Lorenzo Perini

Research Scientist, PhD Computer Science

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in *Lorenzo Perini*
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Research Interests

Making AI models robust and reliable with research on uncertainty quantification, anomaly/out-of-distribution detection, adversarial attacks, weakly supervised learning, human-in-the-loop, and learning to reject.

Industrial Experience

ongoing 12/2024	**Research Scientist @ Meta, Central Applied Science (CAS) team,** working on Uncertainty Quantification, Anomaly Detection, Calibration, Weakly Supervised Learning.
01/2024 09/2023	**Research Scientist Intern @ Bosch Center for AI (BCAI),** with the task of designing a data quality metric for generated defects in anomaly detection.
07/2019 02/2019	**Data Scientist Intern @ Tierra SpA,** with tasks: data engineering, time-series analysis, deep learning, predictive maintenance, anomaly detection.

Academic Experience and Education

11/2024 04/2024	**Postdoctoral Researcher @ KU Leuven,** leading PhD and Master students, research on Uncertainty Quantification and Anomaly Detection.
03/2024 10/2019	**PhD in Computer Science @ KU Leuven,** with thesis: Operational, Uncertainty-Aware, and Reliable Anomaly Detection. Advisor: Prof. Dr. J. Davis.
08/2022 02/2022	**Visiting Researcher @ University of Helsinki,** working on Bayesian Learning, Variational Inference. Advisor: Prof. Dr. A. Klami.
07/2019 10/2017	**MSc in Mathematical Engineering @ Politecnico di Torino (Grade: 110/110 cum laude),** with major in Statistics on Data and Network Optimization. Thesis on Predictive Maintenance and Anomaly Detection (ML). Industrial collaboration with Tierra SpA. Advisor: Prof. Dr. F. Vaccarino.
07/2017 10/2014	**BSc in Mathematics @ Università degli studi di Firenze (Grade: 110/110),** with thesis on Stochastic Differential Equations (probability theory). Advisor: Dr. L. Poggiolini.

Awards & Grants

11/2021	4-year PhD Fellowship for Fundamental Research (FWO) on Uncertainty Quantification and Anomaly Detection.
02/2021	Scientific prize Gustave Boël-Sofina Fellowship for talented researchers for long stay abroad (Link).
09/2020	Overall and Chairs' Engagement Award at ECML-PKDD'20.

Selected Main Author Publications (more on Google Scholar)

[1] Uncertainty-aware Evaluation of Auxiliary Anomalies with the Expected Anomaly Posterior, **ArXiv'24**.
[2] Machine learning with a reject option: A survey, **Machine Learning Journal 2024**.
[3] Unsupervised Anomaly Detection with Rejection, **NeurIPS'23**.
[4] Estimating the Contamination Factor's Distribution in Unsupervised Anomaly Detection, **ICML'23**.
[5] Learning from Positive and Unlabeled Multi-Instance Bags in Anomaly Detection, **KDD'23**.
[6] Transferring the Contamination Factor between Anomaly Detection Domains by Shape Similarity, **AAAI'22**.
[7] Quantifying the confidence of anomaly detectors in their example-wise predictions, **ECML-PKDD'20**.
[8] Class Prior Estimation in Active Positive and Unlabeled Learning, **IJCAI-PRICAI'20**.

Academic and Research Activities

- Editorial Board Member for Machine Learning Journal (Link).
- Reviewer for top-tier conferences (NeurIPS, ICML, ICLR, AAAI, AISTATS, KDD, ECML), and journals (JAIR).
- Supervisor of 11 Master Theses (Link).
- Teaching Assistant: PU Learning (2020 - 2022), Data Mining (2019 - 2023), Introduction to Data Mining (2022 - 2023).

Projects

- Core development team member of **PyOD** (Link), and ontributor of **PyThresh** (Link).
- The implementation of my papers is open-source on GitHub.

Programming and Software Skills

Python (PyTorch, Pandas, NumPy, SkLearn, SciPy), LaTeX, R, Java, Matlab, C, SQL, Git, Bash, Linux.