Researcher & Lecturer, Karlsruhe Institute of Technology (KIT).**
- Conducting independent research, collaborations and student theses.
- Co-supervision of 4+ doctoral students. Lecturer for Data Science.
- Organizer for chair-wide meetings, coaching and mentoring.

2016-2020 **Researcher & Ph.D. Candidate in Data Science, KIT.**
- Published 8 peer-reviewed research papers and a doctoral thesis.
- Advised 10+ student theses (Master/Bachelor level).
- Worked with 2 research labs (international) and 5 industry partners.

2014-2016 **Working student, IBM R&D GmbH, Böblingen.**
- Created ibmdbpy, an open-source interface between Python and DB2.
- Writing my Master's thesis in collaboration between KIT and IBM.
- Co-supervision of two fellow interns. Python coaching.

Education

2020-2021 **MBA, Quantic School of Business and Technology.** (fka "Smartly")
- Online, 7% admission rate. Graduated with Honors (top 10% of cohort).
- Accounting, Economics, Data & Decisions, Leading Organizations, Marketing, Finance, Supply Chain & Operations, Strategy, Entrepreneurship.

2016-2020 **Ph.D. (Dr.-Ing.) in Data Science, KIT.**
- Thesis: Estimating Dependency, Monitoring and Knowledge Discovery in High-Dimensional Data Streams. (Advisor: Prof. Klemens Böhm)
- Summa cum laude. Helmholtz Doctoral Prize. German GPA: 1.0

2015-2016 **M.Sc. Computer Science, KIT.**
- Thesis: Fast In-Database Feature Selection. (Advisor: Prof. Emmanuel Müller)
- German GPA: 1.4 (Very Good)

2010-2015 **Diplôme d'Ingénieur (Dipl.-Ing.), ESIEE Paris, France.**
- Major: Computer Science. Final internship at IBM R&D (6 months).
- "Félicitations du Jury" and "Parcours d'Excellence" award.

Awards

2021 **Helmholtz Doctoral Prize 2020.**
The prize recognizes outstanding achievements during the doctoral phase. The Helmholtz Association is the largest german scientific organisation.

2019 **SSDBM Best Paper Award.** Paper: Monte Carlo Dependency Estimation
Scientific and Statistical Database Management (Core A conference).

2017 **Software Campus Member:** 100K€ research grant, training, mentoring.
Co-founded by BMBF and TRUMPF GmbH + Co. KG.

2015 **Parcours d'Excellence ESIEE Paris.** Top 1% of the cohort.

2014 **Data Mining Cup, Prudsys AG, 2nd place:** 1.000€ cash price.

Research Statement

I am currently interested in problems involving **sequential decision making**, in particular concerning **dynamic, non-stationary settings**. I study new methods, based on Bandit Algorithms or Reinforcement Learning, to tackle important real-world challenges. I am also interested in tasks like outlier detection, clustering, correlation analysis, and generally, learning from high-dimensional data streams.

International Mobility

- **Sept-Dec 2019. University of Illinois at Urbana-Champagin (Prof. Jiawei Han). IL, USA.**
  - 3-month research collaboration in the group of Prof. Jiawei Han, well-known pioneer of the field of Data Mining. This has led to the publication of "Mining Text Outliers in Document Directories" at ICDM'20.
- **June 2019. RIKEN AIP (Asst. Prof. Junpei Komiyama). Tokyo, Japan.**
  - 1-month research collaboration at RIKEN AIP. Following up on the work with Junpei Komiyama ("Scaling Multi-Armed Bandit Algorithms", KDD19). This led to the recent preprint "Finite-time Analysis of Globally Nonstationary Multi-Armed Bandits": https://arxiv.org/abs/2107.11419.
- **Before 2014: Growing up and studying in Paris, France.**
  - I have studied at ESIEE Paris, a graduate school of engineering (so-called Grande Ecole). ESIEE Paris offers a 5-year curriculum leading to a "Diplôme d'Ingénieur", equivalent to the grade of "Master of Engineering" (M.Eng.). I have started to study in Germany via the Erasmus program in my fourth year of study. Then I stayed at KIT as a regular student, while finalizing my degree in France in parallel.

