

Domenico MANDAGLIO

Assistant Professor (RTDa) at University of Calabria

📍 DIMES - University of Calabria, Via Pietro Bucci Cubo 44Z, 87036 Arcavacata di Rende (CS), Italy (Office)

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RESEARCH INTERESTS

My research interests lie primarily in the broad areas of *artificial intelligence* and (*algorithmic*) *data science*, with the main goal of tackling (novel) problems and designing effective yet efficient algorithms that are useful to gain knowledge from data. Due to the fact that much of today's data can be represented as graphs, my emphasis has primarily been on formalizing data-driven challenges as graph problems. More specifically, my recent research interests include neuro-symbolic AI, graph mining, correlation clustering, deep learning on graphs and (combinatorial) multi-armed bandit problems.

RESEARCH EXPERIENCES

Assistant Professor (RTDa) June 2023 - present
University of Calabria, DIMES department Rende, Italy

- Investigated the effectiveness of graph neural networks for the link prediction task in multilayer networks
- Explored the neuro-symbolic AI field which seeks to combine traditional rules-based AI approaches with modern deep learning techniques
- Investigated the active learning problem with deep neural networks

Postdoctoral Researcher May 2021 - June 2023
University of Calabria, DIMES department Rende, Italy

- Designed, implemented and tested a combinatorial multi-armed bandit solution for the problem of correlation clustering with uncertain weights
- Studied the problem of correlation clustering with global weight bounds with application to fair clustering
- Explored the effectiveness of graph neural networks for the problem of discovering polarized communities in signed networks

Research & Teaching Assistant October 2017 - May 2021
University of Calabria, DIMES department Rende, Italy

- Investigated problems and evaluated algorithms in the context of community detection in complex networks
- Designed, implemented and tested novel solutions for the problem of consensus community detection in both multilayer and temporal networks
- Studied the problem of optimizing interactions in probabilistic graphs under clustering constraints
- Explored the effectiveness of combinatorial multi-armed bandit algorithms for online clustering and consensus community detection problems
- Investigated the preference learning paradigm for the problem of trust network inference in online social networks

Research Fellow April 2018 - June 2018
University of Calabria, DIMES department Rende, Italy

- Studied the problem of building privacy-preserving synopses of multidimensional data
- Developed and tested a system prototype which constructs histogram-based synopses of multidimensional data to support approximate query answering with theoretical guarantees on the privacy of the summarized data

EDUCATION

Ph.D. in Information and Communication Technologies October 2017 - May 2021
University of Calabria Rende, Italy

- Thesis: "Mining and Learning Problems in Complex Graph Data"
- Supervisors: prof. Sergio Greco and prof. Andrea Tagarelli

M.Sc. in Computer Science & Engineering (with honors) October 2014 - September 2017
University of Calabria Rende, Italy

- Thesis: "Ensemble-based Community Detection in Multilayer Networks"
- Supervisor: prof. Andrea Tagarelli

B.Sc. in Computer Science & Engineering (with honors) October 2011 - September 2014
University of Calabria Rende, Italy

- Thesis: "Implementation of Outlier Detection Algorithms in Weka"
- Supervisor: prof. Fabio Fassetti

SCIENTIFIC COMMUNITY SERVICE

Program Committee

- *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD) (Research track)* [2023]
- *ACM The Web Conference (WWW) (Social Network Analysis and Graph Algorithms track)* [2022, 2023]
- *ACM International Conference on Web Search and Data Mining (WSDM)* [2023]
- *AAAI Conference on Artificial Intelligence (AAAI)* [2023]
- *European Conference on Artificial Intelligence (ECAI)* [2023]
- *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) (Research track)* [2022, 2023]
- *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) (Applied Data Science track)* [2021, 2022]
- *International Symposium on Methodologies for Intelligent Systems (ISMIS)* [2022]
- *Workshop on Mining Data for financial applications (MIDAS), in conjunction with the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)* [2021, 2022, 2023]

Conference Reviewing (The list does not include reviews done as Program Committee member)

- *ACM SIGMOD International Conference on Management of Data (SIGMOD)* [2023]
- *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)* [2019, 2020, 2021, 2022]
- *ACM The Web Conference (WWW)* [2019, 2020]
- *IEEE International Conference on Data Mining (ICDM)* [2018, 2020, 2021]
- *SIAM International Conference on Data Mining (SDM)* [2018]
- *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)* [2018, 2019]

Journal Reviewing

- *IEEE Transactions on Knowledge and Data Engineering (TKDE)*
- *Social Network Analysis and Mining (SNAM)*

Scientific Boards

- Member of the Editorial Board of Data Mining and Management as Review Editor for Frontiers in Big Data

TALKS & POSTERS

Conference Speaker

- *Learning to Active Learn by Gradient Variation Based on Instance Importance*, International Conference on Pattern Recognition (**ICPR '22**), Montréal, Québec, August 2022
- *Correlation Clustering: from Local to Global Constraints*, Italian Symposium on Advanced Database Systems (**SEBD '22**), Tirrenia (Pisa), Italy, June 2022
- *Correlation Clustering with Global Weight Bounds*, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML-PKDD '21**), Virtual Event, September 2021
- *In and Out: Optimizing Overall Interaction in Probabilistic Graphs under Clustering Constraints*, ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD '20**), Virtual Event, August 2020
- *A Combinatorial Multi-Armed Bandit Based Method for Dynamic Consensus Community Detection in Temporal Networks*, International Conference on Discovery Science (**DS '19**), Split, Croatia, October 2019
- *Dynamic consensus community detection and combinatorial multi-armed bandit*, IEEE/ACM Int. Conference on Advances in Social Networks Analysis and Mining (**ASONAM '19**), Vancouver, Canada, August 2019

EXTERNALLY-FUNDED RESEARCH PROJECTS

Participation as a research-staff member

- *D-All: sfruttare la potenza dei big data per effettuare analisi predittiva in applicazioni innovative di cross-market*, Funding entity: Italian PON 2018-2020, CUP: B48I17000820008.

