

Curriculum Vitae et Studiorum

Contact Information

National Research Council of Italy (CNR)

Institute of Science and Information Technologies "A. Faedo" (ISTI)

Via G. Moruzzi 1, 56124 Pisa, Italy

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Personal Information

Place of birth Florence, Italy

Date of birth 13 July 1990

Research Interests

Indexing, Efficiency, Data Compression, Algorithm Engineering

Education

2015 – 2018 **PhD in Computer Science.**

- University of Pisa, Pisa, Italy
- Thesis: *Space- and Time-Efficient Data Structures for Massive Datasets*.
Defended on 08/03/2019.
- Grade: Excellent.
- Supervisor: Rossano Venturini (<http://pages.di.unipi.it/rossano>)

2012 – 2014 **Master Degree in Computer Science & Networking.**

- University of Pisa and Scuola Superiore Sant'Anna, Pisa, Italy
- Thesis: *Dynamic Elias-Fano Encoding*.
Defended on 06/03/2015.
- Grade: 110/110 *summa cum laude*.
- Supervisor: Rossano Venturini (<http://pages.di.unipi.it/rossano>)

2009 – 2012 **Bachelor Degree in Computer Engineering.**

- University of Florence, Florence, Italy
- Thesis: *Quantum Computation & Grover's Algorithm*.
Defended on 09/10/2012.
- Grade: 110/110 *summa cum laude*.
- Supervisor: Gabriele Vezzosi (<http://www.dma.unifi.it/~vezzosi>)

2004 – 2009 **High School Diploma.**

- Liceo Scientifico Statale Guido Castelnuovo, Florence, Italy
- Grade: 100/100.

Professional Employment

- 11/2018 – present **Postdoctoral Researcher in Computer Science.**
- Institute of Science and Information Technologies “A. Faedo” (ISTI), National Research Council of Italy (CNR), Pisa, Italy
 - HPC-Lab headed by Raffaele Perego (<http://raffaele.isti.cnr.it>)
- 06/2017 – present **Software Developer at ISTI-CNR.**
- European project *Big Data Grapes*, Indexing and Distributed Components, Pisa, Italy
 - European project *Large-scale Indie Gaming Analytics*, Pisa, Italy
- 11/2015 – 11/2018 **PhD Student in Computer Science.**
- University of Pisa, Pisa, Italy
 - Thesis: *Space- and Time-Efficient Data Structures for Massive Datasets*.
 - Supervisor: Rossano Venturini (<http://pages.di.unipi.it/rossano>)
- 05/2018 – 10/2018 **Visiting PhD Student.**
- The University of Melbourne, School of Computing and Information Systems, Melbourne, Australia
 - Supervisor: Alistair Moffat (<https://people.eng.unimelb.edu.au/ammoffat>)
- 04/2018 – 05/2018 **Visiting PhD Student.**
- RIKEN Advanced Intelligence Project (AIP), Tokyo, Japan
 - Supervisor: Yasuo Tabei (<https://sites.google.com/site/yasuotabei>)
- 04/2015 – 07/2015 **Software Engineering Intern at IBM.**
- Rome, Italy

Awards and Grants

- 2020 *Young Researcher Award* issued by ISTI-CNR.
- 2017 *SIGIR Student Travel Grant* issued by ACM SIGIR.
- 2015 *PhD Scholarship* issued by the University of Pisa, Department of Computer Science.
- 2015 *Master Degree Award: Best Performance a.y. 2013/2014* issued by Scuola Superiore Sant'Anna.
- 2015 *Best Master Thesis Award in Theoretical Computer Science*, issued by the Italian chapter of the European Association for Theoretical Computer Science (EATCS).

Publications

- 2021 Giulio Ermanno Pibiri, *Fast and Compact Set Intersection through Recursive Universe Partitioning*. IEEE Data Compression Conference, pages 10.
- 2020 Giulio Ermanno Pibiri and Shunsuke Kanda, *Rank/Select Queries over Mutable Bitmaps*. CoRR, <http://arxiv.org/abs/2009.12809>, pages 21.
- 2020 Giulio Ermanno Pibiri and Rossano Venturini, *Techniques for Inverted Index Compression*. ACM Computing Surveys (CSUR), pages 36.
- 2020 Giulio Ermanno Pibiri and Rossano Venturini, *Practical Trade-Offs for the Prefix-Sum Problem*. Software: Practice and Experience (SPE), pages 29.

