UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

DOTTORATO DI RICERCA / PHD PROGRAM IN
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

Activities and Publications Report

PhD Student: Valerio La Gatta

Student DR number: DR995141

PhD Cycle: XXXVI
PhD Cycle Chairman: Prof. Stefano Russo

PhD program student's start date: 01/11/2020
PhD program student's end date: 31/10/2023

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PhD scholarship funding entity: Università Federico II

General information

Valerio La Gatta received in year 2020 the Master Science degree in Computer Engineering from the University of Naples Federico II. He attended a curriculum in Computer Science within the PhD program in Information Technology and Electrical Engineering. He received a grant from Università Federico II.

Study activities

Attended Courses

Year	Course Title	Type	Credits	Lecturer	Organization
1st	Scientific Programming and Visualization with Python	Ad hoc course	2	Prof. Alessio Botta	ITEE
1st	Statistical data analysis for science and engineering research	Ad hoc course	4	Prof. Roberto Pietrantuono	ITEE
1st	Data science for patient records analysis	Ad hoc course	2.5	Prof. Marcello Cinque	ITEE
1st	Natural Language Processing	MSc course	6	Prof. Francesco Cutugno	University of Naples Federico II
1st	Strategic Orientation for STEM research & writing	Ad hoc course	4	Ms Chie Shin Fraser	ITEE
2nd	Web and Real Time Communication Systems	MSc course	6	Prof. Simon Pietro Romano	University of Naples Federico II
2nd	Big Data Architecture and Analytics	Ad hoc course	5	Prof. Giancarlo Sperlì	ITEE

Attended PhD Schools

Year	School title	Location	Credits	Dates	Organization
1st	AIRO PhD School 2021 and 5th AIRO-Young Workshop	Remote	3.6	08/02/2021 – 10/02/2021	University of Naples Federico II

Attended Seminars

Year	Seminar Title	Credits	Lecturer	Lecturer affiliation	Organization
1st	Digital Project Management: Practices, processes, techniques, tools and scientific approach	0.2	Prof. Dario Carotenuto	Project Management Institute	ITEE
1st	#andràtuttobene: Images, Texts, Emojis & Geodata in a Sentiment Analysis Pipeline	0.3	Prof. Serena Pelosi	University of Salerno	ITEE
1st	At the Nexus of Big Data, Machine Intelligence, and Human Cognition	0.2	Prof. George S. Djorgovski	California Institute of Technology	ITEE

1st	Exploiting Deep Learning and Probabilistic Modeling for Behavior Analytics	0.2	Prof. Giuseppe Manco	ICAR-CNR	ITEE
1st	Data Driven Transformation in WINDTRE through Managers voice	0.4	Marcello Savarese, Erica Bertone, Amida Kudasheva	WINDTRE	ITEE
1st	GDPR basics for computer scientists	0.3	Dr. Ringo Wenning	European Research Consortium for Informatics and Mathematics	University of Naples Federico II
1st	Explainable Artificial Intelligence and Fuzzy Systems	0.2	Prof. Corrado Mencar	IEEE Italy Section Computational Intelligence Society	The IEEE Italy Section Computational Intelligence Society
1st	Artificial Intelligence Between Research and Industry	0.4	Davide Bargna	The Italian Chamber of Commerce and Industry for the UK	The Consulate General of Italy for Scotland and Norther Ireland, the Italian Institute of Culture in Edinburgh and the Scotland Office of the Italian Chamber of Commerce and Industry for the UK
1st	From Photometric Redshifts to Improved Weather Forecasts: an interdisciplinary view on machine learning	0.2	Prof. Kai Polsterer	Heidelberg Institute for Theoretical Studies	ITEE
1st	Cybercrime and electronic evidence: the internation legal framework for an effective criminal justice response	0.2	Eng. Matteo Lucchetti	National Cyber Security Competence Center	ITEE
1st	AI LEGAL: Artificial Intelligence for notary's sector: a case study, Salvatore Falange	0.2	Salvatore Palange	Founder of Fluel Innovation for Business	ITEE
1st	The era of Industry 4.0: new frontiers in business model innovation	0.2	Marco Balzano	University Ca' Foscari in Venice	ITEE
1st	Machine Learning: causality lost in translation	0.3	Edwin A. Valentjin	Kapteyn Astronomical Institute, University of Groningen The Netherlands	ITEE

