Curriculum Vitae

Riccardo Cantini

Contents

1 General information

Date of Birth	Place of Birth	Nationality
30 December, 1993	Catanzaro (CZ), Italy	Italian

Address	E-mail
Work: via Pietro Bucci 41C, 87036 Rende (CS), Italy	riccardo.cantini@unical.it
Home: via Teano n.13, 88100 Catanzaro (CZ), Italy	

2 Positions Held

- Since July 2023, *Researcher in Computer Engineering*, SSD ING-INF/05, at DIMES, University of Calabria, Rende (CS).

  Scientific Supervisor: Prof. Domenico Talia.

- From March 2023 to July 2023, *Research Fellow* at DIMES, University of Calabria, Rende (CS), within the *ASPIDE* project.

  Research Title: *Topic Detection and Tracking Techniques from Social Media Data.*

  Scientific Supervisor: Prof. Fabrizio Marozzo.

- From April 2021 to July 2022, *Visiting Researcher* at the Department of Computer Science, Workflows and Distributed Computing Group, Barcelona Supercomputing Center (BSC), Spain.

  Scientific Supervisor: Prof. Rosa M. Badia.

- From November 2019 to March 2023, *Ph.D. student in Information and Communication Technologies* at DIMES, University of Calabria, Rende (CS).

  Scientific Supervisor: Prof. Paolo Trunfio, co-supervisor: Prof. Fabrizio Marozzo.

- From July 2019 to October 2019, *Research Fellow* at DIMES, University of Calabria, Rende (CS), within the *ASPIDE* project.

  Research Title: *In-Memory Techniques for Efficient Execution of Data-Intensive Applications on Exascale Architectures.*

  Scientific Supervisor: Prof. Paolo Trunfio.

- From July 2018 to June 2019, *Research Collaborator* at DIMES, University of Calabria, Rende (CS), within the *Smart Macingo* project.

  Research Title: *Data Analysis Techniques for Price Estimation in Transportation Services.*

  Scientific Supervisor: Prof. Paolo Trunfio.

3 Education and Training

- European Ph.D. in Information and Communication Technologies, DIMES, University of Calabria, Rende (CS).

  Thesis Title: *Distributed Big Social Data Analysis: Advanced Techniques and Execution Strategies.*

  Supervisor: Prof. Paolo Trunfio.

  Co-supervisor: Prof. Fabrizio Marozzo.

  Evaluation: Excellent

  Completion Date: 07/03/2023.

- Participation in the 1^{st} International School on Internet of Things and Edge AI: Computing, Communications and Systems, Falerna (CZ).

  Organizer: DIMES, University of Calabria, with the sponsorship of the IEEE Italy section and the Computer Engineering Group (GII).

  Date: 08-12/09/2022.

- Master's Degree in Computer Engineering, University of Calabria, Rende (CS).

  Thesis Title: *Analysis of Political Polarization of Twitter Users through Neural Networks.*

  Advisors: Prof. Paolo Trunfio, Prof. Fabrizio Marozzo.

  Evaluation: 110/110 cum laude.

  Completion Date: 12/04/2019.

- Bachelor's Degree in Computer Engineering, University of Calabria, Rende (CS).

  Thesis Title: *Using the ELKI Framework for the Discovery of Regions of Interest through Clustering Techniques.*

  Advisors: Prof. Paolo Trunfio, Prof. Fabrizio Marozzo.

4 Research Activities

Riccardo Cantini's research activities are centered around Deep Learning and Big Data analysis, with a specific focus on data generated on major social media platforms. The primary objective is to extract a wide range of information about users to outline their perception of real-world facts and events, providing a data-driven approach for an in-depth understanding of socio-political phenomena. In this context, cutting-edge machine learning and deep learning models and techniques are employed, with a particular emphasis on the use of Large Language Models, along with frameworks for parallel and distributed computing. Key applications include identifying discussion topics in online conversations, estimating the political polarization of social media users, and exploring the connection between user polarization and emotions expressed in posted content. Another aspect addressed is the dynamism of online conversations and the impact of false information on user discussions. To this end, topic-oriented techniques for false information detection in social content are developed, as well as time-adaptive models capable of effectively handling dynamically evolving scenarios.

