Bardh Prenkaj

Academic Curriculum Vitae
2023

Short Bio

Bardh Prenkaj is currently a postdoc at Sapienza University of Rome, where he is focused on the application of AI and deep learning in the field of medicine, specifically in the areas of explainable AI and anomaly detection. He completed his PhD in 2022, also at Sapienza University of Rome, where he specialised in time-series analysis and anomaly detection. Since 2019, he has been a researcher with the Intelligent Information Mining group, a joint research group between the Computer Science Departments of Sapienza University of Rome and Unitelma Sapienza. He conducted a visiting period at the George Mason University in 2020, where he worked under the tutorship of Prof. Carlotta Domeniconi on anomaly detection in real-world data.
He is the author of 7 refereed conference papers and 6 refereed journal articles, and co-authored the tutorial "Challenges and Solutions to the Student Dropout Prediction Problem in Online Courses" held at the top-rated conference CIKM 2020. He was also a technical coordinator in the Regional project - Avviso Pubblico "Emergenza Coronavirus e oltre", Domanda prot. n. A0376-2020-070051, CUP: F84E21000000006, where he coordinated the development of an intelligent system capable of detecting anomalies in symbolic sequences of patient data coming from environmental and wearable sensors. He is a peer reviewer in many esteemed venues (KDD, CVPR, ICCV, ICDM).

Research Interests: Anomaly Detection, Explainable Artificial Intelligence, AI for Health

Part I - General Information

Full Name:	Bardh Prenkaj
E-Mail:	prenkaj@di.uniroma1.it
Spoken Languages:	Albanian (*native*), Italian (*bilingual*)
	English (*fluent*), German (*basic*)
Current Positions:	Postdoc Researcher

Part II - Appointments

IIIA - Academic

[01/10/2022 — Present]
Institution: Sapienza University of Rome, Italy - *Computer Science Dpt.*
Position: Postdoctoral Researcher (Art. 22 L. 240/2010)
Area: Anomaly Detection, AI for Health
Advisor: prof. Paola Velardi

[01/06/2023 — 01/09/2023]
Institution: TU Munich, Germany - *School of Social Sciences and Technology*
Position: Short Term - Visiting Research Fellow
Area: Explainable AI
Advisor: prof. Gjergji Kasneci

[01/04/2021 — 30/06/2021]
Institution: George Mason University, USA - *College of Engineering and Computing*
Position: Visiting Student

AREA: Anomaly Detection
ADVISOR: prof. Carlotta Domeniconi

[01/11/2018 — 01/11/2021]
INSTITUTION: Sapienza University of Rome, Italy - *Computer Science Dpt.*
POSITION: PhD Student
AREA: Anomaly Detection, Student Dropout Prediction
ADVISOR: prof. Paola Velardi, prof. Damiano Distante
CO-ADVISOR: prof. Giovanni Stilo, prof. Stefano Faralli

IIIB - OTHER

[06/02/2023 — 06/05/2023]
INSTITUTION: Luiss Guido Carli, Italy - *Business and Management Dpt.*
POSITION: Teaching Assistant (art. 409 c.p.c., art. 2, comma 2 lett. a. D.Lgs. 12/06/2015, n. 81)
AREA: Computer Science

[01/07/2022 — 01/10/2022]
INSTITUTION: Heimerer College, Kosovo - *Faculty of Health Sciences and Nursing*
POSITION: External Lecturer
AREA: AI for Health, Bioinformatics

[01/12/2021 — 30/09/2022]
INSTITUTION: Sapienza University of Rome, Italy - *Computer Science Dpt.*
POSITION: Senior Research Fellow
AREA: Explainable AI, AI for Health, Anomaly Detection
ADVISOR: prof. Paola Velardi

[01/07/2017 — 31/10/2018]
INSTITUTION: Sapienza University of Rome, Italy - *Computer Science Dpt.*
POSITION: Junior Research Fellow
AREA: Information Retrieval & Mining, Trend Analysis, Machine Learning
ADVISOR: prof. Paola Velardi, CO-ADVISOR: prof. Giovanni Stilo

PART III - EDUCATION

[25/02/2022] **Ph.D.** in COMPUTER SCIENCE, Sapienza University of Rome
Thesis: *"Latent Deep Sequential Learning of Behavioural Sequences"*
Advisor: Prof. Paola VELARDI, prof. Damiano DISTANTE,
Co-advisor: prof. Giovanni STILO, prof. Stefano FARALLI
Examiners: prof. H. Rangwala (George Mason University), prof. R. Carro (Universidad Autonoma de Madrid)

