

Allegato B

Procedura selettiva di chiamata per n.1 posto di Ricercatore a tempo determinato – Tipologia A presso il Dipartimento di Informatica, Facoltà di ingegneria dell'informazione, Informatica e Statistica, Settore Scientifico-Disciplinare INF/01, Settore concorsuale 01/B1, di cui al bando n. 03/2022, Prot. N. 1929 del 23.12.2022, Class. VII/I, Repertorio n. 365/2022, e con avviso pubblicato sulla G.U. -IV serie speciale n. 101 del 23.12.2022, pubblicato nella pagina web del sito <https://web.uniroma1.it/trasparenza/albo-pretorio> relativa ai bandi di RTD-a in data 23/12/2022, codice concorso 2022RTDAPNRR051.

Viviana Arrigoni
Curriculum Vitae

Full Name: Viviana Arrigoni
Spoken Languages: Italian, English, basic German

EDUCATION

- Bachelor's Degree in mathematics, Sapienza University of Rome, 15/12/2014, 100/110.
Thesis title: "Simpson's Paradox: Algebraic Formalization and Applications".
- Master's degree in computer science, Sapienza University of Rome, 10/01/2017, 110/110 cum laude.
Thesis title: "Avoiding Pivoting in Gaussian Elimination Method when Solving Linear Systems".
- PhD in Computer Science, Sapienza University of Rome, 8/07/2021, cum laude.
Thesis title: "Network Performance Analysis through Boolean Network Tomography and Parallelization of Fundamental Operations in Numerical Linear Algebra".

ACCADEMIC APPOINTMENTS

- 02-07/2016 - Erasmus+ Program scholarship. Department of Computer Science, Universidade do Porto, Porto, Portugal.
- 01/11/2017 – 31/03/2021 - PhD scholarship. Department of Computer Science, Sapienza University of Rome.
- 04-07/2018 - Visiting at the Department of Mathematics, Technische Universität Berlin, (Germany) under the supervision of prof. Volker Mehrmann.
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- 1/04/2021 – 31/03/2023 - Postdoctoral researcher. Department of Computer Science, Sapienza, University of Rome.

TEACHING EXPERIENCE

- 2018-2021 - Teaching assistant for the master's degree course in Computer Science "Intensive Computation", held by prof. Annalisa Massini.
- 2022 - Teaching assistant for the master's degree course in Computer Science "Computer Network Performance", held by prof. Novella Bartolini.

SOCIETY PARTNERSHIP, AWARDS, HONORS and ACTIVITIES

- 05/2021 - N2Women Fellowship at IEEE INFOCOM 2021
N2Women event chair, panel organizer and moderator.
- 06/2022 - TPC member at IEEE SMARTCOMP 2022.
- 06/2022 - TPC member at IEEE SECON 2022.
- 06/2022-06/2023 - Publicity Chair at IEEE DCOSS 2023.
- 02/2023 - TPC member at IEEE DCOSS 2023.
- 12/2022 - TPC member at IEEE PerCom 2023.

FUNDING INFORMATION

- Avvio alla Ricerca (PI) 2019-2020
Devising and Implementing Computational Linear Algebra Algorithms Using HPC Parallel Architectures
Sapienza Research Award
- Avvio alla Ricerca (PI) 2021-2022
Performance Analysis of Dynamic Networks through Progressive Network Tomography
Sapienza Research Award
- NGIAtlantic.eu 4th call, Research Award (co-PI) 2022
Vulnerability Assessment and Robust Defences for Optimized Attacks in Dynamic SDNs
- Avvio alla Ricerca (PI) 2022-2023
Dynamic and Software-Defined Network Monitoring and Vulnerabilities Assessment through Network Tomography
Sapienza Research Award

ATTENDED CONFERENCES AND SCHOOLS

Conferences:

- 09/2019 - PPAM (International Conference on Parallel Processing and Applied Mathematics)
Bialystock, Poland
- 09/2019 - ACM Womencourage
Rome, Italy
- 05/2021 - IEEE INFOCOM (International Conference on Computer Communications)
online
- 08/2021 - ACM ICPP (International Conference on Parallel Processing)
online
- 11/2021 - ACM ICAIF (International Conference on AI in Finance)
online
- 11/2021 - IEEE ICNP (International Conference on Network Protocols)
online
- 06/2022 - IoT Week
Dublin, Ireland

Schools:

- 05/2018 - Summer School on Parallel Computing
CINECA
Bologna (IT)
- 10/2018 - Workshop on Matlab in HPC environment
CINECA
Bologna (IT)
- 02/2019 – School on Advanced Parallel Computing
CINECA
Bologna (IT)
- 07/2020 – ACDL (Advanced Course on Data Science and Machine Learning)
Pontignano, Siena (IT)
- 08-09/2022 – School on Artificial Intelligence and Games
Xania – Krete (EL)

RESEARCH ACTIVITIES

Network tomography

During my research activity, I have been focusing on Network Tomography for network monitoring and vulnerability assessment. In the past years, I worked on providing bounds to network identifiability, that is a core concept in Boolean

Network Tomography. I also formalized a parallelism between these results and separating systems, which are used in Information Theory for studying causal inference. Furthermore, I worked on Boolean Network Tomography solutions for localization of static and dynamic network failures under uncertainty. To tackle this problem, I integrated a Bayesian analysis for probabilistic inference.

I am working on extending this work to consider flow networks, modeling both telecommunication and traffic networks.

Network recovery

Recently, I worked on critical service restoration after massive network failures. With respect to state-of-the-art solutions, which assumed complete or partial knowledge of nodes and links' state, the contribution of my work was to develop a recovery strategy that would exploit network tomography for network monitoring, and Bayesian inference to drive decisions on what network elements to repair to minimize time and costs for satisfying the critical demands and how to route them along possibly redundant paths. This work is being extended to consider traffic flow networks, to guide decision making for traffic redirection and new route establishment.

SDN

Lately, I have been focusing on Software Defined Networks. I am currently working on finding routing and power supplement strategies to minimize the power consumption of software defined data centres and LANs. I am also taking part in a collaboration project that has the goal of measuring performance statistics (i.e., response time and power consumption) of a small testbed composed of SDN switches. SDNs are a key paradigm in the development of SCADA systems typically employed for control and management of critical infrastructure, such as transportation networks and traffic light systems.

Computational Linear Algebra and High-Performance Computing

My research interests also include the design of Linear Algebra algorithms for distributed computing. I developed an algorithm for the multiplication of a matrix by its transpose in distributed systems and a linear solver for quasi-block diagonal linear systems, which often appear in Engineering when modelling objects with finite element methods.

Drone delivery

Recently, I have been studying the problem of drone delivery route planning. I have been working on a survey that analyses different strategies and solutions for optimizing delivery time and power efficiency of programmable drones. I am currently working on the proposal of one such solution in urban environments with multiple drones, multiple depots and multiple customers. The use of multi-drone delivery systems is instrumental in alleviating urban road traffic, and related truck parking issues.

SUMMARY OF SCIENTIFIC ACHIEVEMENTS:

Product type	number	Data base
International papers	8	Google scholar

Total impact factor (over 3 journals)	10.874 (JCR website)
Total citations	34 (google scholar)
Average citations per product	4.86
Hirsch (H) Index	3 (google scholar)
Normalized H Index	3/7

PUBLICATIONS

Arrigoni, V., Prata, M. & Bartolini N.

Tomography-based progressive network recovery and critical service restoration after massive failures
accepted at IEEE INFOCOM (2023)

Arrigoni, V. Bartolini, N., Massini, A., & Trombetti, F.

A Bayesian Approach to Network Monitoring for Progressive Failure Localization.
In IEEE/ACM Transaction on Networking (2022)

Arrigoni, V. Bartolini, N., Massini, A., & Trombetti, F.

Failure localization through Progressive Network Tomography.
In IEEE INFOCOM (2021)

Arrigoni, V., Bartolini, N., & Massini, A.

Topology Agnostic Bounds on Minimum Requirements for Network Failure Identification.
In IEEE ACCESS (2021)

Arrigoni, V., & Bartolini, N.

Network Identifiability: Advances in Separating Systems and Networking Applications.
IEEE Networking Letters (2022)

Bartolini, N., He, T., Arrigoni, V., Massini, A., Trombetti, F., & Khamfroush, H.

On fundamental bounds on failure identifiability by Boolean network tomography.
IEEE/ACM Transactions on Networking, (2022) 28(2), 588-601.

Arrigoni, V. & Massini., A.

Hybrid solver for quasi block diagonal linear systems

In International Conference on Parallel Processing and Applied Mathematics (2020) pp. 129-140. Springer, Cham.

Arrigoni, V., Maggioli, F., Massini, A., & Rodolà, E..

Efficiently Parallelizable Strassen-Based Multiplication of a Matrix by its Transpose.

In 50th International Conference on Parallel Processing (2021, August) pp. 1-12.

7/01/2023