1st	Approaches to Graph Machine Learning	0.2	Miroslav Cepek	ORACLE LABS	ITEE
1st	Big Data and Computational Linguistics	0.4	Prof. Francesco Cutugno	University of Naples Federico II	ITEE
1st	Sensoria Health	0.2	Stefano Rossotti	SENSORIA Health	ITEE
1st	Distributional Semantics Methods: How Linguistic features can improve the semantic representation	0.4	Alessandro Maisto Flora Amato	University of Salerno	ITEE
1st	Robo Ludens: A game design taxonomy for human-robot interaction	0.2	Dr. John Edison Muñoz Cardona	University of Waterloo	University of Naples Federico II
1st	IEEE Authorship and Open Access Symposium: Best Practices to Get Published to Increase the Exposure and Impact of Your Research	0.4	Rachel Berrington	IEEE	IEEE
1st	Introduction to Underwater Robotics	0.4	Prof. Gianluca Antonelli	University of Cassino and Southern Lazio	University of Naples Federico II
1st	5G: l'architettura, le applicazioni e la rete di accesso radio,	0.4	Eng. Francesco Mollica	Vodafone Italia S.p.A.	University of Naples Federico II
1st	Sadas Engine, an innovative DBMS for the Data Warehouse, great performance in the VLDB environment	0.2	Dr. Roberto Mosca, Dr. Aniello Santorelli	SADAS	ITEE
2nd	Cyber security in Akka Technologies	0.4	Dr. Luigi Villa, Sara Belluccini, Matteo Pracchia	AKKA, Consulting company	University of Naples Federico II
2nd	Possible Quantum Machine Learning Approaches in HEP	0.4	Dr. Michele Grossi	CERN, Geneve	University of Naples Federico II
2nd	Single cell omics leverage Machine Learning to dissect tumor microenvironment and cancer immuno editing,	0.4	Dr. Raoul J.P. Bonnal	IFOM - the FIRC Institute of Molecular Oncology	ITEE
2nd	The learning landscape in deep neural networks and its exploitation by learning	0.2	Prof. Riccardo Zecchina	Bocconi University	University of Naples Federico II

	algorithms				
2nd	The quest of quantum advantage with a photonics platform	0.2	Prof. Fabio Sciarrino	University of Rome La Sapienza	PHD programs in Advanced Mathematics and Physical Sciences for Advanced Materials and Technologies
2nd	Project Vac: Can a Text-to-Speech Engine Generate Human Sentiments?	0.2	Prof. V.K. Gubani	Illinois Institute of Technology	ITEE
2nd	From basic principles in spintronics to some recent developments toward spin-orbitronics	0.2	Dr. Vincenzo Cros	Unité Mixte de Physique, CNRS, Thales, Université Paris-Saclay	Scuola Superiore Meridionale
2nd	Towards a Political Philosophy of AI	0.2	Mark Coeckelbergh	University of Wien	ITEE
2nd	5G Networks in Action – The Private Mobile Era	0.2	Ing. Marco Centenaro Ing. Nicola Di Pietro. Ing. Daniele Munaretto	Athonet	5G Academy's Seminar Series
3rd	Open Digital Framework	0.6	Alberto Curcio	CapGemini Invent	University of Naples Federico II
3rd	Ricerca e Formazione nella Società della Transizione Digitale	1	CINI Board and Heads of Campania Universities	CINI, University of Naples Federico II, University of Naples Parthenope, University of Salerno, University of Sannio, University of Campania Luigi Vanvitelli	CINI

Research activities

Valerio La Gatta actively engaged in research related to disinformation mining in today's digital landscape. In particular, he has led investigations into the following areas: (i) advancing the fact-checking process by identifying previously verified information; (ii) enhancing the detection of harmful memes through the integration of common-sense knowledge; (iii) developing models to understand the emotional and contextual factors driving disinformation through multi-task learning techniques. During a period spent abroad, Valerio La Gatta served as a visiting PhD student at the University of Southern California, Los Angeles. In this capacity, he played a leading role in exploring how content moderation on a source platform can inform decisions on other platforms where that content was initially shared.

In addition to his primary research topics, Valerio La Gatta collaborated with fellow members of the PICUSLab on various projects. These included research in the areas of eXplainable Artificial

Intelligence, Recommendation Systems, and Graph Neural Networks.
Notably, Valerio La Gatta presented one research contribution at ACM Hypertext 2023 (HT2023), which received a nomination for the ACM Ted Nelson Award. He also presented one contribution at The 2nd Italian Conference on Big Data and Data Science (ITADATA2023).