- 2020 Simon Gog, Giulio Ermanno Pibiri and Rossano Venturini, *Efficient and Effective Query Auto-Completion*. ACM Conference on Research and Development in Information Retrieval (SIGIR), pages 10.
- 2020 Giulio Ermanno Pibiri and Rossano Venturini, *Succinct Dynamic Ordered Sets with Random Access*. CoRR, <https://arxiv.org/abs/2003.11835>, pages 15.
- 2020 Raffaele Perego, Giulio Ermanno Pibiri and Rossano Venturini, *Compressed Indexes for Fast Search of Semantic Data*. IEEE Transactions on Knowledge and Data Engineering (TKDE), pages 12.
- 2019 Giulio Ermanno Pibiri and Rossano Venturini, *On Optimally Partitioning Variable-Byte Codes*. IEEE Transactions on Knowledge and Data Engineering (TKDE), pages 12.
- 2019 Giulio Ermanno Pibiri and Rossano Venturini, *Handling Massive N-Gram Datasets Efficiently*. ACM Transactions on Information Systems (TOIS), pages 41.
- 2019 Giulio Ermanno Pibiri, Matthias Petri, Alistair Moffat, *Fast Dictionary-based Compression for Inverted Indexes*. ACM Conference on Web Search and Data Mining (WSDM), pages 9.
- 2018 Giulio Ermanno Pibiri and Rossano Venturini, *Variable-Byte Encoding is Now Space-Efficient Too*. CoRR, <https://arxiv.org/abs/1804.10949>, pages 14.
- 2018 Giulio Ermanno Pibiri and Rossano Venturini, *Inverted Index Compression*. Encyclopedia of Big Data Technologies, pages 8.
- 2017 Giulio Ermanno Pibiri and Rossano Venturini, *Efficient Data Structures for Massive N-Gram Datasets*. ACM Conference on Research and Development in Information Retrieval (SIGIR), pages 10.
- 2017 Giulio Ermanno Pibiri and Rossano Venturini, *Dynamic Elias-Fano Representation*. Annual Symposium on Combinatorial Pattern Matching (CPM), pages 14.
- 2017 Giulio Ermanno Pibiri and Rossano Venturini, *Clustered Elias-Fano Indexes*. ACM Transactions on Information Systems (TOIS), volume 2, pages 33.

Software

- GitHub page <https://github.com/jermp>
- rank_select** The C++ library used for the experiments in the paper *Rank/Select Queries over Mutable Bitmaps*.
- psds** The C++ library used for the experiments in the paper *Practical Trade-Offs for the Prefix-Sum Problem*.
- essentials** A C++ library providing essential core utilities for data structure design and benchmarking.
- autocomplete** The C++ library used for the experiments in the paper *Efficient and Effective Query Auto-Completion*.
- 2i_bench** The C++ library used for the experiments in the paper *Techniques for Inverted Index Compression*.

s_indexes	The C++ library used for the experiments in the paper <i>Fast and Compact Set Intersection thorough Recursive Universe Partitioning</i> .
rdf_indexes	The C++ library used for the experiments in the paper <i>Compressed Indexes for Fast Search of Semantic Data</i> .
dint	The C++ library used for the experiments in the paper <i>Fast Dictionary-based Compression for Inverted Indexes</i> .
opt_vbyte	The C++ library used for the experiments in the paper <i>On Optimally Partitioning Variable-Byte Codes</i> .
tongrams	The C++ library implementing the compressed data structures and algorithms described in the papers <i>Efficient Data Structures for Massive N-Gram Datasets</i> and <i>Handling Massive N-Gram Datasets Efficiently</i> .
clustered_indexes	The C++ library used for the experiments in the paper <i>Clustered Elias-Fano Indexes</i> .