TEACHING

Teaching Assistant

University of Calabria

Rende, Italy

- *Algorithms and Data Structures (Group A)*, B.Sc. in Computer Science & Engineering, 18 hours/year. '21-'22, '22-'23
- *Algorithms and Data Structures (Group B)*, B.Sc. in Computer Science & Engineering, 18 hours/year. '21-'22
- *Algorithms and Data Structures*, B.Sc. in Computer Science & Engineering, 18 hours/year. '17-'18, '18-'19, '20-'21
- *Database systems*, M.Sc. in Management Engineering, 15 hours/year. '18-'19, '19-'20

Instructor

University of Calabria

Rende, Italy

- *Correlation Clustering: from classic to Reinforcement Learning-based theoretical frameworks, with applications to fairness and diversity related problems*, PhD program in ICT, 10 hours/year.

'22-'23

AWARDS

- **WWW 2023 Best Reviewer Award**: granted to reviewers "selected by track chairs of the research track from the Program Committee and Senior Program Committee, based on the quality of their reviews and metareviews, and their engaged participation during the discussion phase"

SKILLS (NON-EXHAUSTIVE)

General-Purpose Programming Languages: Python, Java, C

Domain-Specific Languages: SQL (relational DB querying), Bash (shell scripting), LaTeX (typesetting)

Versioning Technology: Git

Interacting Computing Technology: Jupyter Notebook

Software Libraries: numpy, scikit-learn, PyTorch, PyTorch Geometric, pandas, seaborn, NetworkX, igraph

Operating Systems: macOS, Windows, Unix/Linux

Language Skills: (Native) Italian, (Fluent) English, (Basic) French

PUBLICATIONS

International Conferences

- [1] Francesco Gullo, Lucio La Cava, Domenico Mandaglio, and Andrea Tagarelli. "When Correlation Clustering Meets Fairness Constraints". In *International Conference on Discovery Science (DS '22)*, Montpellier, France, October 10-12, 2022, pp. 302–317.
- [2] Sergio Flesca, Domenico Mandaglio, Francesco Scala, and Andrea Tagarelli. "Learning to Active Learn by Gradient Variation Based on Instance Importance". In *Proceedings of the International Conference on Pattern Recognition (ICPR '22)*, Montréal, Québec, Canada, August 21-25, 2022, pp. 2224–2230.
- [3] Domenico Mandaglio, Andrea Tagarelli, and Francesco Gullo. "Correlation Clustering with Global Weight Bounds". In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD '21)*, Bilbao, Spain, September 13-17, 2021, pp. 1371–13815.
- [4] Domenico Mandaglio, Andrea Tagarelli, and Francesco Gullo. "In and Out: Optimizing Overall Interaction in Probabilistic Graphs under Clustering Constraints". In *Proceedings of the ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD '20)*, Virtual Event, CA, USA, August 23-27, 2020, pp. 1371–1381.
- [5] Domenico Mandaglio and Andrea Tagarelli. "Dynamic consensus community detection and combinatorial multi-armed bandit". In *Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM '19)*, Vancouver, British Columbia, Canada, 27-30 August, 2019, pp. 184–187.
- [6] Domenico Mandaglio and Andrea Tagarelli. "A Combinatorial Multi-Armed Bandit Based Method for Dynamic Consensus Community Detection in Temporal Networks". In *International Conference on Discovery Science (DS '19)*, Split, Croatia, October 28-30, 2019, pp. 412–427.
- [7] Domenico Mandaglio, Alessia Amelio, and Andrea Tagarelli. "Consensus Community Detection in Multilayer Networks Using Parameter-Free Graph Pruning". In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD '18)*, Melbourne, VIC, Australia, June 3-6, 2018, pp. 193–205.

Journals

- [8] Francesco Gullo, Domenico Mandaglio, and Andrea Tagarelli. "A Combinatorial Multi-Armed Bandit Approach to Correlation Clustering". *Data Mining and Knowledge Discovery (DAMI)* (2023), *Accepted (to appear)*.
- [9] Domenico Mandaglio and Andrea Tagarelli. "Generalized Preference Learning for Trust Network Inference". *IEEE Access* (2019), pp. 174583–174596.

National Conferences & Workshops

- [10] Domenico Mandaglio, Andrea Tagarelli, and Francesco Gullo. "Correlation Clustering: from Local to Global Constraints". In *Proceedings of the 30th Italian Symposium on Advanced Database Systems (SEBD '22)*, Tirrenia (Pisa), Italy, June 19-22, 2022, pp. 445–452.