The research activities also focus on sustainable artificial intelligence, with a focus on ensuring an efficient, fair, and trustworthy use of Large Language Models. In this context, techniques for efficient fine-tuning, energy-aware models, bias elicitation techniques, and advanced retrieval-augmented generation systems are currently explored, as well as the use of curriculum learning and knowledge distillation for learning effectively from limited amounts of data and scarce computing resources.

5 List of Publications

Journals

[1] R. Cantini, A. Orsino, and D. Talia, "Xai-driven knowledge distillation of large language models for efficient deployment on low-resource devices," *Journal of Big Data*, vol. 11, no. 1, 2024. DOI: 10.1186/s40537-024-00928-3.

[2] R. Cantini, F. Marozzo, A. Orsino, *et al.*, "Block size estimation for data partitioning in hpc applications using machine learning techniques," *Journal of Big Data*, vol. 11, no. 1, 2024. DOI: https://doi.org/10.1186/s40537-023-00862-w.

[3] L. Belcastro, R. Cantini, F. Marozzo, A. Orsino, D. Talia, and P. Trunfio, "Programming big data analysis: Principles and solutions," *Journal of Big Data*, vol. 9, no. 1, 2022. DOI: 10.1186/s40537-021-00555-2.

[4] R. Cantini, F. Marozzo, D. Talia, and P. Trunfio, "Analyzing political polarization on social media by deleting bot spamming," *Big Data and Cognitive Computing*, vol. 6, no. 1, 2022. DOI: 10.3390/bdcc6010003.

[5] L. Belcastro, F. Branda, R. Cantini, F. Marozzo, D. Talia, and P. Trunfio, "Analyzing voter behavior on social media during the 2020 us presidential election campaign," *Social Network Analysis and Mining*, vol. 12, no. 1, 2022. DOI: 10.1007/s13278-022-00913-9.

[6] L. Belcastro, R. Cantini, and F. Marozzo, "Knowledge discovery from large amounts of social media data," *Applied Sciences*, vol. 12, no. 3, 2022. DOI: 10.3390/app12031209.

[7] R. Cantini, F. Marozzo, G. Bruno, and P. Trunfio, "Learning sentence-to-hashtags semantic mapping for hashtag recommendation on microblogs," *ACM Transactions on Knowledge Discovery from Data (TKDD)*, vol. 16, no. 2, 2021. DOI: 10.1145/3466876.

[8] R. Cantini, F. Marozzo, S. Mazza, D. Talia, and P. Trunfio, "A weighted artificial bee colony algorithm for influence maximization," *Online Social Networks and Media*, vol. 26, p. 100 167, 2021. DOI: 10.1016/j.osnem.2021.100167.

[9] R. Cantini, F. Marozzo, A. Orsino, D. Talia, and P. Trunfio, "Exploiting machine learning for improving in-memory execution of data-intensive workflows on parallel machines," *Future Internet*, vol. 13, no. 5, 2021. DOI: 10.3390/fi13050121.

[10] L. Belcastro, R. Cantini, F. Marozzo, D. Talia, and P. Trunfio, "Learning political polarization on social media using neural networks," *IEEE Access*, vol. 8, pp. 47 177–47 187, 2020. DOI: 10.1109/ACCESS.2020.2978950.

Conferences

[11] R. Cantini, C. Cosentino, and F. Marozzo, "Multi-dimensional classification on social media data for detailed reporting with large language models," in *20th International Conference on Artificial Intelligence Applications and Innovations*, to appear.

