

# Antonio Mallia

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## Work experience

Nov 2023–present **Senior Research Scientist**, *Pinecone*, Remote.

Sept 2021–Oct 2023 **Applied Scientist**, *Amazon, Alexa AI*, Remote.  
Working in the Alexa Search team.

2018–2022 **PhD Fellow**, *New York University*, New York, US.  
Teaching Assistant for Web Search Engines (Fall 2018)

Jun–Aug 2019 **Applied Scientist Intern**, *Amazon*, Barcelona, Spain.  
Working in the Product Search team on improving efficiency and relevance.

2016–2018 **Software Engineer**, *Bloomberg L.P.*, London, United Kingdom.  
Working in the Collaboration Frameworks team on a distributed architecture, and ensuring reliability, scalability and performance. Working in an Agile team, doing software development/testing, code optimization and code review. Learned how to work with large volumes of real-time data, and how to develop software in a large-scale, fast-paced environment.  
Detailed achievements:

- Involved in the design and development of a tagging and sharing framework.
- Designed and refactored code following the microservice paradigm.
- Created a Continuous Integration infrastructure to automate build, tests and deployment.
- Migrated the build system to use the more modern CMake.
- Introduced static code analysis and code coverage to run on the codebase.
- Investigated and debugged production environment issues caused by software defects, system configuration errors, and data inconsistencies.

2013–2016 **Software Engineer**, *NIC .it - National Research Council*, Pisa, Italy.  
Worked for the Italian National Research Council on projects for the ccTLD .it Registry.  
Detailed achievements:

- Developed several features of the main application used by NIC .it domain name registrars. Focused on database query optimization, export of data, third-party web-services integration.
- Co-operated on the development of an internal application, used by administrative staff to manage contracts and billing system. Focused on UX enhancement, data presentation and export.
- Co-operated on the development of an ETL system and presentation of data using interactive charts.
- Developed a UI library for JavaServer Faces (JSF) application and integration with the main NIC applications.
- Planned and developed an e-voting system used for the election of the Registry steering committee.

2011–2016 **Software Engineer**, *Self-Employed*, Remote.  
Worked as a freelancer remotely and on personal projects.  
Detailed achievements:

- Planned and developed a web application providing web privacy and anonymity tools: user management, load balancing, payment integration (Paypal, Bitcoin, credit card gateway, phone). Design of a RESTful API for third-party integration.
- Mail server configuration and administration.
- Google Chrome and Mozilla Firefox extension development to integrate features of a web application.
- Planned and developed a CMS to perform feed aggregation using parsing technics and categorisation.
- Software prototyping of a crawling and parsing system of an airline company to extract flight information and post-analysis.
- Developed a ad-hoc download manager software, including packaging for Windows and OS X.
- Owned an Italian blog network about technology widely-read and realised using Wordpress. Development of several plugins, integration with advertising agency web services. System administration main focused on performance optimisation.

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## Education

- 2018–2022 **Ph.D. Program in Computer Science, New York University.**  
Pursuing a Ph.D. with a focus on advancing efficiency in Information Retrieval for large-scale systems.
- 2018–2020 **Master's degree in Computer Science, New York University.**  
Relevant exams:
  - Machine Learning
  - Natural Language Processing
  - Graphics Processing Units (GPUs): Architecture and Programming
  - Big Data
  - Deep Learning
- 2014–2015 **Master's degree in Computer Science, University of Pisa, 110/110 cum laude.**  
This Master's Degree in Computer Science provided me a solid, in-depth background, in line with the innovation needs of the informatics field. The courses attended increased my knowledge portfolio, in both the theoretical and practical aspect.  
**Thesis:** *Efficient top-k document retrieval with two level indexes.* Supervisor: Prof. Rossano Venturini  
Relevant exams:
  - Advanced Algorithms
  - Advanced Database Systems
  - Advanced Programming
  - Computational Models
  - Distributed Systems: paradigms and models
  - Numerical Methods and Optimization
  - Principle of Programming Languages
- 2012–2013 **Erasmus Programme, University of Essex.**  
This experience enabled me to understand the value of studying and working in an international environment. Exploring practice-oriented learning methods improved my professional skills.  
Relevant exams:
  - Programming in Java
  - Web Technologies & XML
  - Large Scale Software Development & Extreme Programming
  - Network Laboratory
  - Photonics Networks & Devices
  - Mobile Robotics
  - Programming Embedded Systems
  - Electronic System Design & Integration
- 2008–2012 **Bachelor's degree in Electronic Engineering, University of Pisa.**  
I acquired knowledge of methodological aspects of mathematics and basic disciplines to understand and provide appropriate solutions to engineering problems. During the Curriculum in Electronic Engineering I developed professionally with sound fundamental and multidisciplinary skills ranging from electronics, circuit theory, systems theory, computer science, communications, control theory, economics, electromagnetism, nanoelectronics.

