

Luca Lumetti

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EDUCATION

- Department of Engineering Enzo Ferrari, Unimore** Modena, IT
Ph.D. in ICT - Healthcare applications of AI, Computer Vision, and Medical Imaging *November 2022 – Ongoing*
- Department of Engineering Enzo Ferrari, Unimore** Modena, IT
MSc in Artificial Intelligence Engineering 110/110 with honors *September 2020 – October 2022*
- Department of Engineering Enzo Ferrari, Unimore** Modena, IT
BSc in Computer Engineering 100/110 *September 2017 – July 2020*

EXPERIENCE

- Honorary Fellow in Multimedia Data Processing** Modena, IT
Department of Engineering Enzo Ferrari, Unimore *March 2023 - Ongoing*
- Honorary fellow of the course "Multimedia Data Processing" of the M.Sc. degree in Computer Engineering course of the University of Modena and Reggio Emilia.
- Honorary Fellow in Data Structures and Algorithms** Modena, IT
Department of Engineering Enzo Ferrari, Unimore *March 2023 - Ongoing*
- Honorary fellow of the course "Data structures and algorithms" of the B.Sc. degree in Computer Engineering course of the University of Modena and Reggio Emilia.
- Teaching Assistant** Modena, IT
Department of Engineering Enzo Ferrari, Unimore *February 2023 - Ongoing*
- Teaching assistant for 120 hours with Prof. Federico Bolelli and Prof. Maurizio Vincini in the exam of "Data structures and algorithms" of the bachelor degree in Computer Engineering course of the University of Modena and Reggio Emilia.
 - Selected for the project "Fondo Sostegno Giovani" (Youth Support Fund) for the the Academic Year 2022-2023. The project is funded by MIUR - "Ministero dell'Istruzione, dell'Università e della Ricerca" (Ministry of Education, University and Research).
- Contract Employment** Modena, IT
Artificial Intelligence Research and Innovation Center AIRI, Unimore *January 2023 - February 2023*
- Written a survey about the state-of-the-art in image stitching techniques and implemented in python a pipeline to perform stitching of big images for an external company.
 - Duration of the contract: 10 days
- Student Internship** Modena, IT
AImageLab *March 2022 - August 2022*
- University internship under the supervision of Prof. Costantino Grana and Prof. Federico Bolelli about the development of a novel architecture for the segmentation of the Inferior Alveolar Canal in CBCT volumes.
 - Attended the conference ICIAP 2021.
 - Submitted a paper titled "Are skin lesion datasets really biased?" to IEEEAccess, to date still under revision
- High School Professor** Sassuolo (MO), IT
Highschool I.S.S. Alessandro Volta *November 2021 - June 2022*
- Taught 6h a week IT subjects to last year students.
- Fullstack Developer/Sysadmin** Remote
Web Team Ubuntu-IT *September 2014 – November 2017*
- Contributed to the development and translation of the website and the managing of the servers.

PUBLICATIONS

Federico Bolelli, [Luca Lumetti](#), Mattia Di Bartolomeo, Shankeeth Vinayahalingam, Alexandre Anesi, Bram van Ginneken, Costantino Grana | **Tooth Fairy: A Cone-Beam Computed Tomography Segmentation Challenge** | *MICCAI 2023*

Di Bartolomeo M, Pellacani A, Bolelli F, Cipriano M, [Lumetti L](#), Negrello S, Allegretti S, Minafra P, Pollastri F, Nocini R, Colletti G, Chiarini L, Grana C, Anesi A. | **Inferior Alveolar Canal Automatic Detection with Deep Learning CNNs on CBCTs: Development of a Novel Model and Release of Open-Source Dataset and Algorithm.** | *Applied Sciences*. 2023; 13(5):3271

OPEN SOURCE CONTRIBUTIONS

PyTorch (<https://github.com/pytorch/pytorch>) | *PyTorch, Python*

- Fixed a bug in TorchGen that caused some keyword arguments to be wrong in `torch.where()`
- Changed the documentation accordingly.

TorchIO (<https://github.com/fepegar/torchio>) | *PyTorch, Medical Imaging*

- Contributed to the development by adding Hann window functions to reduce edge-effects in a patch based training.
- Contributed to the documentation.

Hyprpicker (<https://github.com/hyprwm/hyprpicker>) | *C*

- Fixed a bug that would cause wrong color output in some particular kind of shells.

PROJECTS

IAN Annotation Tool (https://github.com/AImageLab-zip/IAN_annotation_tool) | *Qt5, Scikit-Image, OpenCV, Scipy*

- A tool used to produce 3D annotation of the Inferior Alveolar Canal, used to create the Maxillo Dataset (<https://ditto.ing.unimore.it>).
- Improved the tool by adding many additional features, as local contrast stretching and prediction of a deep learning model, that helped us to fix 40% of previously annotated data that contained some errors in the segmentation mask.

Alveolar Canal (https://github.com/AImageLab-zip/alveolar_canal) | *PyTorch, OpenCV, TorchIO*

- Inferior alveolar canal segmentation of cone beam computed tomography (CBCT) using deep learning.
- Implementation of many deep neural network architectures, loss functions, and other computer vision algorithms improving the state-of-the-art in DICE score by 0.02 and achieving 12x faster training time.

Deep Facial Inpainting (<https://github.com/LucaLumetti/Deep-Facial-Inpainting>) | *PyTorch, OpenCV, Scikit-Image*

- Built a dataset, combining CelebA and FFHQ (100k images in total), and developed a pipeline to detect, segment and inpaint surgical mask in a given photo of a person.
- Developed a FCNN to inpaint an image containing a person face with a surgical mask, trained on 3 nodes each with 2 GPUs.

DQNTS (<https://github.com/LucaLumetti/DQNTS>) | *PyTorch, Pandas, Scipy, Numpy*

- Pipeline to solve the Max Mean Dispersion Problem (NP-hard) by combining a Graph Neural Network and a Tabu Search, achieving SOTA results in large instances (≥ 5000 nodes), increasing up to 7 in objective score.

SmartGate | *Node.js, MongoDB, OpenCV, Tensorflow, Aedes, Raspberry PI, Arduino*

- Given a camera placed above a garage door, real-time reading of car licence plate using custom YoloV4, Tesseract OCR and OpenCV. Everything has been deployed on a Raspberry Pi 4, reaching a performance of 2 FPS, which is above the requirements we had fixed.
- Web application written in Node.js, deployed on Raspberry PI 4 and communicating with an Arduino to manage the garage door.

OTHER ACTIVITIES AND HOBBIES

- Achieved 2nd place at the CTF competition held during at the University of Modena and Reggio Emilia.
- Competed in many competitive programming challenges, like AdventOfCode, Google FooBar, Reply, etc., both individually and in a team.
- Took part in the Math Olympiads during high school, achieving 4th place in the regional phase and a participation up to the national phase.
- Practicing rock climbing since I was 5 years old, during which I have participated in many competitions at the national level, where I often reached the top three places.