

Eleonora Grassucci

Ph.D. Student, Sapienza University of Rome, Italy.

I am currently a Ph.D. Student in Information and Communication Technologies (ICT) at the Intelligent Signal Processing and Multimedia (ISPAMM) Lab, advised by prof. Aurelio Uncini and prof. Danilo Comminiello. I am the PhD students representative, and an IEEE graduate student member. I was awarded with the Best Paper Award at the IEEE ISCAS in June 2022. I deal with generative deep learning, and low-complexity models for computer vision and audio processing. My research activities focus on lightweight and efficient deep generative models by defining them in hypercomplex domains such as quaternion one and exploiting hypercomplex algebras to capture latent internal relations in multidimensional inputs such as color images and multichannel audio. Expected graduation January 2023.

Other Activities

- Feb 2019 - **Research Scientist**, *Bambino Gesù Hospital*, Rome, Italy.
- March 2022 I have been part of the Innovation and Research team of the hospital, working in the EU-JAV project founded from the European Union's Health Programme. The aim of the project is to apply machine learning methods to study the spread of misinformation around vaccine hesitancy on social media platforms.
- May 2018 - **Intern**, *Sapienza University of Rome*, Italy.
- Sept 2019 I was part of the ERC project Inscribe which explored the three earliest Aegean scripts in Europe. The aim was to analyze through deep learning techniques the relationship between these scripts and to apply a multi-stepped decipherment strategy.
- Apr 2019 **Data Science Course Lecturer**, *Skienda*, Roma, Italy.
I held lectures on the data science main concepts and on introduction to Python to graduate students to be hired by the company.

Education

- Sept 2017 - **Master's degree in Data Science**, *Sapienza University of Rome*, Italy.
July 2019 Thesis title: *Generative Adversarial Networks with flexible activation functions*.
Thesis supervisors: Prof. Simone Scardapane and Prof. Aurelio Uncini.
Final grade: 110/110 with honors.
- Sept 2014 - **Bachelor's degree in Statistics**, *Sapienza University of Rome*, Italy.
July 2017 Thesis title: *Economic mobility measures in Italy: Analysis for family typology*.
Thesis supervisor: Prof. Roberto Zelli.

Preprints

- 2022 **Eleonora Grassucci**, Gioia Mancini, Christian Brignone, Aurelio Uncini, and Danilo Comminiello, "Dual Quaternion Ambisonics Array for Six-Degree-of-Freedom Acoustic Representation", *ArXiv preprint: <https://arxiv.org/pdf/2204.01851.pdf>*, Apr. 2022.
- 2022 Eleonora Lopez, **Eleonora Grassucci**, Martina Valleriani, and Danilo Comminiello, "Multi-View Breast Cancer Classification via Hypercomplex Neural Networks", *ArXiv preprint: <https://arxiv.org/pdf/2204.05798.pdf>*, Apr. 2022.
- 2021 **Eleonora Grassucci**, Aston Zhang, Danilo Comminiello, "PHNNs: Lightweight neural networks via parameterized hypercomplex convolutions", *ArXiv preprint: <https://arxiv.org/pdf/2110.04176.pdf>*, Oct. 2021.

Published Papers

- 2022 **Eleonora Grassucci**, Luigi Sigillo, Aurelio Uncini, and Danilo Comminiello, "Hypercomplex Image-to-Image Translation", in *IEEE International Joint Conference on Neural Networks (IJCNN)*, Jul. 2022.
- 2022 Christian Brignone, Gioia Mancini, **Eleonora Grassucci**, Aurelio Uncini, Danilo Comminiello, *Efficient sound event localization and detection in the quaternion domain*, IEEE Transactions on Circuits and Systems II: Express Briefs, vol. 69 no. 5, pp. 2453-2457, 2022.

- 2022 Lorenza Parisi, Francesca Comunello, **Eleonora Grassucci**, Vittoria Bernardini, Carla Nisi, Arianna Bussoletti, Simone Mulargia, Ileana Croci, Barbara Lanfranchi, and Francesco Gesualdo, "Analyzing vaccine-related engagement on Tiktok among Italian users", accepted to *ECREA 2022*, Oct. 2022.
- 2021 **Eleonora Grassucci**, Edoardo Cicero and Danilo Comminiello, *Quaternion Generative Adversarial Networks*, in *Generative Adversarial Learning: Architectures and Applications*, R. Razavi-Far, A. Ruiz-Garcia, V. Palade, and J. Schmidhuber, Springer International Publishing, pp. 57–86, 2022.
- 2021 **Eleonora Grassucci**, Danilo Comminiello, and Aurelio Uncini, *An Information-Theoretic Perspective on Proper Quaternion Variational Autoencoders*, *Entropy* 23, no. 7: 856, July 2021.
- 2021 **Eleonora Grassucci**, Danilo Comminiello and Aurelio Uncini, *A Quaternion-valued Variational Autoencoder*, ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021, pp. 3310-3314.
- 2021 **Eleonora Grassucci**, Simone Scardapane, Danilo Comminiello, and Aurelio Uncini, *Flexible Generative Adversarial Networks with Non-Parametric Activation Functions*, in *Progress in Artificial Intelligence and Neural Systems*, (Anna Esposito, Marcos Faundez-Zanuy, Francesco Carlo Morabito, Eros Pasero, Eds.), vol. 184 of Smart Innovation, Systems and Technologies, ISBN: 978-981-15-5092-8, Springer, 2021.

Invited Talks

- Aug 2022 *Simplify by hypercomplex: going beyond the real domain*, Belmont University, Nashville, TN, USA.
- Apr 2021 *Generative Deep Learning in the Quaternion Domain*, IBM Reserach, Zurich.
- Nov 2020 *Quaternion Variational Autoencoders*, Sussex University, Brighton, UK.

Other Academic Activities

- Feb 2022 **Invited Reviewer** IEEE WCCI 2022.
- Dec 2021 **Invited Reviewer** IEEE Trans. Signal Process.
- Oct 2021 **Invited Reviewer** IEEE ICASSP 2022.
- Oct - Dec 2021 **Teaching Assistant**, Neural Networks master's degree course, Sapienza University of Rome.
- Feb - May 2021 **Teaching Assistant**, Machine Learning for Signal Processing master's degree course, Sapienza University of Rome.
- Feb - May 2020 **Teaching Assistant**, Machine Learning for Signal Processing master's degree course, Sapienza University of Rome.
- Dec 2020 **Invited Reviewer** IEEE ICASSP 2021.
- Apr 2021 **Invited Reviewer** Springer Cognitive Computation.

Awards

- 2022 **Best Paper Award** in the track for the paper "Efficient Sound Event Localization and Detection in the Quaternion Domain", IEEE International Symposium on Circuits And Systems (ISCAS).
- 2021 Component of the winner team for *Progetti di Ricerca Grandi* with the project "Social media and vaccine confidence: exploring knowledge needs, media use, and social representations of health and vaccine-related issues among Italian teens", Sapienza University of Rome, Italy.
- 2020 Component of the winner team for *Progetti di Ricerca Medi* with the project "DYCOS - Deep Hyper-complex Compressive Sensing", Sapienza University of Rome, Italy.
- 2019 Top 5% of the students of the Data Science Master's degree at Sapienza University of Rome, Italy.

Schools

- 2021 Probabilistic AI (ProbAI) Summer School 2021 Edition.