Emilian Postolache, Ph.D.

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Research Interests

Model Optimization, Real-time Speech Enhancement, Sequence Models, Deep Generative Models, Compositional Music Generation, Source Separation

Education

- **Sapienza University of Rome** — Rome, Italy
  Ph.D. in Computer Science; Advisor: Prof. Emanuele Rodolà; Final grade: Excellent with honors. — *2020 - 2024*
- **Sapienza University of Rome** — Rome, Italy
  M.Sc. in Artificial Intelligence and Robotics; Final grade: 110 with honors / 110. — *2018 - 2020*
- **Sapienza University of Rome** — Rome, Italy
  B.Sc. in Computer Science; Final grade: 110 with honors / 110. — *2014 - 2018*

Experience

- **IRIS Audio Technologies** — London, United Kingdom
  Senior AI Research Scientist — *August 2024 - Ongoing*
  - Research related to model optimization in real-time speech enhancement.
- **Ca' Foscari University of Venice** — Venice, Italy
  Research Fellow — *March 2024 - August 2024*
  - Research in generative modeling applied to signal processing.
- **Sony CSL** — Tokyo, Japan
  AI Researcher — *November 2023 - February 2024*
  - Worked on the task of EEG to music decoding using latent diffusion models.
- **Dolby Laboratories** — Barcelona, Spain
  AI Researcher — *June 2022 - September 2022*
  - Introduced a novel method for universal sound separation, reaching state-of-the-art results. Improved my planning skills, optimized parallel experiment execution to make the best use of computational resources, and developed modular code that allowed me and the team to perform experiments efficiently.
- **Sapienza University of Rome** — Rome, Italy
  Junior Research Fellow — *June 2019 - May 2020*
  - Research activity in geometry processing.
- **Babelscape** — Rome, Italy
  Software Developer — *June 2018 - September 2018*
  - Ported BabelNet, a very large multilingual semantic network, from Java 8 to Python 3.

Research Visits

- **Queen Mary University of London** — London, United Kingdom
  Academic Visitor — *May 2023 - September 2023*
  - Visited the Center For Digital Music (C4DM) at Queen Mary University of London, under the supervision of Dr. Emmanouil Benetos. Worked on compositional diffusion models for music, singing voice separation, and foley sound synthesis.

Selected Works

- **Multi-Source Diffusion Models for Simultaneous Music Generation and Separation**: Proposed a diffusion-based generative model capable of both waveform music synthesis and source separation. Introduced source imputation, where a subset of the sources are generated given the others (accompaniments). Utilizing a novel Dirac sampler, the method exhibits competitive separation performance on the Slakh2100 dataset compared to state-of-the-art regressors. **Accepted at ICLR-2024 with oral presentation (top 1.2%)**.
- **Generalized Multi-Source Inference for Text Conditioned Music Diffusion Models**: Proposed a generalization of Multi-Source Diffusion Models (MSDM) via text-conditioned diffusion models. I show how the task of total and partial generation of MSDM can be solved with an inference procedure in which one performs separation while generating the sources. Source separation can be performed in a zero-shot way via the independent Dirac separator. **Accepted at ICASSP-2024**.
- **Accelerating Transformer Inference for Translation via Parallel Decoding**: Proposed with A. Santilli parallel decoding methods for machine translation that offer a speed-up with respect to greedy sampling up to 38% without affecting translation quality (having mathematical guarantees) and up to 2× when scaling the available resources. **Accepted at ACL-2023**.

Patents

- **Method for Adversarial Training for Universal Sound Separation (WO/2024/083422)**: Proposed a novel *I*-replacement context-based adversarial loss and multiple discriminator training for universal sound separation (separating mixes containing any kind of sound).

Professional Activities / Academic Service

- **Conference Organizing Committee Member**
  - Web Chair: Smart Tools and Applications in Graphics (**STAG**), 2021
- **International Program Committee Member**
  - International Conference on Learning Representations (**ICLR**), 2025
  - IEEE International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), 2024, 2025
  - IEEE International Joint Conference on Neural Networks (**IJCNN**), 2025
  - Joint IAPR International Workshops on Statistical Techniques in Pattern Recognition and Structural and Syntactic Pattern Recognition (**S+SSPR**), 2024
  - Conference on Neural Information Processing Systems (**NeurIPS**), 2023
  - Unifying Representations in Neural Models Workshop (**UniReps**), 2023, 2024
  - International Conference on 3D Vision (**3DV**), 2021
- **External Reviewer (not in the PC)**
  - Conference on Neural Information Processing Systems (**NeurIPS**), 2024
  - International Conference on Learning Representations (**ICLR**), 2024
  - Conference on Empirical Methods in Natural Language Processing (**EMNLP**), 2022
- **Conference Volunteering**
  - International Conference on Learning Representations (**ICLR**), 2024
- **Reviewer for International Journals**
  - IEEE Transactions on Visualization and Computer Graphics (**TVCG**)
  - IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**)

Grants and Awards

- **AWS Cloud Credit for Research**
  Amazon *February 2024*
  - Winner, with our team, of 50.000$ worth of Amazon AWS Credit for developing research related to compositional music generation.
- **ICASSP-2024 Travel Grant**
  IEEE Signal Processing Society *February 2024*
  - Winner of a 500$ travel grant awarded by the IEEE Signal Processing Society.
- **ERC Proof-of-Concept**
  European Commission *May 2023*
  - Seal of excelence for a project on generative AI for music generation.
- **AAAI-2023 Student Scholarship**
  Association for the Advancement of Artificial Intelligence *December 2022*
  - Winner of a 500$ scholarship awarded by the AAAI organization.
- **Imminent Grant**
  Translated *April 2022*
  - Winner, with our team, of a 20.000€ grant awarded by Translated for the project "Incremental Parallel Inference for Machine Translation".
- **Galileo Program**
  Université Franco Italienne *January 2022*
  - Winner, with our team, of a 7.000€ research grant awarded for the joint project "Multimodal Artificial Intelligence for 3D shape analysis, modelling and applications".

Invited Talks

- **Tech Talk: Multi-Source Diffusion Models for Simultaneous Music Generation and Separation**
  PI School *21 March 2023*
  - Presented my work together with a tutorial on diffusion models for music at the PI School of Artificial Intelligence.
- **Adversarial Permutation Invariant Training for Universal Sound Separation**
  Ca' Foscari University of Venice *3 November 2022*
  - Presented my work at the Department of Environmental Sciences, Informatics and Statistics. Event organized by Prof. Luca Cosmo.

Teaching Activities

- Assisted Prof. M. Felisatti in the "Linear Algebra" course of the B.Sc. program "Applied Computer Science and Artificial Intelligence" (2021-2022) at Sapienza University of Rome.
- Assisted Prof. E. Rodolà in the "Metodi Numerici per l'Informatica" course of the B.Sc. program "Informatica" (2021-2022, 2022-2023) at Sapienza University of Rome.

Languages

Romanian (native), Italian (native), English (fluent), Spanish (basic)