ANTONIO JOSE ARAGON MOLINA
CURRICULUM VITAE ET STUDIORUM

PERSONAL INFORMATION

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1 Short biography

1.1 Education

- *November 2023*
  Master of Science in Telecommunications Engineering, University of Seville, Spain.
  Thesis: "Training and deployment of an audio classification model".
  Advisor: Prof. María del Mar Elena Pérez.

- *July 2021*
  Bachelor of Science in Telecommunications Engineering, University of Seville, Spain.
  Thesis: "Implementation of Artificial Intelligence tools to achieve a communication closer to the human".
  Advisor: Prof. María del Mar Elena Pérez.

1.2 Work experience

- Research Assistant at the Department of Computer Science of the University of Milan, *Research topic*: "Artificial Intelligence for the identification of people in forensic scenarios", from March 2024 to March 2025.

- Data Science Engineer at Atlantica Sustainable Infrastructure, Seville, Spain, from May 2023 to February 2024.

- AI Software Engineer at AICIA Research Center (Andalusian Association of Research and Industrial Cooperation), Seville, Spain, from October 2021 to April 2022.

2 Research activity

2.1 Computer Vision and Deep Learning for Biometrics

He has been working on the development of image processing and deep learning methods for the analysis of images in the context of biometric recognition and forensic investigations. The research activity has focused on the development of deep learning models for the assessment of the legal age from panoramic dental X-ray images, applying transfer learning techniques to adapt CNN based models to the specific task. The results have been published in a conference paper [1].
More recently, he is working on an iris recognition project, where he is implementing and developing deep learning models for the recognition of the iris from images.

2.2 Statistical analysis for discrimination between binary features

He has been studying statistical methods for the discrimination between binary features from human skulls [4]. In particular, the research activity was focused on the following aspects:

- Cleaning and preprocessing of the dataset.

- Study of distance metrics for the comparison of binary features.

- Analysis of the statistical distribution of the distances between the features.

2.3 Audio classification

He worked on the analysis of a real-world scenario for the classification of audio emotions in emergency calls from October 2021 to April 2022. The research activity was focused on the development of deep learning models for the classification of emotions in audio recordings of emergency calls and how to deploy them in a real-world scenario.
He developed a deep learning model for the classification of audio emotions applying transfer learning techniques. The model was trained using a dataset of audio recordings from acted emotions and was served through an user-friendly interface for the classification of emotions in real-time. It was deployed using Docker containers and Flask Python framework for the backend [2].

2.4 Artificial Intelligence tools for communication

He focused on developing Artificial Intelligence tools to foster communication that feels more human-like. The project was focused on as study of the State of the Art Natural Language Processing (NLP) models and the implementation of a chatbot on a Raspberry Pi device. The chatbot possesses the ability to interact with the user through voice commands. The project was developed using Python and the ParlAI library for the implementation of the chatbot [3].

3 Research Collaborations

- Working at the *Industrial, Environmental and Biometric Informatics Laboratory*, Department of Computer Science, University of Milan (since March 2024).
  During this collaboration, I have been working on the development of image processing and deep learning methods for the analysis of images in the context of biometric recognition and forensic investigations.

- Collaborating with the *Laboratory of Forensic Anthropology and Odontology* of the University of Milan (since March 2024).
  The collaboration takes place within the project *Artificial Intelligence for the identification of people in forensic scenarios*, funded by the European Union - Next Generation EU.

- Collaborating with the *Public Enterprise Program for Health Emergencies* in Spain, *EPES* (from October 2021 to April 2022).
  The collaboration focused on the development of deep learning models for the classification of emotions in audio recordings of emergency calls and how to deploy them in a real-world scenario.

4 Experience in the Industry

From May 2023 to February 2024, he worked as a Data Science Engineer at Atlantica Sustainable Infrastructure, a company that manages renewable energy assets. Some of the main tasks performed were:

- Development of ETL processes for the extraction, transformation, and loading of data, using Python and SQL.
- Creation and maintenance of REST APIs for integrating data sources.
- Design and implementation of DevOps pipelines using Azure services.

5 Technical Skills

5.1 Projects developed during my studies

- *Implementation of an IoT device on a STM32 microcontroller* (2023): Sensoring device development using FreeRTOS on a STM32 microcontroller, including MQTT communication through a Wi-Fi module in C language.
- *Development of a CNN based image classifier and implementation on a Raspberry Pi* (2023): Development of a Transfer Learning Model for Image Classification Using PyTorch, with Quantization for Deployment on Raspberry Pi with TPU Support.
- *Analysis of the propagation of a Gaussian beam in an optical fiber* (2022): Development of a simulation of the propagation of a Gaussian beam in an optical fiber using Maltab.
- *Design and development of an analog filter* (2022): Design of an analog filter using Cadence Virtuoso.
- *Development of a digital transmitter on a FPGA* (2021): Development of a digital transmitter using VHDL on a FPGA for the modulation and transmission of a digital signal.

5.2 Informatic skills

- *Programming languages*: Python, Matlab, HTML, CSS, JavaScript, Java, C, C++, SQL, VHDL.
- *Frameworks*: Pytorch, Tensorflow, Keras, Flask, Docker, Azure DevOps.
- *Operating systems*: Windows, Linux.

5.3 Languages

- *Spanish*: Native language.
- *English*: Cambridge English Certificate (C1).
- *Italian*: Basic knowledge.

6 Publications

6.1 Publications on International Conferences with Scientific Committee

[1]   A. J. A. Molina, D. De Angelis, R. Donida Labati, F. Scotti, V. Piuri, "Deep Neural Networks for Assessing the Legal Age from Panoramic Dental X-ray Images", in *Proceedings of the IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA 2024)*, pp. 1–6, 2024. DOI: 10.1109/CIVEMSA58715.2024.10586604.

6.2 Thesis

[2]   A. J. A. Molina, "Entrenamiento y despliegue de un modelo de clasificación de audio", Master Thesis, University of Seville, 2023. URL: https://idus.us.es/handle/11441/151664.

[3]   A. J. A. Molina, "Implementación de herramientas de Inteligencia Artificial para conseguir una comunicación más humana", Bachelor Thesis, University of Seville, 2021. URL: https://idus.us.es/handle/11441/125219.

6.3 Publications under submission

[4]   A. J. A. Molina, R. Donida Labati, F. Scotti, V. Piuri, "Statistical Analysis for Discrimination between Binary Features", Work in submission to a journal.

Milano, October 23, 2024

Antonio Jose Aragon Molina