Patricia Alonso de Apellániz

Researcher Engineer at Universidad Politécnica de Madrid

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Patricia-A-Apellaniz

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Languages

Spanish: Native

English: C1 level

German: A1 level

Technical Skills

Programming & Development

- *Languages:* Python, R, Matlab, Java, C

- *Deep Learning Frameworks:* Pytorch, Tensorflow, Keras

- *Software Development & Deployment:* Docker, Git, Bash scripting, AGILE methodologies

Data Processing & Medical AI

- *Data Processing*

- *Statistical & Probabilistic Modeling*

- *Explainable Artificial Intelligence:* Model interpretability, feature importance

Model Deployment & Engineering:

- *Containerization & Reproducibility:* Docker

- *Federated Learning Infrastructure:* Flower Framework

PROFESSIONAL EXPERIENCE

Researcher – ETSIT, UPM

Jan 2024 - Now

Worked on AI-Health projects (Synthia, Genomed4ALL, Synthema, and Repo4EU) under Horizon Europe.

Developed deep generative models (e.g., VAEs) for critical medical tasks, such as Survival Analysis, enabling personalized medicine.

Implemented and validated synthetic data generation techniques using latent space exploration, enhancing model robustness in data-scarce and privacy-constrained environments.

Integrated Explainable AI methods, leveraging Shapley values to assess feature importance and model interpretability in medical predictions.

Deployed and tested federated models in real-world clinical environments, leveraging the Flower framework to address data heterogeneity, non-IID distributions, and privacy concerns.

Developed information-sharing strategies to optimize federated AI collaboration among decentralized healthcare entities.

Packaged AI models into Docker containers, ensuring scalability and seamless deployment across different environments.

Collaborated with interdisciplinary teams, including medical researchers and AI engineers.

Disseminated findings through scientific publications, webinars, and technical reports.

Assistant Professor – ETSIT, UPM

Mar 2022 – Dec 2023

Taught laboratory sessions for undergraduate and graduate students in Probability, Statistics, Random Signals, Digital Signal Processing, and Audio Processing.

Designed practical assignments and exams, focusing on real-world applications of statistical and signal-processing methods.

Provided individual tutoring and academic mentoring for students in AI and data science-related courses.

Business Consultant – Management Solutions

Sep 2021 – Jan 2021

Worked with Banco Santander's Risk division to develop a data extraction, transformation, and analysis tool for financial risk assessment.

Optimized data pipelines to enhance model interpretability and decision-making processes in the banking sector.

Predoctoral Researcher – ETSIT, UPM

Oct 2019 – Jun 2020

Developed a pilot AI model for the AI4EU Consortium, focusing on deep learning for facial gesture transfer.

Processed large-scale multimedia datasets, extracting key features for AI-driven animation models.

Implemented and validated GAN architectures for video generation.

EDUCATION

Ph. D in Telecommunications Engineering – ETSIT, UPM

Mar 2021 – Apr 2025

Thesis: Deep Generative Models for Survival Analysis and Synthetic Data Generation in Healthcare

Master's Degree in Telecommunications Engineering – ETSIT, UPM Sep 2018 - Jul 2020

Machine Learning and Multimedia Data Science specialization

Thesis: Analysis and implementation of deep learning algorithms for face-to-face translation based on audio-visual representations

Bachelor's Degree in Telecommunications Engineering – EPS, UAM Sep 2012 - Jun 2018

Multimedia signal specialization

Thesis: Voice Activity Detection based on Neural Networks

→ FURTHER EDUCATION

Organizing Committee – SATELEC Job Fair, ETSIT, UPM Oct 2019 - Jul 2020

Student Council – UPM Oct 2018 - Sep 2020

Student Council – UAM Oct 2015 - Jul 2018

PUBLICATIONS

Journal Publications

- ✓ **Apellániz P.**, Parras J., and Zazo S., *Improving Synthetic Data Generation through Federated Learning in Scarce and Heterogeneous Data Scenarios*, in Big Data and Cognitive Computing, vol. 9(2), 18, 2025, doi: 10.3390/bdcc9020018.
  Journal metrics (2023): IF 3.7, Rank Q2 (66.8 in Computer Science, Artificial Intelligence; 70.2 in Computer Science, Information Systems; 83.0 Computer Science, Theory & Methods).

- ✓ **Apellániz P.**, Parras J., and Zazo S., *Leveraging the variational Bayes autoencoder for survival analysis*, in Scientific Reports, vol. 14, 24567, 2024, doi: 10.1038/s41598-024-76047-z.
  Journal metrics (2023): IF 3.8, Rank Q1 (81.7 in Multidisciplinary Sciences).