Talks

27/07/2020	<i>Efficient and Effective Query Auto-Completion</i> . SIGIR conference presentation. Virtual event.
17/09/2019	<i>Compressed Indexes for Fast Search of Semantic Data</i> . IIR conference presentation. Department of Information Engineering, Padova, Italy.
07/06/2019	<i>Ordered Set Problems</i> . Seminar. ISTI-CNR, Pisa, Italy.
08/03/2019	<i>Space- and Time-Efficient Data Structures</i> . PhD thesis defense. The University of Pisa, Pisa, Italy.
12/02/2019	<i>Fast Dictionary-based Compression for Inverted Indexes</i> . WSDM conference presentation. Melbourne Exhibition Center, Melbourne, Australia.
01/02/2019	<i>Indexing Compressed Data for Fast Retrieval</i> . Talk. The University of Pisa, Pisa, Italy.
15/11/2018	<i>Space- and Time-Efficient Data Structures</i> . PhD research results. The University of Pisa, Pisa, Italy.
29/10/2018	<i>Effective Web Graph Representations</i> . Seminar. The University of Pisa, Pisa, Italy.
17/05/2018	<i>On Optimally Partitioning Variable-Byte Index Data</i> . Seminar. RMIT University, Melbourne, Australia.
10/04/2018	<i>Elias-Fano Encoding: a powerful tool for data structure design</i> . Seminar. RIKEN AIP, Tokyo, Japan.
10/10/2017	<i>Space- and Time-Efficient Data Structures</i> . PhD research results. The University of Pisa, Pisa, Italy.
10/08/2017	<i>Efficient Data Structures for Massive N-Gram Datasets</i> . SIGIR conference presentation. Keio Plaza Hotel, Tokyo, Japan.
06/07/2017	<i>Dynamic Elias-Fano Representation</i> . CPM conference presentation. University Library of Warsaw, Warsaw, Poland.
06/06/2017	<i>Efficient Data Structures for Massive N-Gram Datasets</i> . IIR conference presentation. Università della Svizzera Italiana, Lugano, Switzerland.

- 17/10/2016 *Space- and Time-Efficient Data Structures* PhD thesis proposal. The University of Pisa, Pisa, Italy.
- 21/06/2016 *Elias-Fano Encoding: succinct representation of monotone integer sequences with search operations*. Seminar. The University of Pisa, Pisa, Italy.

Teaching Experience

- 02/2020 – 06/2020 Teacher for *Algorithmics and Laboratory - Corso B, code 008AA*, Bachelor Degree in Computer Science, University of Pisa, Italy
- 02/2019 – 06/2019 Assistant for *Algorithmics and Laboratory - Corso A, code 008AA*, Bachelor Degree in Computer Science, University of Pisa, Italy
- 10/2018 – 12/2018 Assistant for *Competitive Programming and Contests, code 645AA*, Master Degree in Computer Science, University of Pisa, Italy
- 09/2017 – 12/2017 Assistant for *Competitive Programming and Contests, code 645AA*, Master Degree in Computer Science, University of Pisa, Italy
- 10/2016 – 12/2016 Teacher for *Algorithmics and Laboratory - Corso di recupero, code 008AA*, Bachelor Degree in Computer Science, University of Pisa, Italy
- 02/2016 – 06/2016 Assistant for *Algorithmics and Laboratory - Corso A, code 008AA*, Bachelor Degree in Computer Science, University of Pisa, Italy

Professional Activities

- 2021 Member of the Program Committee of the 44-th edition of the International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2021).
- 2021 Member of the Program Committee of the 43-rd European Conference on Information Retrieval (ECIR 2021).
- 2020 Member of the Program Committee of the 14-th International ACM Conference on Web Search and Data Mining (WSDM 2021).
- 2020 Member of the Program Committee of the 29-th edition of the International ACM SIGIR Conference on Information and Knowledge Management, (CIKM 2020).
- 2020 Member of the Organizing Committee of the 28-th edition of the Annual European Symposium on Algorithms (ESA 2020).
- 2020 Member of the Program Committee of the 43-rd edition of the International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2020).
- 2019 Member of the Program Committee of the 42-nd edition of the International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2019).
- 2019 Member of the Organizing Committee of the 30-th edition of the International Symposium on Combinatorial Pattern Matching (CPM 2019).

- 2018 Member of the Program Committee of the 2-nd edition of the Workshop on Knowledge Graphs and Semantics for Text Retrieval and Analysis (KG4IR), in conjunction with ACM SIGIR 2018.
- 2017 Member of the Organizing Committee of the 24-th edition of the International Symposium on String Processing and Information Retrieval (SPIRE 2017).
- 2016 Student volunteer for the organization of the 39-th edition of the International ACM SIGIR Conference on Research and Development in Information Retrieval, (SIGIR 2016).

--- Languages

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|---------|---|-----------------------|
| Italian | Native | <i>CEFR level: C2</i> |
| English | Fluent | <i>CEFR level: C1</i> |
| 2018 | TOEFL iBT in English.
100 (HIGH level) | |
| 2008 | First Certificate in English (Level B2).
University of Cambridge, Cambridge, United Kingdom | |

--- Driving Licences

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|------------|---------------------------|
| 01/10/2010 | Driving License of type B |
| 23/01/2010 | Driving License of type A |

--- Web

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|----------|---|
| Personal | http://pages.di.unipi.it/pibiri |
| GitHub | https://github.com/jermp |
| LinkedIn | https://www.linkedin.com/in/giulio-ermanno-pibiri-496ab3ab/ |