Tutoring and supplementary teaching activities

- Valerio La Gatta has supervised approximatively 20 MS students in Computer Engineering at University of Naples Federico II.
- Valerio La Gatta has been responsible, together with other PICUSLab members, for the practical lectures of two courses for the MS degree in Computer Engineering at University of Naples Federico II:
  - Sistemi Informativi (Prof. Vincenzo Moscato): AA 2021/2022, 2022/2023
  - Big Data Engineering Course (Proff. Giancarlo Sperlì and Vincenzo Moscato): AA 2020/2021, 2021/2022, 2022/2023
- Valerio La Gatta served as Tutor for 1st year courses:
  - AA 2021/2022: 60 hours
    - Fondamenti di Informatica, Prof. Alessio Botta
    - Calcolatori Elettronici I, Prof. Giancarlo Sperlì
  - AA 2022/2023: 60 hours
    - Calcolatori Elettronici I, Prof. Giancarlo Sperlì

Credits summary

PhD Year	Courses	Seminars	Research	Tutoring / Supplementary Teaching	Total
1st	22.1	6.1	34.2	1.6	64
2nd	11	2.4	60	1.6	75
3rd	0	1.6	49.4	0	51
Total	33.1	10.1	143.6	3.2	190

Research periods in institutions abroad and/or in companies

PhD Year	Institution / Company	Hosting tutor	Period	Activities
2nd	University of Southern California, Los Angeles	Prof. Emilio Ferrara	June 2022 – October 2022	Research on cross-platform moderation strategies and false claims diffusion during major geopolitical events, focus on Ukraine-Russia conflict.
3rd	University of	Prof. Emilio	November	Research on cross-platform moderation

	Southern California, Los Angeles	Ferrara	2022 - December-2022	strategies and false claims diffusion during major geopolitical events, focus on Ukraine-Russia conflict.

PhD Thesis

In the digital era, the pervasive spread of disinformation poses profound threats to society, economics, and politics. Recent events have underlined the urgency of combating this multifaceted menace. For instance, during the COVID-19 pandemic, health-related disinformation contributed to vaccine hesitancy. In parallel, political disinformation campaigns attempted to attribute the Ukraine-Russia conflict to NATO expansion.

This thesis adopts a multifaceted approach, fusing computer science, network science, artificial intelligence, and knowledge-informed methodologies to confront online disinformation. In particular, disinformation is viewed as a complex challenge intertwined with human cognition, social dynamics, and emotional responses. Consequently, our investigations are fundamentally oriented towards understanding how diverse forms of *contextual knowledge* can bolster efforts to combat online disinformation.

Focusing on the enduring importance of manual fact-checking processes, our study reveals the potential to expedite the process through the consideration of *knowledge about previously fact-checked information*. We illustrate this efficacy within the context of the ongoing Ukraine-Russia conflict and introduce an innovative AI-driven system designed for effective operation in multimodal settings.

Additionally, our investigation delves into the crucial role of *background and cultural knowledge* in comprehending intricate information objects, such as internet memes. In this pursuit, we propose KERMIT (Knowledge-EmpoweRed Model In harmful meme deTection), a pioneering methodology seamlessly incorporating internal meme entities with background knowledge to enhance harmful meme identification.

Furthermore, as disinformation capitalizes on emotions and cognitive biases, we explore the advantages of simultaneously addressing various disinformation-related tasks, such as fake news detection and sentiment analysis. Our findings demonstrate that *knowledge acquired from additional tasks* significantly bolsters overall detection performance, providing a more profound understanding of disinformation content.

Lastly, this thesis investigates how the *knowledge of content moderation on a source platform* can inform the moderation strategies of the other social media platforms where that content was initially shared. By analyzing Twitter discussions around moderated YouTube videos, we uncover the benefits of sharing moderation interventions across different platforms to enhance the integrity of the overall digital information ecosystem.

All in all, our results advance the understanding of online disinformation spread and highlights the need for holistic approaches to combat this issue.

Research products

Research results appear in *8* papers published in international journals, *0* papers published in national journals, *4* contributions to international conferences, *3* contributions to national conferences, 0 patents.

List of scientific publications

International journal papers

V. La Gatta, V. Moscato, M. Postiglione, G. Sperlì
Covid-19 sentiment analysis based on Tweets,
IEEE Intelligent Systems,
vol. 38 (3), pp. 51-55, 2023, DOI: 10.1109/MIS.2023.3239180

T. Chakraborty, **V. La Gatta**, V. Moscato, G. Sperlì,
Information retrieval algorithms and neural ranking models to detect previously fact-checked information,
Neurocomputing,
vol. 557, 2023, DOI: 10.1016/j.neucom.2023.126680

A. Ferraro, A. Galli, **V. La Gatta**, M. Postiglione,
Benchmarking Open Source and Paid Services for Speech to Text: An Analysis of Quality and Input Variety,
Frontiers in Big Data,
vol. 6, 2023, DOI: 10.3389/fdata.2023.1210559