[12] R. Cantini, C. Cosentino, I. Kilanioti, F. Marozzo, and D. Talia, "Unmasking covid-19 false information on twitter: A topic-based approach with bert," in *International Conference on Discovery Science*, Springer, 2023, pp. 126–140. DOI: https://doi.org/10.1007/978-3-031-45275-8_9.

[13] R. Cantini and F. Marozzo, "Topic detection an tracking in social media platforms," in *Pervasive Knowledge and Collective Intelligence on Web and Social Media*, C. Comito and D. Talia, Eds., Cham: Springer Nature Switzerland, 2023, pp. 41–56. DOI: 10.1007/978-3-031-31469-8_3.

[14] R. Cantini, F. Marozzo, A. Orsino, M. Passarelli, and P. Trunfio, "A visual tool for reducing returns in e-commerce platforms," in *2021 IEEE 6th International Forum on Research and Technology for Society and Industry (RTSI)*, IEEE, 2021, pp. 474–479. DOI: 10.1109/RTSI50628.2021.9597230.

[15] L. Belcastro, R. Cantini, F. Marozzo, D. Talia, and P. Trunfio, "Discovering political polarization on social media: A case study," in *2019 15th International Conference on Semantics, Knowledge and Grids (SKG)*, IEEE, 2019, pp. 182–189. DOI: 10.1109/SKG49510.2019.00038.

Books

[16] D. Talia, P. Trunfio, F. Marozzo, L. Belcastro, R. Cantini, and A. Orsino, *Programming Big Data Applications: Scalable Tools and Frameworks for Your Needs*. World Scientific, 2023, ISBN: 978-1-80061-504-5. DOI: https://doi.org/10.1142/q0444.

Chapters

[17] R. Cantini, F. Marozzo, and A. Orsino, "Deep learning meets smart agriculture: Using lstm networks to handle anomalous and missing sensor data in the compute continuum," in *Device-Edge-Cloud Continuum - Paradigms, Architectures and Applications*, Springer Nature, 2023, pp. 141–153.

[18] A. Orsino, R. Cantini, and F. Marozzo, "Evaluating the performance of a multimodal speaker tracking system at the edge-to-cloud continuum," in *Device-Edge-Cloud Continuum - Paradigms, Architectures and Applications*, Springer Nature, 2023, pp. 155–166.

6 Participation as Speaker at International Conferences

- *26th International Conference on Discovery Science* (DS2023) Porto, Portugal, October 9-11, 2023, presenting the following work: *Unmasking COVID-19 False Information on Twitter: A Topic-Based Approach with BERT* [12].
- *EAI International Conference on Pervasive Knowledge and Collective Intelligence on Web and Social Media* (EAI PerSoM 2022) Messina, Italy, November 17-18, 2022, presenting the following work: *Topic Detection and Tracking in Social Media Platforms* [13].
- *IEEE 6th International Forum on Research and Technology for Society and Industry* (RTSI 2021), September 6-9, 2021, presenting the following work: *A Visual Tool for Reducing Returns in E-commerce Platforms* [14].

7 Participation in Projects

- *FAIR: Future Artificial Intelligence Research*

  Research Objective: Development of machine learning and deep learning techniques to support energy-aware computing and contribute to the advancement of green and sustainable AI.

- *eFlows4HPC: Enabling Dynamic and Intelligent Workflows in the Future EuroHPC Ecosystem*

  Research Objective: Use of machine learning techniques for optimizing data partitioning to support efficient execution of data-intensive workflows in HPC environments.

- *ASPIDE: exAScale ProgramIng models for extreme Data procEssing*

  Research Objective: Development of in-memory techniques for the efficient execution of data-intensive applications on Exascale architectures.

- *Smart Macingo*

  Research Objective: Definition and implementation of data mining techniques for estimating the prices of transportation services.

8 Professional Services

Participation in Journal Editorial Boards

- Guest Editor for the special issue *Generative AI and Large Language Models* in the journal *Big Data and Cognitive Computing*.
- Review Editor of *Frontiers in Big Data*, Data Mining and Management section.
- Review Editor of *Frontiers in High-Performance Computing*.

