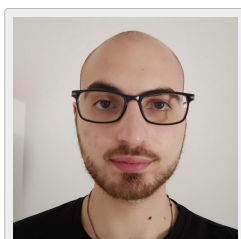


ROBERTO BRUNO

Curriculum Vitae - 30th August 2026

PERSONAL INFORMATION



Name: Roberto Bruno

Date of Birth: 25th March 1998

Address: Via Contrada Valloni, 5,
83043 Bagnoli Irpino (AV), Italy

Phone: +39 345 85 67 214

E-Mail: roberto250398@gmail.com

Institutional E-Mail:

rbruno@unisa.it

GitHub Profile: @R11001

LinkedIn Profile:

robertobruno11001

ORCID: 0000-0001-6039-2075

EDUCATION

University of Salerno

Fisciano, SA

PhD student in Computer Science

2022 - 2026

Supervisor: *Prof. Ugo Vaccaro*

Research Area: Information Theory and its application

Thesis: From Search to Coding (and Back): Two Sides of the Same Coin

University of Salerno

Fisciano, SA

Master's degree in Computer Science

2020 - 2022

Thesis: Application of Information Theory functionals to dimension reduction of probability distributions

Grade 110/110 cum laude

Academic advisor: *Prof. Ugo Vaccaro*

University of Salerno

Fisciano, SA

Bachelor's degree in Computer Science

2017 - 2020

Thesis: Exact Exponential Algorithms

Grade 110/110 cum laude

Academic advisor: *Prof. Ugo Vaccaro*

RESEARCH ACTIVITY AND WORK EXPERIENCE

Postdoctoral Researcher at University of Salerno

July 2026 - currently

PhD student at University of Salerno

November 2022 - March 2026

Main research topics: My research explored the fundamental duality between searching and coding, focusing primarily on alphabetic and prefix codes, and binary search trees. We have established novel entropic bounds on the average length of these binary codes—and consequently on the complexity of their corresponding search algorithms. We also developed efficient linear time procedures for their construction. Additionally, my research has investigated problems related to the information bottleneck, dimension reduction, and compression, providing complexity results and near-optimal efficient approximation procedures.

Academic advisor: Prof. Ugo Vaccaro

Visiting Research Student at Okinawa Institute of Science and Technology (OIST) May 2025 - Nov. 2025

Main research topics: We investigated the application of various information measures to the hypothesis testing problem, with the aim of deriving novel finite-sample bounds.

Supervisor: Prof. Amedeo Roberto Esposito

Teaching Assistant, University of Salerno

March 2024 - September 2024

Teaching assistant for a bachelor's course in algorithm design.

PUBLICATIONS

Title: *Bounds and Algorithms for Alphabetic Codes and Binary Search Trees*

Authors: Roberto Bruno, Roberto De Prisco, Alfredo De Santis, Ugo Vaccaro;

Journal: IEEE Transactions on Information Theory;

DOI: [10.1109/TIT.2024.3428699](https://doi.org/10.1109/TIT.2024.3428699)

Title: *NP-Hardness and Approximation Algorithms for Constrained Entropy Maximization*

Authors: Roberto Bruno, Ugo Vaccaro;

Journal: IEEE Transactions on Information Theory;

DOI: [10.1109/TIT.2025.3644150](https://doi.org/10.1109/TIT.2025.3644150)

Title: *A Note on Equivalent Conditions for Majorization*

Authors: Roberto Bruno, Ugo Vaccaro;

Journal: AIMS Mathematics;

DOI: [10.3934/math.2024419](https://doi.org/10.3934/math.2024419)

Title: *Hardness and Approximability of Dimension Reduction on the Probability Simplex*

Authors: Roberto Bruno;

Journal: Algorithms MDPI;

DOI: [10.3390/a17070296](https://doi.org/10.3390/a17070296)

Recognition: Editor's Choice.

Title: *Entropic Bounds on the Average Length of Codes with a Space*

Authors: Roberto Bruno, Ugo Vaccaro;

Journal: Entropy MDPI;

DOI: [10.3390/e26040283](https://doi.org/10.3390/e26040283)

Title: *Old and New Results on Alphabetic Codes*

Authors: Roberto Bruno, Roberto De Prisco, Ugo Vaccaro;

Journal: Proceedings of the Workshop on Information Theory and Related Fields, Lecture Notes in Computer Science;

DOI: [10.1007/978-3-031-82014-4_7](https://doi.org/10.1007/978-3-031-82014-4_7)

Title: *Optimal Binary Variable-Length Codes with a Bounded Number of 1's per Codeword: Design, Analysis, and Applications*

Authors: Roberto Bruno, Roberto De Prisco, Ugo Vaccaro;

Conference: IEEE International Symposium on Information Theory, ISIT 2025, Ann Arbor, Michigan, USA.

