

Matteo De Francesco

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ABOUT ME

I'm a second year master student in Artificial Intelligence at University of Pisa. During my studies I had the opportunity to take different classes and doing practical experience with hands-on projects. My interests lie into the mathematical aspects of AI, combinatorial optimization and game theory, and probabilistic models for Deep Learning.

EDUCATION

M.Sc. in Computer Science - Artificial Intelligence Sep. 2020 - Present
University of Pisa

B.Sc. in Computer Science Sep. 2017 - Jul. 2020
University of Pisa

RESEARCH-WORK EXPERIENCE

Research Fellow Apr. 2022 - Present
University of Pisa

- * Been awarded of a fully funded scholarship by the Italian Ministry of Justice in the context of an European project called "Giustizia Agile";
- * 6 months of collaboration aimed to improve the Italian "Ufficio per il Processo";
- * The aim of the work consists in bring improvements to the courts of the court of Florence (Pisa, Lucca and Leghorn) increasing the actual ICT systems of the aforementioned courts.

Teaching Assistantship Sep. 2021 - Dec. 2021/Sep. 2020 - Dec. 2020
University of Pisa

- * 40+ hours of continuous collaboration;
- * Been selected two times as teaching assistant for the practical lectures of "Fundamentals of Computer Science" course of the Bachelor's Degree in Computer Science;
- * The course provides to the students the basics of Computer Science, from basic set operations, combinatorics math to graph theory;
- * I helped student solving exercises, providing them feedback about proposed solutions and giving them helpful suggestions.

Teaching Assistantship May 2020 - Jul. 2020
University of Pisa

- * 20+ hours of continuous collaboration;
- * Been selected as a teaching assistant for the last practical lectures of "Mobile Application Development" course of the Bachelor's Degree in Computer Science;
- * Created a simple application to let the students familiarize with Android development tools and correct implementation patterns;
- * Provided office hours to support students in their final project implementation.

Research Intern Mar. 2020 - Jul. 2020
University of Pisa

For my Bachelor's thesis final work, I developed a Machine Learning framework for the classification of topics on StackOverflow. I explored the different theoretical aspects of Deep Learning framework, from statistical Machine Learning method to modern NLP methods. I exploited the different preprocessing techniques to extract tokens from question and answers and finally I provided the embeddings to different models, comparing the results.

Mobile App Developer Sep. 2019 - Mar. 2020
Omega Travel

- * 6 months of part-time work;
- * I developed a mobile application for the travel agency "Omega Travel" of my hometown, using a typical software approach: development of use cases, architecture design and implementation;
- * I exploited the Flutter framework and Dart language, having a versatile application that could be placed both on the AppStore and Google Play Store.

PROJECTS

CSRAE

Sep. 2021 - Mar. 2022

Implementation of a *Cauchy-Schwarz Regularized Autoencoder*. Following the paper from arxiv, I implemented a variational autoencoder based on the Cauchy-Schwarz divergence, exploiting the PyTorch library. The more versatility of the divergence allows for the use of more complex priors like a gaussian mixture models against the normal gaussian used.

Quadratic Disjoint Simplices

Jul. 2021 - Dec. 2021

Computational Mathematics and Optimization course. I first developed a theoretical analysis of the ADAGRAD algorithm with its convergence properties, then based on these I implemented a solver from scratch to find the minimum of a quadratic objective function subject to disjoint simplices constraint.

Autonomous Driving

Sept. 2021 - Dec. 2021

Project developed in collaboration with other students. We had the opportunity to work in team for the "Eteam Squadra Corse" of the University of Pisa. The aim of the final project was to implement an autonomous driving system for the "Formula Student" competition. I had the opportunity to work in a big team, focusing on the SLAM task, covering all the steps from the starting architecture description to the implementation phase, exploiting ROS.

Parallel Boruvka

Sept. 2021 - Dec. 2021

Parallel and Distributed System course. I developed a parallel implementation of the "Boruvka algorithm", for finding the Minimum Spanning Tree of a given graph. I studied topics from the original paper, and I exploited also an ad hoc data structure to deal with this kind of problem, known as "Disjoint Sets". I exploited the C++ language and its basic functionalities.

Secure Server

Apr. 2021 - Jun. 2021

Foundations of Cybersecurity course. Working in team, I implemented a secure client-server application using the OpenSSL library. The application consisted in a basic messages exchange application, but using modern security protocols for the initial handshake, for each communication and also to establish secure channels between client. I exploited the C++ language with the support of OpenSSL external library.

Smart Park

May. 2021 - Jun. 2021

I developed an intelligent Smart park for bicycles using the different IoT protocol stack. The aim was to synchronize locks intelligently through the use of sensors located above the parking spots. The sensors were programmed using the C language, exploiting the connection at the IPv6 layer, having two different purpose: locking and logging. The server was implemented in Python, receiving data from the CoAP sensors (locking) and MQTT sensors (logging).

Find Your Venue

May 2020 - Jun. 2020

Mobile Application Development course. I implemented a mobile application in Android. The aim of the application was to allow the user to go through the city, drawing a certain area on the integrated map and visualize all the locations in there. This was realized connecting to an external API, showing the results in the selected zone. Further, the application provide a storage functionality to save preferred locations. I exploited the Android Studio software together with useful libraries, using Kotlin language.

WordQuizzle

Dec. 2020 - Jan. 2020

Network course. I implemented a translator game to challenge friends. It connects to an external API to fetch words and its translations, providing to the user a nice User Interface to start a game with a friend and input the translations to the proposed words, collecting the results and counting the scores. I exploited the Java language, the network connections and the RMI functionality.

Client-Server

May. 2019 - Jun. 2019

Operating Systems course. I implemented a client-server for exchanging messages, storage of data and registrations of users. I covered different topics, from the file tree directories management to the low level connection through sockets, exploiting the C language.

TECHNICAL SKILLS

Languages

Python, Julia, C++, C, MATLAB, Java, Bash, Dart, Kotlin, SQL

Software/Frameworks

Git, Flutter, Android Studio, Docker, ROS

LANGUAGES

Italian English

Mother tongue
Advanced