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## Publications

Antonio Mallia, Torsten Suel, and Nicola Tonellotto. **Faster Learned Sparse Retrieval with Block-Max Pruning.** In *The 47th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR)*, 2024.

Puxuan Yu, Antonio Mallia, and Matthias Petri. **Improved Learned Sparse Retrieval with Corpus-Specific Vocabularies.** In *European Conference on Information Retrieval*, 2024.

Xueguang Ma, Hengxin Fun, Xusen Yin, Antonio Mallia, and Jimmy Lin. **Enhancing Sparse Retrieval via Unsupervised Learning.** In *Proceedings of the Annual International ACM SIGIR Conference on Research and Development in Information Retrieval in the Asia Pacific Region*, 2023.

Gabriel Tolosa and Antonio Mallia. **Many Algorithms Are Better Than One: Speeding Up Top-K Selection by Combining Strategies.** In *Information Processing & Management*, 2023.

Joel Mackenzie, Antonio Mallia, Alistair Moffat, and Matthias Petri. **Accelerating Learned Sparse Indexes Via Term Impact Decomposition**. In *Findings of the Association for Computational Linguistics: EMNLP 2022*, 2022.

Antonio Mallia, Joel Mackenzie, Torsten Suel, and Nicola Tonellotto. **Faster Learned Sparse Retrieval with Guided Traversal**. In *Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval*, 2022.

Michał Siedlaczek, Antonio Mallia, and Torsten Suel. **Using Conjunctions for Faster Disjunctive Top-k Queries**. In *Proceedings of the 15th ACM International Conference on Web Search and Data Mining (WSDM)*, 2022.

Jimmy Lin, Xueguang Ma, Joel Mackenzie, and Antonio Mallia. **On the Separation of Logical and Physical Ranking Models for Text Retrieval Applications**. In *Design of Experimental Search & Information REtrieval Systems (DESIREs)*, 2021.

Antonio Mallia, Omar Khatat, Nicola Tonellotto, and Torsten Suel. **Learning Passage Impacts for Inverted Indexes**. In *Proceedings of the 44th International ACM SIGIR Conference on Research and Development in Information Retrieval*, 2021.

Antonio Mallia, Michał Siedlaczek, and Torsten Suel. **Fast Disjunctive Candidate Generation Using Live Block Filtering**. In *Proceedings of the 14th ACM International Conference on Web Search and Data Mining*, 2021.

Luke Gallagher, Antonio Mallia, J. Shane Culpepper, Torsten Suel, and B. Barla Cambazoglu. **Feature Extraction for Large-Scale Text Collections**. In *Proceedings of the 29th ACM International Conference on Information and Knowledge Management (CIKM)*, 2020.

Antonio Mallia, Michał Siedlaczek, Mengyang Sun, and Torsten Suel. **A Comparison of Top-k Threshold Estimation Techniques for Disjunctive Query Processing**. In *Proceedings of the 29th ACM International Conference on Information and Knowledge Management (CIKM)*, 2020.