Participation in Conference Program Committees

- *Advanced Data Mining and Applications* (ADMA) 2023, 2024 (Core rank: B).
- *Discovery Science* (DS) 2024 (Core rank: B).
- *International Conference on Learning Representations* (ICLR) 2024 (Core rank: A*), workshop on *Large Language Model Agents*.

Reviewer Activity

- Riccardo Cantini served as a Reviewer for several international journals, including: *ACM Computing Surveys*, *IEEE Transactions on Cloud Computing*, *IEEE Transactions on Parallel and Distributed Systems*, *IEEE Transactions on Neural Networks and Learning Systems*, *Future Generation Computer Systems*, *Journal of Big Data*, *IEEE Access*, *Computer*, and *Social Network Analysis and Mining*.
- Riccardo Cantini served as a Reviewer for several international conferences, including: *International Conference on Advanced Data Mining and Applications* (ADMA), *International Conference on Learning Representations* (ICLR): 2024, *International European Conference on Parallel and Distributed Computing* (EuroPar), *IEEE International Conference on Machine Learning and Applications* (ICMLA), and *IEEE International Conference on Big Data* (IEEE BigData).

9 Teaching Activities

Riccardo Cantini has been Teaching Assistant for the following courses:

- **High-Performance Computing**, Master's Degree in Computer Engineering, DIMES, University of Calabria, Rende (CS).

  Topics Covered: main principles and practical aspects related to high-performance computing, with a focus on GPU computing in CUDA, and the MPI (Message Passing Interface) paradigm, encompassing both shared and distributed memory implementations.

  Academic Year 2023-2024: 16 hours of lesson.

- **Operating Systems**, Bachelor's Degree in Computer Engineering, DIMES, University of Calabria, Rende (CS).

  Topics Covered: main constructs for modeling and implementing multi-threaded applications, issues related to synchronization and access to shared variables, and concurrency mechanisms in Java, particularly Semaphores and Monitors.

  Academic Year 2023-2024: 27 hours of lesson; Academic Year 2022-2023: 27 hours of lesson; Academic Year 2021-2022: 17 hours of lesson.

- **Distributed Systems and Cloud/Edge Computing for IoT**, Master's Degree in Computer Engineering for the Internet of Things, DIMES, University of Calabria, Rende (CS).

  Topics Covered: fundamental concepts of Edge Computing in relation to Cloud architectures and the Internet of Things, with a focus on major tools and frameworks for modeling, simulating, and implementing large-scale interoperable IoT applications.

  Academic Year 2021-2022: 23 hours of lesson; Academic Year 2020-2021: 23 hours of lesson; Academic Year 2019-2020: 23 hours of lesson.

He has also served as a **Thesis Advisor** for over 30 graduating students at DIMES, University of Calabria, overseeing both bachelor and master theses. The main topics of the supervised theses include social media and big data analysis, machine learning, deep learning, natural language processing, large language models, and high-performance data analytics.

I authorize the processing of my personal data included in the CV, in accordance with Article 13 of Legislative Decree no. 196 of June 30, 2003, "*Personal Data Protection Code*," and Article 13 of GDPR 679/16, "*European Regulation on the Protection of Personal Data*". I declare that the information provided in the CV is accurate and truthful. I declare to be aware of the implications of asserting the truthfulness of the above representation and to be informed of the criminal penalties under Article 76 of Legislative

Decree no. 445 of December 28, 2000, "*Consolidated Text of Legislative and Regulatory Provisions Regarding Administrative Documentation*," and in particular of what is provided for by Article 495 of the Criminal Code in case of false statements or false attestations. The above is presented in the form of a self-certification under Articles 19, 46, and 47 of Legislative Decree no. 445/2000.

Rende, 87036 Italy
May 4, 2024

Signature

Riccardo Cantini