GUIDO GAGLIARDI

PERSONAL INFORMATION

Guido Gagliardi is joint Ph.D. student in the International Ph.D. Program in Smart Computing at the University of Pisa, Florence, and Siena (Italy) and in the Doctoral Programme in Engineering Science at KU Leuven (Belgium).

His research is mainly focused on employing explainable artificial intelligence for the recognition of human emotional states through the analysis of physiological signals to support the decision-making process in a medical scenario, for example telling doctors about the mental state of patients during their treatments. Using this research together with the application of social virtual reality systems and artificial intelligence, he would like to develop a tool to surpass the emotional bias between people and to let them directly communicate their emotions.

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Date of birth:	***25 September 1996***
Birthplace:	***Pisa (PI)***
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EDUCATION

Nov. 2021—Present	Title	**double degree of Doctor of Philosophy (PhD.)**
	Course	**Smart Computing - Doctoral Programme in Engineering Science**
	Institute	**University of Pisa, Florence and Siena (Italy) - KU Leuven (Belgium)**
	Expected Graduation Date	**Oct. 2024**
Sep. 2019—Sep. 2021	Title	**Master's degree**
	Course	**Artificial Intelligence and Data Engineering**
	Institute	**University of Pisa**
	Graduation Mark	**110L**
	Graduation Date	**24/09/2021**
	Exams' mark weighted average	**30.0**
Thesis Title		**A novel multimodal feature learning architecture for explainable affective computing**
Thesis Supervisors		**Mario G.C.A. Cimino, Gigliola Vaglini, Antonio Luca Alfeo**
Thesis Abstract		Development of AI architectures apt to recognize emotional states from electroencephalogram and other physiological signals and to provide insights on how the output is established.

Master's degree Exams

Code	Title	Mark/30
878II	DATA MINING AND MACHINE LEARNING	**27**
883II	LARGE-SCALE AND MULTI-STRUCTURED DATABASES	**30**
876II	CLOUD COMPUTING	**30**
875II	BUSINESS AND PROJECT MANAGEMENT	**30**
696AA	OPTIMIZATION METHODS AND GAME THEORY	**27**
891II	ROBOTICA E MACCHINE INTELLIGENTI	**30L**
882II	INTERNET OF THINGS	**30**
886II	MULTIMEDIA INFORMATION RETRIEVAL AND COMPUTER VISION	**30**
888II	PROCESS MINING AND INTELLIGENCE	**30L**
910II	INDUSTRIAL APPLICATIONS	**30**
877II	COMPUTATIONAL INTELLIGENCE AND DEEP LEARNING	**30**
893II	SYMBOLIC AND EVOLUTIONARY ARTIFICIAL INTELLIGENCE	**30L**
	AVERAGE SCORE	**30.0**

Sep 2015—Feb 2019

Title	**Bachelor's Degree**
Course	**Computer Engineering**
Institute	**University of Pisa**
Graduation Mark	**105/110**
Thesis Title:	**Novelty data detection methods**
Thesis Supervisors	**Francesco Marcelloni, Alessio Bechini**
Thesis Abstract	AI deployment on outlier detection task, based on two algorithms of LE (learning entropy) and ELBND (error and learning-based novelty detection). System testing with both general stream of data and in presence of concept drift.

Sep 2010—July 2015

Title	**High School Diploma**
Institute	**Liceo Scientifico Ulisse Dini**
Mark	**87/100**

RESEARCH Project Contributions

Title	**Heartbeat anomalies detection using a Data Mining approach**
Course	Data Mining and Machine Learning
Abstract	The project investigated the possibility to use classical Data Mining approaches such as Support Vector Machines, k-Nearest Neighbours or Random Forest classifiers to face a multi-label classification problem in a strong unbalanced scenario. Specifically, the task was to perform arrhythmia detection on 5 classes of arrhythmia on the MIT-BIH dataset. The project work focused, in the first step, on signal analysis and signal intelligence, to extract as many as possible useful features from the data; then the work moved to data oversampling to face data unbalancing and finally, **we proposed the construction of an ensemble of classifiers** to obtain good performance relative to the metrics adopted.

Title	**Medical image analysis using CNN**
Course	Computational Intelligence and Deep Learning

Abstract

The project investigated the possibility to use Convolutional Neural Networks to perform abnormalities detection in medical images such as mammography for cancer detection.