Jimmy Lin, Joel Mackenzie, Chris Kamphuis, Craig Macdonald, Antonio Mallia, Michał Siedlaczek, Andrew Trotman, and Arjen de Vries. **Supporting Interoperability Between Open-Source Search Engines with the Common Index File Format**. In *Proceedings of the Conference on Research and Development in Information Retrieval (SIGIR)*, 2020.

Antonio Mallia, Michał Siedlaczek, Torsten Suel, and Mohamed Zahran. **GPU-Accelerated Decoding of Integer Lists**. In *Proceedings of the 28th ACM International Conference on Information and Knowledge Management (CIKM)*, 2019.

Antonio Mallia, Michał Siedlaczek, Joel Mackenzie, and Torsten Suel. **PISA: Performant Indexes and Search for Academia**. In *Proceedings of the Open-Source IR Replicability Challenge (OSIRRC) co-located with SIGIR*, 2019.

Antonio Mallia and Elia Porciani. **Faster BlockMax WAND with Longer Skipping**. In *Proceedings of the European Conference on Information Retrieval (ECIR)*, 2019.

Antonio Mallia, Michał Siedlaczek, and Torsten Suel. **An Experimental Study of Index Compression and DAAT Query Processing Methods**. In *Proceedings of the European Conference on Information Retrieval (ECIR)*, 2019.

Joel Mackenzie, Antonio Mallia, Matthias Petri, J. Shane Culpepper, and Torsten Suel. **Compressing Inverted Indexes with Recursive Graph Bisection: A Reproducibility Study**. In *Proceedings of the European Conference on Information Retrieval (ECIR)*, 2019.

Melanie Tosik, Antonio Mallia, and Kedar Gangopadhyay. **Debunking Fake News One Feature at a Time**. *CoRR*, abs/1808.02831, 2018.

Antonio Mallia, Giuseppe Ottaviano, Elia Porciani, Nicola Tonellotto, and Rossano Venturini. **Faster BlockMax WAND with Variable-sized Blocks**. In *Proceedings of the Conference on Research and Development in Information Retrieval (SIGIR)*, 2017.

## Other research activities

- Member of the SIGIR Artifact Evaluation Committee (AEC)
- PC member for SIGIR 2021, SIGIR 2022, SIGIR 2023, SIGIR 2024
- PC member for ECIR 2020, ECIR 2021, ECIR 2022, ECIR 2023, ECIR 2024
- PC member for CIKM 2020, CIKM 2021, CIKM 2022, CIKM 2023, CIKM 2024
- PC member for TheWebConf 2022, TheWebConf 2023, TheWebConf 2024
- PC member for WSDM 2023
- Reviewer for ACM Transactions on Information Systems (TOIS)
- Reviewer for ACM Transactions on the Web (TWEB)
- External reviewer for KDD 2018, KDD 2019, KDD 2020

## Books

Antonio Mallia and Francesco Zoffoli. **C++ Fundamentals**. Packt Publishing. 2019

## Languages

Italian **Native**

English **Professional working proficiency**

TOEFL iBT: 105 (C1)

## Invited Talks and Tutorials

- 11/2017 **Everything You Always Wanted to Know About Search (But Were Afraid to Ask)**, *Codemotion*, Rome.
- 11/2017 **C++: unexpected behaviour**, *Meeting C++*, Berlin.
- 10/2017 **C++: unexpected behaviour**, *Topconf*, Düsseldorf.
- 04/2016 **Backend for Android Developers**, *Droidcon Italy*, Turin.

## Awards and Grants

- 2023 **The Pearl Brownstein Doctoral Research Award**.
- 2021 **SIGIR Student Travel Grant**, *issued by ACM SIGIR*.
- 2021 **WSDM Student Travel Grant**, *issued by ACM SIGIR*.
- 2020 **CIKM Student Travel Grant**, *issued by ACM SIGIR*.
- 2019 **ESSIR Scholarship**, *issued by the Italian Association for Artificial Intelligence*.

## Personal skills

Leadership Good experience in team management acquired training and guiding a blog network editorial staff.