[24/10/2018] **M.Sc.** in COMPUTER SCIENCE, Sapienza University of Rome
110/110 *summa cum laude*
Thesis: *"Time-aware Topic Detection and Anomaly Classification in a Multi-layer Network"*
Advisor: Prof. Paola VELARDI, Co-advisor: prof. Giovanni STILO

[15/12/2016] **B.Sc.** in COMPUTER SCIENCE, Sapienza University of Rome
110/110
Thesis: *"Rilevamento Automatico del Focus di Notizie Online"*
Advisor: Prof. Paola VELARDI, Co-advisor: prof. Giovanni STILO

Part IV - Teaching and Mentoring experience

Courses taught as a Professor

Bioinformatics (30h, 6 CFU)
M.Sc. in Medical Laboratory Sciences,
Faculty of Health Sciences and Nursing,
Heimerer College, Kosovo
A. Years: 2022-2023

Courses taught as an Assistant

Algorithms (26h, 8 CFU, Laboratory classes)
B.Sc. in Management and Computer Science,
Department of Business and Management,
Luiss Guido Carli, Italy
A. Years: 2022-2023

Machine Learning (24h, 6 CFU, Laboratory classes)
M.Sc. in Computer Science,
Faculty of Information Engineering, Computer Science and Statistics,
Sapienza University of Rome
A. Years: 2022-2023

Web and Social Information Extraction (16h, 6 CFU, Laboratory classes, co-teaching with prof. Giovanni Stilo)
M.Sc. in Computer Science,
Faculty of Information Engineering, Computer Science and Statistics,
Sapienza University of Rome
A. Years: 2018-2019, 2019-2020

Social and Behavioural Networks (16h, 6 CFU, Laboratory classes, co-teaching with prof. Giovanni Stilo)
M.Sc. in Data Science,
Faculty of Information Engineering, Computer Science and Statistics,
Sapienza University of Rome
A. Years: 2018-2019

Thesis Advising M.Sc.

Dario Aragona [10/2021]
Semi-supervised Anomaly Detection on Elderly Behaviour Time Series
M.Sc. in Computer Science,
Department of Computer Science,
Sapienza University of Rome
Co-advised with prof. Paola Velardi

Luca Podo [10/2021]
Machine Learning applied to the Visual Analytics of health conditions in older people
M.Sc. in Computer Science,
Department of Computer Science,
Sapienza University of Rome
Assistance to prof. Paola Velardi

Gianmarco Forcella [10/2018]
DataEX: A Distributed Micro Service Architecture to support Data Analytics in the eLearning sector
M.Sc. in Computer Science,
Department of Computer Science,

Sapienza University of Rome
Assistance to prof. Paola Velardi

Emanuele Alessi [10/2018]
Student Dropout Prediction through Attention Networks with an application to Unitelma Sapienza
M.Sc. in Computer Science,
Department of Computer Science,
Sapienza University of Rome
Assistance to prof. Paola Velardi

B.Sc.

Leonardo Berti [10/2022]
Deep Learning for Trend Prediction in Financial Time Series
B.Sc. in Computer Science,
Department of Computer Science,
Sapienza University of Rome
Assistance to prof. Paola Velardi

Part V - Involvement in Funded Projects

SI4SI

SI4SI Smart Intervention for Senior Isolation - This work is funded under AAL Programme (AAL Call 2020)
https://si4si-aal.com/
Duration: 01/04/2021 — 31/03/2023
Funded: € 1,745,125.00
Position: Component
Responsibilities: The project aims at monitoring, managing, and contrasting the phenomenon of social isolation in elder people through the development of an integrated care model. In addition to identifying symptoms of social isolation, the project comprises a number of technological solutions to improve the overall quality of life of senior users, by means of enhancing their independence in their day-to-day life and decision-making ability. To validate the potential impact of this ecosystem, the project performs 2 pilots with 40 users (20 in Italy and 20 in Romania). At each pilot, patients are monitored according to the use cases and scenarios defined.