In the first instance, we constructed from scratch Convolutional Neural Networks to face up the problem, then we tried to build a Fine-Tuning model and a Siamese one to achieve higher performances.

Eventually, since the main problem on the task was that the data were strongly unbalanced, **we proposed and constructed a Generative Adversarial Network approach, in particular a Variational Autoencoder,** to oversample the dataset in a way that would let the Convolutional Neural Network train more without going in overfitting too fast due to the replication of images usually done when dealing with oversampling in images data.

Title **User mobility profile**

Course Industrial Application

Abstract

The project investigated the possibility to use an Artificial Intelligence approach on Real Time-systems such as a new generation of unmanned cars, to create a fast and responsive user profiling, storing all the user information, and automatically associate this profile with a physical person whenever he/she enter in the car with an automatic face recognition step.

My contribution to the teamwork has focused on **the design of the Artificial Intelligence system, with Deep Neural Network and OpenCV, in a Real-Time and mobile system** with its typical constraints (low power consumption, low bandwidth, lossy networks and so on), both from the point of view of the **implementation of the AI** and the **design of a cloud platform** needed to maintain consistency in the data.

Title **A Deep Reinforcement Learning approach to train multi-agent robot system for formation control**

Course Robotica e Macchine Intelligenti

Abstract

The project investigated a very unexplored research topic: the use of a Deep Reinforcement Learning approach to training a multi-agent robot network, in a decentralized fashion, to let the robots perform a leader-follower task with collision avoidance constraints.

The main contributions of the research project, on which I worked alone, have been: the study and the **production of a new environment's reward functions** able to fit both the leader-follower task and the Actor-Critic Deep Reinforcement Learning model; the **study of the Actor-Critic model in a continuous action space** (the robots were treated as integrators, so they were controlled in speed) and finally the construction of both **a custom simulation environment**, using Google open-ai gym, and a **new training framework** capable of letting the agents correctly visit the state space and follow the leader.

Title **Interior Point Method improvements using sparse matrixes**

Course Symbolic and evolutionary Artificial Intelligence

Abstract

The project investigated the possibility to improve the speed performances of the Interior Point Method algorithm in a multi-objective environment using sparse matrixes to solve in a faster way the Karush Kuhn Tucker system related to the method.

My contribution to the research has been done in the first moment in the extension of the actual Julia 1.6 libraries and the BAN (Bounded Algorithmic Numbers) library provided by the University of Pisa, to explicitly support the concept of sparse matrixes while using non-Archimedean numbers (fundamental in a multi-objective lexicographic optimization problem).

Then the study continued by proposing new analytical methods to solve the Karush Kuhn Tucker system, such as matrix partitioning and Cholesky factorizations, in a sparse matrix environment, to speed up the computation compared to the LU factorization needed to solve the standard system.

Study Plan Related Experience

I have participated in the **Roborace** team of the **Research Centre E. Piaggio of the University of Pisa**, in 2018, (ref. Engineer Danilo Caporale, Research Centre E. Piaggio) referenced by Prof. Lucia Pallottino of the University of Pisa, which aims to build an intelligent autonomous system to drive an electrical unmanned race car, for competing with other universities around Europe.

My work was focused on the localization of the vehicle and the map construction in absence of GPS signal only with lidar systems.

In particular, I had the opportunity to learn and understand the main problems and requirements that this kind of system needs to face while driving, and also, I needed to learn the ROS language (that I've further improved during my course of "Robotica e Macchine Intelligenti") for simulation purpose and hardware virtualization in a real-world scenario.

Furthermore, during this period I also **have been in the UK at the Roborace company headquarters**, on a mission for the University of Pisa**, to test the performances of the implementations of our team on the real race care prototype**.

Skills and Ability

MOTHER TONGUE	**ITALIAN**
OTHER LANGUAGES	**ENGLISH**
Reading	**C1**
Writing	**C1**
Listening	**C1**
Speaking	**C1**

TECHNICAL SKILLS

Artificial Intelligence, Deep Learning, Data Mining, Machine Learning, Robotics, Real-Time Programming, Internet of Things, Networking.

C++, Python, Julia, ROS, Java, UML.

