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 combinatorial optimization, algorithms, 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;
∗ 2 principal tasks to be developed: Data analysis over the current software used in the courts, and the implementation of a search engine to retrieve efficiently legal acts.

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, combinatorial math to graph theory;
∗ I helped student solving exercises, providing them feedback about proposed solutions and giving them helpful suggestions.

Teaching Assistantship   May 2021 - Jul. 2021
University of Pisa

∗ 20+ hours of continuous collaboration;
∗ Been selected as a teaching assistant for the closing practical lectures of "Mobile Application Development" course of the B.Sc. 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, 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 feeded the embeddings into 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 engineering 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

GoEmotions   Jan. 2022 - Apr. 2022

Human Language Technologies course. Implementation of different BERT-based models trained and tested over the GoEmotions dataset, the most versatile dataset in terms of assigned labels. The different models were compared over the same task with different runs to select the best one according to time/F1 scoring.

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

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 implememt 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. Development of a parallel implementation of the "Boruvka algorithm", for finding the Minimum Spanning Tree of a given graph. The result was achieved by following the original paper, and exploiting 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, we implemented a secure client-server application using the OpneSSL 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 bycicles using the 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. Implementation of a mobile application in Android. The aim 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

Computer Networks course. I implemented a translator game to challenge friends. It connects to an external API to fetch words and the relative translations, providing to the user a nice interface to challenge a friend, by inserting the translation of the random appearing word, collecting the results and counting the scores. I exploited the Java language, the network connections and the Java RMI functionality.

Client-Server   May. 2019 - Jun. 2019

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

TECHNICAL SKILLS

Subjects	Machine Learning (ML), Deep Learning (DL), Operations Research (OR), Data Analysis Natural Language Processing (NLP), Algorithms, Big Data, Parallel Patterns Paradigms
Languages	Python, Julia, C++, C, MATLAB, Java, Bash, Dart, Kotlin, SQL
Software/Frameworks	Pytorch, Tensorflow, Git, Flutter, Android Studio, Flask, Docker, ROS

LANGUAGES

Italian	Mother tongue
English	Advanced