

Leonardo Peroni

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Professional Experience

Research assistant

Mar. 2020 – Aug. 2024

IMDEA Networks Institute

Madrid Spain

- Worked extensively in video streaming by (1) developing a framework for personalized QoE models, (2) implementing a mechanism for communicating stall duration from users to ISPs, (3) analyzing and implementing QoE models, (4) conducting crowdsourced subjective assessments, (5) generating and analyzing QoE datasets, (6) implementing and comparing ABR algorithms in simulation and emulation, and (7) experimenting with various codecs.
- Worked extensively with machine learning by implementing, evaluating, and comparing off-the-shelf algorithms, such as SVM, RF, XGBoost, CNN, and LSTM as well as advanced custom algorithms, across different learning paradigms including supervised, active, and reinforcement learning.

Technology consultant

Sep. 2018 – Feb. 2020

Hesplora s.r.l.

Florence Italy

- Contributed to the Acqua4.0 project, enhancing pipeline loss risk prediction in Tuscany by (1) creating custom risk metrics through expert insights and historical data, (2) processing diverse unstructured data (DEM, lithology, SAR interferometry), and (3) applying unsupervised learning techniques like k-means, DBSCAN, and PCA.
- Contributed to the Apollon project on environmental pollution monitoring in Apulia, assisting in (1) implementing a cloud-based IoT platform for indoor pollution tracking with AWS IoT Core, and (2) processing and storing device data in JSON format via HTTP, using AWS Lambda and DynamoDB.
- Contributed to process mining projects by analyzing, modeling, and identifying bottlenecks in business processes across various sectors, using process discovery tools and statistical analysis.
- Supported the IT department of the Italian Postal Service by conducting quantitative analysis, visualizing, and managing physical asset data, using spreadsheets and VB macros for task automation.

Education

University Carlos III of Madrid

Nov. 2020 – Feb. 2025 (expected)

Ph.D., Telematic Engineering

Madrid Spain

Provisional thesis title: User Empowerment in Adaptive Video Streaming over Best-Effort Networks

Polytechnic University of Turin

Oct. 2015 – Apr. 2018

M.Sc., Mechatronic Engineering

Turin Italy - 110L/110

Thesis: Machine learning framework for classification of mild cognitive impairment and high resolution multispectral-multitemporal satellite images

The Sapienza University of Rome

Sep. 2011 – May. 2015

B.Sc., Informatic and Automatic Engineering

Rome Italy - 110L/110

Thesis: Lab-on-chip integrated systems for thermal control in biomolecular analysis

Relevant Publications

- [5] **L. Peroni, S. Gorinsky, and F. Tashtarian, "In-Band Quality Notification from Users to ISPs", CloudNet, Rio de Janeiro, Brazil, November 2024**

Developed a prototype to detect and report stalls in YouTube Live under encrypted traffic without OTT support. The end-user agent, deployed on the client, achieved nearly 100% precision in detecting stalls, while the ISP agent, hosted on Amazon EC2, estimated stall durations with an average MAE of 231 ms and RMSE of 288 ms.

- [4] **L. Peroni and, S. Gorinsky "An End - to - End Pipeline Perspective on Video Streaming in Best - Effort Networks: A Survey and Tutorial", arXiv, preprint arXiv:2403.05192, September 2024 (Under submission to a journal)**

The survey covers the video streaming pipeline, tackling challenges like compression, CDN support, ABR, and QoE. We classify 200+ designs by methodology (heuristics, optimization, ML) and traits like codec use and super resolution, linking research to industry practices and future trends.

- [3] **L. Peroni and S. Gorinsky, "Quality of Experience in Video Streaming: Status Quo, Pitfalls, and Guidelines", COMSNETS, Bengaluru, India, January 2024**

Analyzed two large QoE datasets using statistical techniques. The results highlighted several pitfalls in QoE and QoE models, particularly in test conduction, model building, and model application.

Based on these findings, we proposed a set of guidelines for rectification.

- [2] **L. Peroni et al., "Empowerment of Atypical Viewers via Low - Effort Personalized Modeling of Video Streaming Quality", CoNEXT, Paris, France, December 2023**

Developed a new method for generating personalized QoE models by leveraging user feedback in an active learning framework. By collecting 14,400 individual scores from 120 participants results showed that a 22 - minute session allows viewers to create a personalized QoE model, improving accuracy by 42% on average and 85% for atypical viewers compared to baseline models.

Other Publications

- [1] **A. Khaliq, L. Peroni, and M. Chiaberge, "Land cover and crop classification using multitemporal sentinel - 2 images based on crops phenological cycle", EESMS, Salerno, Italy, June 2018**

International Experiences

Visiting Research Student

Korea Advanced Institute of Science & Technology (KAIST)

Mar. 2023 – Aug. 2023

Daejeon, South Korea

Erasmus Extra UE

Beihang University

Sep. 2016 – Feb. 2017

Beijing, China

Awards & Honors

Available, Functional, and Reproduced ACM Artifact Badges

Dec. 2023

This recognition highlights the high quality and reproducibility of the code and its documentation for the paper [2] at ACM CoNEXT 2023.

Talks

IMDEA/UC3M Seminars and CoNEXT

Dec.2021 - Dec. 2023

Presented research findings on advanced video streaming and machine learning topics at international conferences and research seminars, showcasing strong communication skills and the ability to engage diverse technical audiences.

Language Skills

Italian: mother tongue, **English:** fluent, **Spanish:** fluent, **Chinese:** very basic

Computer Skills

Programming languages: Python, JavaScript, Matlab & Simulink, Java, SQL

Video tools: FFmpeg, GPAC, dash.js

Video compression standards: AVC, HEVC, LCEVC

Protocols: MPEG - DASH, WebRTC, QUIC, RTMP, HTTP, TCP

Python ML/DL libraries: Tensorflow, Keras, Scikit - learn, Pytorch

AWS Platform: EC2, IoT Core, Lambda, Dynamo db, MTurk, DeepLens, Rekognition

Geospatial data analysis tools: Qgis, Snap

Process mining tools: Disco, Apromore, Prom

Others: Git, Wireshark, Gurobi