Title: *Optimal Average-Case Binary Search with Outcome-Dependent Costs*

Authors: Roberto Bruno, Roberto De Prisco, Ugo Vaccaro;

Journal: Information Processing Letters;

DOI: [10.1016/j.ipl.2026.106640](https://doi.org/10.1016/j.ipl.2026.106640)

Title: *A Finite-Sample Strong Converse for Binary Hypothesis Testing via (Reverse) Rényi Divergence*
 Authors: Roberto Bruno, Adrien Vandenbroucq, Amedeo Roberto Esposito;
 Conference: IEEE International Symposium on Information Theory, ISIT 2026, Guangzhou, China;
 Current Status: accepted for publication.

Title: *Constrained Maximum Entropy Contiguous Aggregations*
 Authors: Roberto Bruno, Ugo Vaccaro;
 Conference: IEEE International Symposium on Information Theory, ISIT 2026, Guangzhou, China;
 Current Status: accepted for publication.

Title: *Robust Shift-Invariant Superimposed Codes*
 Authors: Roberto Bruno, Adele Anna Rescigno, Ugo Vaccaro;
 Conference: IEEE International Symposium on Information Theory, ISIT 2026, Guangzhou, China;
 Current Status: accepted for publication.

Title: *An Information Theoretic Treatment of Yager's Probability Distribution Negation*
 Authors: Roberto Bruno, Ugo Vaccaro;
 Current Status: submitted.

Title: *Generalized Superimposed Codes: Their Role in Modern Multiple Access and Algorithms for their Construction*
 Authors: Roberto Bruno, Adele Anna Rescigno, Ugo Vaccaro;
 Current Status: submitted.

Title: *The Sharma-Mittal Entropy is Subadditive and Supermodular on the Majorization Lattice*
 Authors: Roberto Bruno, Ugo Vaccaro;
 Current Status: submitted.

PERSONAL SKILLS

Organisational / Managerial Skills

Management and Scheduling Thanks to the PhD work activities and the exams carried out, I could improve my ability to organize work to meet deadlines. Both in preparation for exams and in work, I have shown good ability in organization, always accomplishing the assigned tasks as well as possible. Especially during PhD research activity.

Communication Skills

Communication During my studies and research activity, I've had the opportunity to develop good communication and interpersonal skills. Participating in international summer schools and internships also allowed me to work on my interpersonal skills, enhancing my ability to interact with others and to work as part of a team.

Job related Skills

C/C++	● ● ● ● ●	Java	● ● ● ● ●
JavaScript	● ● ● ● ●	MATLAB	● ● ● ● ●
SQL	● ● ● ● ●	Python	● ● ● ● ●

Programming Models: SYCL, CUDA, OpenMP, MPI.

Technologies: Relational Databases, NoSQL Databases (MongoDB), Docker, Git.

Interests: Information Theory, Algorithms and Data structures, Game Theory, Artificial Intelligence.

Master's degree courses:

Information Theory: Basic concepts of Information Theory; Data compression; Data security; Binary codes; Information measures and inequalities.

Optimization methods: Linear and integer programming techniques.

Advanced algorithms: Exact algorithms; Approximated algorithms; Randomised algorithms; Online and distributed algorithms; Reduction techniques.

Distributed architectures: P2P protocols; Distributed networks; Leader election and consensus problem on distributed systems.

OTHER INFORMATION

Languages

Italian
Mother tongue

English
Listening — B2
Reading — C1
Spoken interaction — B2
Spoken production — B2
Writing — C1

Università degli Studi di Salerno
Centro Linguistico di Ateneo
June 2021

ACADEMIC PROJECTS

SYCL Performance Portability

Project realized for High-Performance Computing Master course, based on a performance portability study on AMD CPU and NVIDIA GPU of different types of matrix multiplication implementations using SYCL.

Auction Mechanism

Project realized for a Master course. It is based on the design and development in Java of an auction mechanism based on a P2P Network using TomP2P library.

Toy compiler

My colleague and I developed a source-to-source toy compiler addressing the stages of compiler development from lexical analysis to intermediate code generation.

MyTutor

MyTutor was developed for the Software Engineering course to digitalize and speed up the procedure for requesting the Help Teaching activities at the Computer Science Department of the University of Salerno.

PRIVACY TREATMENT & SIGNATURE

I give consent to process my data with the purpose of the recruitment process, in accordance to the Regulation of the European Parliament 679/2016, regarding the protection of natural persons and free movement of such data.

Fisciano, 30/08/2026

Signature