E-Linus

E-Linus - This work is supported by POR FESR Lazio 2014-2020, Avviso Pubblico "Emergenza Coronavirus e oltre"
https://datawizard.it/en/discover-e-linus-improving-home-care/
Duration: 01/11/2020 — 30/11/2021
Funded: € 504,523.20
Position: Component
Responsibilities: The project aims to identify social isolation, improve levels of home care, intervene with human interactions and AI devices, and foster emotional relationships with family members. It is an Active & Independent Living solution that operates through a network of noninvasive IoT devices; identifies symptomatic behaviours and activates care-giving protocols and services, via an App for professional and family caregivers.

PersonalSDP

PersonalSDP: Personalised e-learning solutions to improve the efficacy of learning outcomes in computer science e-courses - This work is supported by Avvio alla Ricerca 2020 - Tipo 1, protocol number AR120172A8B35EEA.

Duration: 13/10/2020 — 30/11/2021
Position: P.I.
Funded: € 1,000.00
Responsibilities: The main aim of this project is to identify students prone to drop out of university in online computer science courses, and provide them with personalised feedback and learning pathways to support their academic journey.

Technology Transfer

DynAmo **(PI)** Dynamic Drift Anomaly Detector (DynAmo) is a fully unsupervised strategy for detecting gradual behavioural changes based on dynamic clustering and trajectory detection.
https://github.com/bardhprenkaj/dynamo

GRETEL **(I)** GRETEL is an open source framework for Evaluating Graph Counterfactual Explanation Methods. It is implemented using the Object Oriented paradigm and the Factory Method design pattern. Our main goal is to create a generic platform that allows the researchers to speed up the process of developing and testing new Graph Counterfactual Explanation Methods.
https://github.com/MarioTheOne/GRETEL

uCrawler **(I)** Universal Crawler (uCrawler) is a Concurrent, Distributed, Highly Configurable, and Flexible Next Generation Crawler. uCrawler allows to define a specialized crawler directly throw configuration files. Principal features are: web pages, rest services, extendable, concurrent, distributed, flexible, efficient.
https://github.com/giovanni-stilo/uCrawler-Core

Part VI - Research Activities

International Collaborations

Collaboration Agreement and Results

Perception and Intelligence Lab (PINLab) lead by prof. Fabio Galasso of the Department of Computer Science, Sapienza University of Rome, Italy. The scope of the collaboration is oriented in research activities focused on anomaly detection. 01/01/2023 - ongoing
We published [1, 15].

Artificial Intelligent Information Mining (AIIM) Research Laboratory lead by prof. Giovanni Stilo of the Department of Engineering, Information, Computer Science and Mathematics, University of L'Aquila, Italy. The scope of the collaboration is oriented in research activities focused in Explainable AI in graphs where I co-supervise a PhD student at Gran Sasso Science Insitute (GSSI). 01/01/2023 - ongoing
We published [7, 8, 14].

Data Mining and Machine Learning Laboratory lead by prof. Carlotta Domeniconi of Department of Computer Science at George Mason University, USA. The scope of the collaboration is oriented in research activities focused on anomaly detection. 01/03/2020 - 30/06/2021.
We published [10].

Intelligent Information Mining (IIM) Research Laboratory lead by prof. Paola Velardi of the Department of Computer Science, Sapienza

University of Rome, Italy, and prof. Damiano Distance of Unitelma Sapienza University of Rome. The scope of the collaboration is oriented in research activities focused in time series forecasting and anomaly detection. 01/02/2019 - 31/10/2021.
We published [2, 3, 4, 9, 11, 12].

Gamification Lab, lead prof. Emanuele Panizzi, Rome, Italy. The scope of the collaboration is oriented in research activities focused on human computer interaction. 01/11/2018 - 01/03/2019.
We published [5].

VISITING

TU Munich, hosted by prof. Gjergji Kasneci of the School of Social Sciences and Technology, Munich, Germany. Collaboration focused on explainable AI. 01/06/2023 - 01/09/2023

George Mason University, hosted by prof. Carlotta Domeniconi of the College of Engineering and Computing, Fairfax, VA, USA. Collaboration focused on anomaly detection. 01/04/2021 - 30/06/2021

Scientific Community Service

INVITED TALKS

Plotly.plus, an Improved Dataset for Visualization Recommendation, 17-21/10/2022, 31st ACM International Conference on Information and Knowledge Management, Atlanta, Georgia, USA. Video Presentation.

Explaining Anomalies in Patient Daily Behaviour Profiles, 12/07/2022, PhD Internal Colloquium, Martin-Luther University of Halle-Wittenberg, Universitätsklinikum Halle (Saale), Germany.