Service

- **Program Committee (PC) member / Reviewer:**
  - SIGKDD 2021 (ACM Special Interest Group on Knowledge Discovery and Data Mining)
  - IJCAI 2021 (International Joint Conference on Artificial Intelligence)
  - ICDM 2021 (IEEE International Conference on Data Mining)
  - SDM 2022 (SIAM International Conference on Data Mining)
- **April 2021 – now: Steering Committee Member: Karlsruhe House of Young Scientists (KHYS) at KIT**

The KHYS steering committee members meet on a monthly basis to review KIT-internal grant proposals and reach an agreement (via voting) on the final decision. The committee includes the KIT vice president for research (Prof. Olivier Kraft) and one representative professor for each division and graduate schools. I am part of the committee to represent the postdoctoral researchers at KIT.

- **October 2021 – now: Elected at the council of the KIT-Faculty of Computer Science ("Fakultätsrat")**

The faculty council is responsible for various academical administration tasks at the faculty of computer science.

Teaching

Advised Master/Bachelor Theses

13. Outlier Analysis in Live Systems from Application Logs. May21 – Oct21. Master's thesis. Wenrui Zhou
12. Change Detection in High-Dimensional Data Streams. Mar21 – Sep21. Master's thesis. Tanja Fenn.
11. Analysis and Visualization of Semantics from Massive Document Directories. Mar21 – Jul21. Bachelor's Thesis. Klevia Ulqinaku.
10. Subspace Search in Data Streams. May19 – Oct19. Master's thesis. Florian Kalinke.
9. Anytime Tradeoff Strategies for Multiple Targets. May19 – Nov19. Master's thesis. Marco Heyden.
8. Interactive Visualization of Correlations in High-Dimensional Streams. Mar19 – Jun19. Bachelor's thesis. Yimin Zhang.
7. Statistical Generation of High-Dimensional Data Streams with Complex Dependencies. Jun18 – Nov18. Bachelor's thesis. Alexander Poth.
6. Adaptive Variational Autoencoders for Outlier Detection in Data Streams. Sep18 – Feb18. Master's thesis. Florian Pieper.
5. On the Interpretability of Anomaly Detection via Neural Networks. Apr18 – Sep18. Master's thesis. Marco Sturm. With Daimler AG.
4. Energy Time Series Reduction. Jan18 – Apr18. Bachelor's thesis. Lucas Krauß.
3. Relevance-Driven Feature Engineering. Jul17 – Dec17. Master's thesis. Rosina Kazakova. With BMW AG.
2. High-Dimensional Neural-Based Outlier Detection. Apr17 – Sep17. Master's thesis. Daniel Popovic.
1. Quality of High-Contrast Subspace Search in Data Streams with Missing Values. Feb17 – Apr17. Bachelor's thesis. Jonathan Bechtle. Co-advised with Georg Steinbuss.

Lectures/Labs/Seminars

7. Main Lecturer (Lehrbeauftragt): Data Science I (formerly Big Data Analytics I). KIT, IPD Böhm. Winter 2021.
    - This lecture presents the fundamentals of Data Science, with an emphasis on data analysis techniques.
6. Main Lecturer (Lehrbeauftragt): Big Data Analytics II. KIT, IPD Böhm. Summer 2021.
    - This lecture presents advanced techniques to deal with "high-dimensional data streams" (large amounts of data continuously being collected), which were a central theme in the applicant's Ph.D. work.
5. Teacher: Big Data Analytics Lab. KIT, IPD Böhm. Summer 2018.
    - Proposed (as a research assistant) an original data analysis assignment based on a real-world case study (based on data from the Bioliq power plant at KIT Campus North). 12 students were split into 4 groups and presented their progress on a weekly basis.
4. Teacher: Machine Learning Seminar. KIT, IPD Böhm. Summer 2017.
    - Proposed (as a research assistant) four original research topics. The students were expected to produce an 8-page summary of their literature study and a final presentation.
3. Teacher: Big Data Analytics Lab. KIT, IPD Böhm. Summer 2017.
    - Similar to item 5 above (with a different assignment).
2. Tutor: Big Data Analytics Lab. KIT, IPD Böhm. Summer 2016.
    - Advised (as a student assistant) a group of students regarding their participation in a Data Mining competition (The "Data Mining Cup", from Prudsys AG).
1. Tutor: Customer Relation Management. KIT, IISM. Winter 2015.
    - Responsible (as a student assistant) for the exercises associated to the lecture. Giving a 1.5 hour tutorial every two weeks. Correcting assignments and the final exam.