V. La Gatta, V. Moscato, M. Pennone, M. Postiglione, G. Sperlì,
Music Recommendation via Hypergraph Embedding,
IEEE Transactions on Neural Networks and Learning Systems,
vol. 34 (10), pp. 7887-7899, 2022, DOI: 10.1109/TNNLS.2022.3146968

A. Barducci, S. Iannaccone, **V. La Gatta**, V. Moscato, M. Postiglione, G. Sperlì, S. Zavota,
An end-to-end framework for information extraction from Italian resumes,
Expert Systems with Applications,
vol. 210, 2022, DOI: 10.1016/j.eswa.2022.118487

V. La Gatta, V. Moscato, M. Postiglione, G. Sperlì,
CASTLE: Cluster-aided space transformation for local explanations,
Expert Systems with Applications,
vol. 179, 2021, DOI: 10.1016/j.eswa.2021.115045

V. La Gatta, V. Moscato, M. Postiglione, G. Sperlì,
PASTLE: Pivot-aided space transformation for local explanations,
Pattern Recognition Letters,
vol. 149, pp. 67-74, 2021, DOI: 10.1016/j.patrec.2021.05.018

V. La Gatta, V. Moscato, M. Postiglione, G. Sperlì,
An Epidemiological Neural Network Exploiting Dynamic Graph Structured Data Applied to the COVID-19 Outbreak,
IEEE Transactions on Big Data,
vol. 7 (1), pp. 45-55, 2020, DOI: 10.1109/TBDATA.2020.3032755

International conference papers

V. La Gatta, L. Luceri, F. Fabbri, E. Ferrara
The Interconnected Nature of Online Harm and Moderation: Investigating the Cross-Platform Spread of Harmful Content between YouTube and Twitter,
34th ACM International Conference on Hypertext and Social Media (HT2023),
Rome, Italy, Sept. 2023, ACM, DOI: 10.1145/3603163.3609058
Nomination for the ACM Hypertext Ted Nelson Award

M. Postiglione, G. Esposito, R. Izzo, **V. La Gatta**, V. Moscato, R. Piccolo

Harnessing multi-modality and expert knowledge for adverse events prediction in clinical notes,
International Conference on Image Analysis and Processing (ICIAP2023), Workshop on Multi-modal Medical Imaging Processing
Udine, Italy, Sept. 2023

V. La Gatta, C. Wei, L. Luceri, F. Pierri, E. Ferrara
Retrieving false claims on Twitter during the Russia-Ukraine conflict,
Companion Proceedings of the ACM Web Conference 2023 (WWW2023),
Austin, TX, USA, Apr. 2023, ACM, DOI: 10.1145/3543873.3587571

A. Ferraro, A. Galli, **V. La Gatta**, M. Postiglione
A Deep Learning pipeline for Network Anomaly Detection based on Autoencoders,
Proceedings of the 2022 IEEE International Conference on Metrology for Extended Reality, Artificial Intelligence and Neural Engineering (MetroXRAINE2022),
Rome, Italy, Oct. 2022, IEEE, DOI: 10.1109/MetroXRAINE54828.2022.9967598

National conference papers

G. Riccio, A. Romano, A. Korsun, M. Cirillo, M. Postiglione, **V. La Gatta**, A. Ferraro, A. Galli, V. Moscato
Healthcare Data Summarization via Medical Entity Recognition and Generative AI,
The 2nd Italian Conference on Big Data and Data Science (ITADATA2023),
Naples, Italy, Sept. 2023, CEUR Workshop Proceedings

A. Ferraro, A. Galli, **V. La Gatta**, V. Moscato, M. Postiglione, G. Sperlì, F. Amato
HEMR: Hypergraph Embeddings for Music Recommendation,
Symposium on Advanced Database System, SEBD2023,
Galzignano Terme, Italy, July 2023, CEUR Workshop Proceedings

A. Ferraro, A. Galli, **V. La Gatta**, V. Moscato, M. Postiglione, G. Sperlì, F. Moscato
Unsupervised Anomaly Detection in Predictive Maintenance using Sound Data,
Symposium on Advanced Database System, SEBD2023,
Galzignano Terme, Italy, July 2023, CEUR Workshop Proceedings

Patents and/or spin offs

None

Awards and Prizes

- Nomination for the Ted Nelson Award at the ACM Hypertext Conference 2023
- ACM Hypertext 2023 Travel Grant

Date 19/10/2023

PhD student signature 

Supervisor signature