CoRoNNa: a deep sequential framework to predict epidemic spread, 22-26/03/2021, SAC'21: Proceedings of the 36th Annual ACM Symposium on Applied Computing, Seoul, South Korea.

Challenges and Solutions to the Student Dropout Prediction Problem in Online Courses 19/10/2020, Half-day (4h) Tutorial at 29th ACM International Conference On Information and Knowledge Management, CIKM'20, October 19 - 23, 2020, Galway, Ireland.

A reproducibility study of deep and surface machine learning methods for human-related trajectory prediction 20/10/2020, 29th ACM International Conference On Information and Knowledge Management, CIKM'20, Galway, Ireland.

A smart peephole on the cloud 11-15/09/2017, 19th International Conference on Image Analysis and Processing, ICIAP'17, Catania, Italy.

JOURNAL REVIEWING

ACM Transactions on Knowledge Discovery from Data, (**TKDD**), ISSN 15564681, Association for Computing Machinery Press

ACM Transactions on Intelligent Systems and Technology, (**TIST**), ISSN 21576904, 21576912, Association for Computing Machinery Press

IEEE Transactions on Knowledge and Data Engineering, (**TKDE**), ISSN 10414347, IEEE Computer Society

Knowledge and Information Systems, An International Journal, (**KAIS**), ISSN 02191377, 02193116, Springer London

Program Committees

29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, (**KDD'23**), August 6 - 10, 2023, Long Beach, CA, USA

IEEE International Conference on Computer Vision (**ICCV'23**), October 2-6, 2023, Paris, France

IEEE / CVF Computer Vision and Pattern Recognition Conference (**CVPR'23**), June 18-22, 2023, Vancouver, Canada

Tertiary Reviewer (not in the PC)

SIAM International Conference on Data Mining (**SDM'23**), April 27-29, 2023, Minneapolis, MI, USA

22nd IEEE International Conference on Data Mining (**ICDM'22**), November 28 - December 1, 2022, Orlando, FL, USA

29th International Joint Conference on Artificial Intelligence, (**IJCAI'20**), January 7-15, 2021, Tokyo, Japan

26th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, (**KDD'20**), August 23 - 27, 2020, Virtual Conference

19th IEEE International Conference on Data Mining, (**ICDM'19**), November 8-11, 2019, Beijing, China

European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, (**ECML-PKDD'19**), September 16-19, 2019, Würzburg, Germany.

25th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, (**KDD'20**), August 4 - 8, 2019, Anchorage, AK, USA

Conference Participation

31st ACM International Conference On Information and Knowledge Management, (**CIKM '22**), October 17 - 21, 2022, Atlanta, USA

36th ACM/SIGAPP Symposium on Applied Computing, (**SAC '21**), March 22-26, 2021, Seoul, South Korea

29th ACM International Conference On Information and Knowledge Management, (**CIKM '20**), October 19 - 23, 2020, Galway, Ireland

19th International Conference on Image Analysis and Processing, (**ICIAP '19**), September 11-15, 2017, Catania, Italy

Part VII - Summary of Scientific Impact (May 2023)

	Scopus	Google Scholar	Web of Science
Total Impact Factor	-	-	31.306
Total Citations	71	120	-
Avg. Citations per Product	5.917	6.316	-
Hirsh (H) Index	5	5	-

Part VIII - Publications

Journals

[1] B. Prenkaj, D. Aragona, A. Flaborea, F. Galasso, S. Gravina, L. Podo, E. Reda and P. Velardi
A self-supervised algorithm to detect signs of social isolation in the elderly from daily activity sequences.
Artificial Intelligence In Medicine. **135** pp. 102454 (2023)
(DOI: https://doi.org/10.1016/j.artmed.2022.102454)
Journal IF: **7.011**

[2] B. Prenkaj, D. Distante, S. Faralli and P. Velardi
Hidden space deep sequential risk prediction on student trajectories.
Future Generation Computer Systems. **125** pp. 532-543 (2021)
(DOI: https://doi.org/10.1016/j.future.2021.07.002).
Journal IF: **7.307**

[3] D. Aragona, L. Podo, B. Prenkaj and P. Velardi
Latent and sequential prediction of the novel coronavirus epidemiological spread.
ACM SIGAPP Applied Computing Review. **21**, 5-18 (2021)
(DOI: https://doi.org/10.1145/3493499.3493500).