RELATIONAL SKILLS

Ability to work well in a team acquired both through academic group projects and by participating in **University of Pisa Radio**, **RadioEco**. This last activity also helped me acquire leadership and decision-making skills because of my position as **President of the Association,** which lasted 2 years, and also my public speaking capabilities.

Aptitude to work in well competitive and stressful scenarios with close deadlines as proven during my academic career.

Extracurricular Activities

From 2017 to 2021 I took part in RadioEco a non-profit student Association, which, in collaboration with the University of Pisa, provides a professional Radio-Station laboratory for students. RadioEco counts a big number of members, with at least 300 applications a year. The Association has an elective executive board that is in charge of all the activity that the Association propose for its members and the public, and it manages also all the funds and the technical equipment provided by the University of Pisa. The executive board is led by an elective president in charge for 2 years.

July 2019 – June 2021	Title	**President of the Association**
Description	Full legal and managerial responsibility of the Association, head of the executive border and station managing of the radio.	

Sep 2018- July 2019	Title	**IT-Manager in the executive board**
Description	General managing of the Association, related to the IT infrastructure, such as the website and the radio flow streaming.	

Sep 2017 – Dec 2020	Title	**Radio Speaker**
Description	Hosting and directing many radio shows, such as UnipiNews, with insights on social and cultural-related topics.	

CERTIFICATES AND DOCUMENTS

Master Degree in Artificial Intelligence and Data Engineering

Bachelor's Degree in Computer Engineering

High School Diploma

Driver License B

English Certification C1

Il sottoscritto GUIDO GAGLIARDI nato a PISA prov. PI il 25/09/1996 residente a PISA prov. PI Andrea Cesalpino 9, 56124, consapevole delle sanzioni penali, nel caso di dichiarazioni non veritiere, di formazione o uso atti falsi richiamate dall'art. 76 del D.P.R. 445 del 28 dicembre 2000, nonché della sanzione ulteriore prevista dall'art. 75 del citato D.P.R. 445 del 28 dicembre 2000, consistente nella decadenza dai benefici eventualmente conseguenti al provvedimento emanato sulla base della dichiarazione non veritiera. Autorizzo il trattamento dei miei dati personali presenti nel cv ai sensi del Decreto Legislativo 30 giugno 2003, n. 196 "Codice in materia di protezione dei dati personali" e del GDPR (Regolamento UE 2016/679).

AOO "CLI" - Prot.: 0001756/2022 del 26/05/2022

UNIVERSITÀ DI PISA

CENTRO LINGUISTICO

Guido Gagliardi

born in Pisa on September 25, 1996

attended a Course of ***English for Research Publication and Presentation Purposes*** of 30 hours from January 25, 2022 to March 29, 2022 (attendance: 80%) with the following result:

Grade*: Very Good

(*) Scale: Pass, Good, Very good, Excellent

The Director

Prof. Silvia Bruti

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The present **Certificate of ATTENDANCE and ACHIEVEMENT** is given to students who attend at least 80% of the course and certifies that the student has fulfilled the **C1 Level** objectives for **Writing** (academic writing skills related also to scientific manuscripts) and **Speaking Skills** (presenting and debating the PhD student's research project). For the above-mentioned skills, the overall final level is comparable to **C1** (**CEFR**).

Sulla base delle disposizioni di cui al comma 5 dell'articolo 43 della legge 445/2000 e dell'interpretazione fornita dall'Agenzia delle Entrate con Risoluzione 29/E del 12 marzo 2014, tutti i documenti riepilogativi emessi dal CLI saranno rilasciati ai fini dell'aggiornamento della posizione curricolare dello studente. Nessun uso ulteriore può essere consentito. In caso di utilizzo di tali documenti per fini privati, ma comunque nel rispetto dei principi di de-certificazione previsti dalla legge 445/2000, è necessario che sia corrisposta dall'utente l'imposta di bollo nella misura di legge vigente (per l'anno corrente: 16€ ogni 100 righe) e sia tempestivamente comunicato al CLI via e-mail (impostadibollo@cli.unipi.it) il numero identificativo di 14 cifre assegnato al contrassegno telematico utilizzato sul documento ai sensi della Risoluzione nr. 89/2016 dell'Agenzia delle Entrate consapevole della nullità dell'utilizzo compiuto in violazione.

CLI – Centro Linguistico dell'Università di Pisa - Organizzazione con Sistema di gestione qualità certificato UNI EN ISO 9001:2015

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