List of Publications (Peer-Reviewed)

10. Florian Kalinke, Pawel Bielski, Snigdha Singh, Edouard Fouché and Klemens Böhm. 'An Evaluation of NILM Approaches on Industrial Energy-Consumption Data'. In: *e-Energy*. ACM, 2021. DOI: 10.1145/3447555.3464863
9. Edouard Fouché, Florian Kalinke and Klemens Böhm. 'Efficient Subspace Search in Data Streams'. In: *Information Systems* 97 (2021), p. 101705. ISSN: 0306-4379. DOI: 10.1016/j.is.2020.101705
8. Edouard Fouché, Yu Meng, Fang Guo, Honglei Zhuang, Klemens Böhm and Jiawei Han. 'Mining Text Outliers in Document Directories'. In: *ICDM*. **Acceptance Rate: 9.8%**. IEEE, 2020, pp. 152–161. DOI: 10.1109/ICDM50108.2020.00024
7. Edouard Fouché, Alan Mazankiewicz, Florian Kalinke and Klemens Böhm. 'A Framework for Dependency Estimation in Heterogeneous Data Streams'. In: *Distributed and Parallel Databases* (2020). DOI: 10.1007/s10619-020-07295-x
6. Avipsa Roy, Edouard Fouché, Rafael Rodriguez Morales and Gregor Möhler. 'In-Database Geospatial Analytics using Python'. In: *ARIC@SIGSPATIAL*. ACM, 2019, pp. 17–24. DOI: 10.1145/3356395.3365598
5. Hasan Ümitcan Yilmaz, Edouard Fouché, Thomas Dengiz, Lucas Krauß, Dogan Keles and Wolf Fichtner. 'Reducing energy time series for energy system models via self-organizing maps'. In: *Information technology* 61.2-3 (2019). 37.06.01; LK 01, pp. 125–133. ISSN: 2196-7032, 1611-2776. DOI: 10.1515/itit-2019-0025
4. Daniel Popovic, Edouard Fouché and Klemens Böhm. 'Unsupervised Artificial Neural Networks for Outlier Detection in High-Dimensional Data'. In: *ADBIS*. Lecture Notes in Computer Science. Springer, 2019, pp. 3–19. DOI: 10.1007/978-3-030-28730-6_1
3. Edouard Fouché, Junpei Komiyama and Klemens Böhm. 'Scaling Multi-Armed Bandit Algorithms'. In: *KDD*. **Acceptance rate: 9.0%**. ACM, 2019. DOI: 10.1145/3292500.3330862
2. Edouard Fouché and Klemens Böhm. 'Monte Carlo Dependency Estimation'. In: *SSDBM*. **Best Paper Award**. ACM, 2019. DOI: 10.1145/3335783.3335795
1. Edouard Fouché, Alexander Eckert and Klemens Böhm. 'In-Database Analytics with ibmdbpy'. In: *SSDBM*. ACM, 2018, 31:1–31:4. DOI: 10.1145/3221269.3223026

Preprints

1. Junpei Komiyama, Edouard Fouché and Junya Honda. 'Finite-time Analysis of Globally Nonstationary Multi-Armed Bandits'. In: *CoRR* abs/2107.11419 (2021). arXiv: 2107.11419

Dissertation

- Edouard Fouché. 'Estimating Dependency, Monitoring and Knowledge Discovery in High-Dimensional Data Streams'. **Summa cum laude**. PhD thesis. KIT, July 2020. DOI: 10.5445/IR/1000127232
- Communications for the Helmholtz Doctoral Price:
  - Press release (KIT-Informatik): https://www.informatik.kit.edu/11147_12050.php
  - See also the following video: https://youtu.be/6TUFDovtBws