[4] B. Prenkaj, P. Velardi, G. Stilo, D. Distante, and S. Faralli
A Survey of Machine Learning Approaches for Student Dropout Prediction in Online Courses.
ACM Computing Surveys (**CSUR**), 53, 3, Article 57 (June 2020), 34 pages
(DOI: https://doi.org/10.1145/3388792).
Journal IF: **10.282**

[5] A. Coletta, M. De Marsico, E. Panizzi, B. Prenkaj and D. Silvestri
MIMOSE: multimodal interaction for music orchestration sheet editors.
Multimedia Tools And Applications. **78** pp. 33041-33068 (2019)
(DOI: https://doi.org/10.1007/s11042-019-07838-0).
Journal IF: **2.313**

[6] M. De Marsico, E. Nemmi, B. Prenkaj and G. Saturni
House in the (biometric) cloud: a possible application.
IEEE Cloud Computing. **5**, 58-69 (2018)
(DOI: https://doi.org/10.1109/MCC.2018.043221015).
Journal IF: **4.393**

Conferences

[7] M.A. Prado-Romero, B. Prenkaj and G. Stilo
Revisiting CounteRGAN for Counterfactual Explainability of

Graphs. In *Proceedings of the Eleventh International Conference on Learning Representations* (**ICLR '23**). May 1-5, 2023, Kigali, Rwanda.

[8] M.A. Prado-Romero, B. Prenkaj and G. Stilo
Developing and Evaluating Graph Counterfactual Explanation with GRETEL. *In Proceedings of the Sixteenth ACM International Conference on Web Search and Data Mining* (**WSDM '23**). February 27-March 3, 2023, Singapore, Singapore.
DOI: https://doi.org/10.1145/3539597.3573026

[9] D. Aragona, L. Podo, B. Prenkaj, and P. Velardi
CoRoNNa: a deep sequential framework to predict epidemic spread. In *Proceedings of the 36th Annual ACM Symposium on Applied Computing* (**SAC '21**), pp. 10-17. 2021.
DOI: https://doi.org/10.1145/3412841.3441883

[10] H. Sarvari, C. Domeniconi, B. Prenkaj and G. Stilo
Unsupervised Boosting-Based Autoencoder Ensembles for Outlier Detection. In *Karlapalem K. et al. (eds) Advances in Knowledge Discovery and Data Mining.* (**PAKDD'21**), Lecture Notes in Computer Science, Springer, vol 12712.
DOI: https://doi.org/10.1007/978-3-030-75762-5_8

[11] B. Prenkaj, G. Stilo, L. Madeddu
Challenges and Solutions to the Student Dropout Prediction Problem in Online Courses. In *Proceedings of the 29th ACM International Conference on Information & Knowledge Management* (**CIKM'20**), Association for Computing Machinery, 2020, p.3513–3514.

[12] B. Prenkaj, P. Velardi, D. Distante, and S. Faralli
A Reproducibility Study of Deep and Surface Machine Learning Methods for Human-related Trajectory Prediction. In *Proceedings of the 29th ACM International Conference on Information & Knowledge Management* (**CIKM'20**). Association for Computing Machinery, New York, NY, USA, 2169–2172.
DOI: https://doi.org/10.1145/3340531.3412088

[13] M. De Marsico, E. Nemmi, B. Prenkaj, and G. Saturni
A smart peephole on the cloud. In *International Conference on Image Analysis and Processing* (**ICIAP '17**), pp. 364-374. Springer, Cham, 2017.
DOI: https://doi.org/10.1007/978-3-319-70742-6_34.

Workshops

[14] M.A. Prado-Romero, B. Prenkaj, G. Stilo, A. Celi, E. Estevanell-Valladares and D. Valdés-Pérez
Ensemble approaches for Graph Counterfactual Explanations
In the *Third Italian Workshop on Explainable Artificial Intelligence, XAI.it*, 2022, Vol. 3277, pp. 88-97.
DOI: https://ceur-ws.org/Vol-3277/paper6.pdf.

[15] A. Flaborea, B. Prenkaj, B. Munjal, M. Sterpa, D. Aragona, L. Podo and F. Galasso
Are we certain it's anomalous?
VAND: Visual Anomaly and Novelty Detection, CVPR 2023 Work-

shop. (2023), June 18 2023, Vancouver, Canada.