- ✓ **Apellániz P.**, Jiménez A., Arroyo Galende B., Parras J., and Zazo S., *Synthetic Tabular Data Validation: A Divergence-Based Approach*, in IEEE Access, vol. 12, pp. 103895-103907, 2024, doi: 10.1109/ACCESS.2024.3434582.
  Journal metrics (2023): IF 25.669, Rank Q2 (65.3 in Computer Science, Information Systems; 65.5 in Engineering, Electrical & Electronic; 60.9 in Telecommunications).

- ✓ D'Amico, S., Dall'Olio, L., Rollo, C., **Alonso, P.**, Prada-Luengo, I., Dall'Olio, D., et al., *MOSAIC: An Artificial Intelligence–Based Framework for Multimodal Analysis, Classification, and Personalized Prognostic Assessment in Rare Cancers*, in JCO Clinical Cancer Informatics, 8, e2400008, 2024, doi: 10.1200/CCI.24.0000.
  Journal metrics (2023): IF 3.3, Rank Q2 (63.5 in Oncology).

- ✓ Lahoz Navarro, M., Jehle, J.S., **A. Apellániz, P.**, Parras, J., Zazo, S., Gerdts, M. *Deep Learning as a New Framework for Passive Vehicle Safety Design Using Finite Elements Models Data*, in Applied Sciences, vol. 14, 9296, 2024, doi: 10.3390/app14209296.
  Journal metrics (2023): IF 2.5, Rank Q2 (50.7 in Chemistry, Multidisciplinary, 75.7 in Engineering, Multidisciplinary, 41,4 in Materials Science, Multidisciplinary, and 51.7 in Physics, Applied).

Conference Publications

- ✓ **Apellániz P.**, Parras J., and Zazo S., *CR-SAVAE: A Parametric Method for Survival Analysis with Competing Risks*, in the 32nd European Signal Processing Conference (EUSIPCO), Lyon, France, 2024, pp. 1526-1530, doi: 10.23919/EUSIPCO63174.2024.10715431.

- ✓ **Apellániz P.**, Parras J., and Zazo S., *An Improved Tabular Data Generator with VAE-GMM Integration*, in the 32nd European Signal Processing Conference (EUSIPCO), Lyon, France, 2024, pp. 1886-1890, doi: 10.23919/EUSIPCO63174.2024.10715230.

- ✓ Casadei, F., Carota L., Asti G., D'Amico S., Piscia D., Zazo S., **A. Apellániz P.**, Parras J., et al., *Survival Model Optimization via Federated Learning: A Study Combining Simulations and Experiments*, in 2024 IEEE International Conference on Big Data (BigData), pp. 7658-7667, 2024, doi: 10.1109/BigData62323.2024.10825368.

- ✓ Asti G., D'Amico S., Carota L., Piscia D., Casadei F., Saha Cyrille Merleau N., **Alonso De Apellaniz P.**, et al., *An Artificial Intelligence-Based Federated Learning Platform to Boost Precision Medicine in Rare Hematological Diseases: An Initiative By GenoMed4all and Synthema Consortia,* Poster Abstract published in Blood Journal, 144 (Supplement 1), p. 4989, 2024, doi: 10.1182/blood-2024-205541.
  Journal metrics (2023): IF 21.1, Rank Q1 (98.5 in Hematology).

- ✓ Collado Gimbert A., Reidel S., **A. Apellániz P.**, Álvarez F., Arroyo Galende B., et al., *Data Driven Research through the European RADeep Registry and the Use of Artificial Intelligence Towards Personalized Medicine in Sickle Cell Disease*, Poster Abstract published in Blood Journal, 144 (Supplement 1), p. 1138, 2024, doi: 10.1182/blood-2024-203331.

- ✓ Piscia, D., **Apellaniz, P. A.,** Arroyo, B., Barrio, S., Moreno, F., Parras, J., et al., *GenoMed4All, a federated learning platform for clinical and omics data*, Poster Abstract published in European Journal of Human Genetics, Vol. 32, pp. 1640-1640, 2024, doi: 10.1038/s41431-024-01734-4.

- ✓ D'Amico, S., Dall'Olio, L., Rollo, C., **Alonso, P.**, Prada-Luengo, I., Dall'Olio, D., et al., *Multi-modal analysis and federated learning approach for classification and personalized prognostic assessment in myeloid neoplasms*, in Blood, 140 (Supplement 1), pp. 9828-9830, 2022, doi: 10.1182/blood-2022-166802.