

curriculum vitae of
Emilio Paolini

PH.D. STUDENT IN PHOTONIC TECHNOLOGIES

PERSONAL INFORMATION

- Born in Siena (Italy), on 5 November 1997.
- Address: Via Martiri della Libertà 58, 53041 Asciano (SI), Italy.
- E-mail: paolini.emilio5@gmail.com

EDUCATION

- Oct. 2021 – present **Ph.D.** in *Emerging Digital Technologies - Photonic Technologies* SCUOLA SUPERIORE SANT'ANNA, ITALY
Joint Ph.D. Scholarship Scuola Superiore Sant'Anna, CNR-IEIIT, Sma-RTy.
- Sept. 2019 – Sept. 2021 **M.Sc.** in *Artificial Intelligence and Data Engineering* (110/110 cum laude) UNIVERSITY OF PISA, ITALY
Courses and exams taken in English. During the studies, he attended courses of machine learning, databases, optimization methods, cloud computing, deep learning, cybersecurity, IoT, evolutionary AI, process mining and intelligence. Thesis title: "Development of a Fixed-Point Neural Deep Networks Library in C++ and its use to validate Photonic Neuromorphic Accelerators". Supervisors: Marco Cococcioni, Nicola Andriolli, Lorenzo De Marinis
- Sept. 2016 – July 2019 **B.Sc.** in *Computer Engineering* (110/110 cum laude) UNIVERSITY DI PISA, ITALY
During the studies, he attended courses of computer programming and architecture, computer networks, physics, digital electronics, electrotechnics, mathematical analysis, numerical calculus, algebra, numerical communication, operational research.
- Sept. 2011 – July 2016 **High School Diploma** (100/100 cum laude) I.I.S. TITO SARROCCHI, ITALY

EXPERIENCES

- Feb. 2019 **Internship** 3LOGIC MK, PISA
He has designed a management system for Personal Protective Equipment (PPE) in road construction sites. The system was based on Bluetooth Low Energy (BLE), Arduino, Node.js and MySQL. During this internship he has also worked with RedBear DUO, a thumb-size development board that contains WiFi, BLE and Cloud.
- Feb. 2016 **Internship** NEW YORK UNIVERSITY, ABU DHABI
He took part in a project with Prof. Rebecca Morton, Jonathan Rogers from New York University Abu Dhabi, Eleonora Patacchini (Cornell University) and Paolo Pin (Bocconi University). The project was related to social networks and voting. The particular approach was about the creation of networks of friends: most existing social network research relied on self-reported networks of friends instead this project used a specially designed social network program, created and administered by students.
- June 2015 – July 2015 **Training Placement** NICO GROUP, BELFAST
He has fulfilled a training placement within Nico Group under the ERASMUS+ mobility project funded by the ERASMUS+ Programme of the European Commission's Lifelong Learning Programme. During the training he has carried out the following tasks: maintenance and development of websites, IT systems management, customer service.

SKILLS

Deep Learning

Good knowledge and experience in

- Deep Neural Networks.
- Convolutional Neural Networks.
- *Software*: numpy, scikit, Keras, PyTorch, TensorFlow, TinyDNN.

Machine Learning

Good knowledge and experience in

- Data Preprocessing: data cleaning, data transformation, data reduction.
- Machine Learning algorithms: SVM, k-means, Naive Bayes, Regression.

Cloud Computing

Experience in both Hadoop and Spark.

Programming Languages and Web Development

Good knowledge and experience in

- C, C++, Python, MATLAB, R, Java.
- HTML, CSS, Javascript, PHP, SQL, MongoDB.

PORTFOLIO

Convolutional Neural Networks and Web Search Engine

A web search engine written in Flask based on features extracted from art images, which works efficiently thanks to a Vantage Point Tree Index implementation.

The list of images that can be retrieved are contained in the "Art Dataset", a dataset split into five classes, and in a "Distractor Dataset", based on the Mirflickr25k dataset.

For features extraction a Convolutional Neural Network has been used. Two models have been used: one is based on a Pre-Trained Network (InceptionV3) with weights computed on "Imagenet" and the other one is a fine-tuned version of the same Pre-Trained Network through the "Art Dataset". The VPtree is used to run efficiently k-NN and range queries on the features extracted.

Convolutional Neural Network for Medical Imaging Analysis: Abnormality detection in mammography

The objective of this project is to perform abnormality classification in mammography using Deep Learning techniques. There are two main tasks: to distinguish between "Mass" and "Calcification" and to distinguish between "Benign" and "Malignant". Models built "from scratch", pre-trained models, model ensembling techniques have been used to solve these two tasks.

Also some techniques provided by the literature have been applied, like Difference of Gaussians and Siamese learning.

Hadoop and Spark: Parallel K-Means

K-Means implementation in Hadoop and Spark.

Sentiment Analysis: comparing stock prices and sentiments in tweets

An application, written in Java, that allows to compare Apple stock price and sentiments contained in tweets related to the Apple topic.

Secure Client-Server four-in-a-row

A project that implements a client-server secure version of the famous game four-in-a-row using OpenSSL and C++.