Parmenion Koutsogeorgos

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I am an Artificial Intelligence Engineer based in the Netherlands. I am currently working part-time for Cordys Analytics, a startup affiliated with the University Medical Center Utrecht which applies A.I. methods for the purpose of diagnosing heart disease from electrocardiograms (ECGs). At the same time, I am working on my thesis for the Master of Science in Artificial Intelligence at Maastricht University, researching the use of State-Space models (Mamba) trained on bio-acoustic data for the purpose of monitoring animal populations. I have a strong background in Mathematics, having completed a bachelor's and master's in Mathematics at the University of Cambridge. I am mainly interested in A.I. with applications to engineering and healthcare.

Professional experience

Cordys Analytics **Utrecht, NL**

A.I. Engineer *Sep. 2024 - Today*

After completing a 6-month internship for Cordys Analytics, I started working with them as a part-time A.I. Engineer. My responsibilities involve both A.I. research work, as well as assistance with the development of the company's main software product, an end-to-end online diagnostic service.

A.I. Intern *Mar. 2024 - Aug. 2024*

During my internship, I focused on the topic of "Noise Detection and Uncertainty Estimation in ECGs," applying deep learning techniques to identify noisy electrocardiograms. My main contributions and takeaways include:

- I familiarized myself with Out Of Distribution (OOD) detection methods and implemented various techniques from recent literature to improve the robustness and reliability of ECG noise detection models.
- I designed and conducted various experiments, testing different models on public and private ECG datasets to evaluate and optimize the performance of noise detection algorithms.
- I gained firsthand experience in the dynamic startup environment at Cordys.
- I actively contributed to Cordy's ECGxAI package, a useful tool in the analysis and interpretation of ECG data using deep learning methods.

My strong performance and good work ethic during my internship resulted in me getting hired for a part-time A.I. Engineering role in the same company.

Maastricht University **Maastricht, NL**

Self-Learning Module Website Developer *Jul. 2024 - Aug. 2024*

I developed and hosted on GitHub pages a self-learning module website template focused on Multivariable Calculus. I also wrote a Python script to convert LaTeX to HTML.

Teaching Assistant *Apr. 2023 - Feb. 2024*

I was a teaching assistant for bachelor's mathematics courses such as Linear Algebra, Logic, Probability & Statistics and Multivariable Calculus.

Education

Maastricht University **Maastricht, NL**

MSc in Artificial Intelligence *Sep. 2022 - Today*

I have taken courses in topics such as Search Algorithms, Deep Learning, Autonomous Robotics Systems, Computer Vision, Data Mining, Text Mining and Natural Language Processing. Additionally, as a part of my degree, I participated in two research group projects. I am currently working on my master's thesis alongside my work at Cordys Analytics.

University of Cambridge **Cambridge, UK**

master of Mathematics (bachelor's & integrated master's) *Oct. 2017 - Jul. 2021*

In my two final years of study I mainly focused on Logic and Combinatorics, taking courses such as: Model Theory (on which I wrote my master's thesis), Topics in Combinatorics, Ramsey Theory, Additive Combinatorics, Logic and Set Theory, Graph Theory. Other topics I have taken include: Differential Equations, Statistics, Linear Algebra, Number Theory, Group/Ring/Module Theory, Real and Complex Analysis, Topology, Probability and Measure Theory, Linear Analysis, Differential Geometry.

Mandoulides Schools **Thessaloniki, GR**

Apolytirion of Geniko Lykeio (high-school diploma) *Sep. 2014 - Jun. 2017*

Due to my strong performance in school exams as well as extracuriccular maths and physics competitions (most notably winning a bronze medal in the 18th Junior Balkan Mathematical Olympiad, a gold medal in the 31st Greek Junior National Mathematical Olympiad and the first place in the 25th Panhellenic Physics Competition) I received a full scholarship throughout my years of study in Mandoulides Schools.

Skills

A.I. development: I have practical experience in developing A.I. algorithms for signal analysis, including ECG and audio signals. Moreover, for my current master's I have studied and worked on high-quality projects in various fields of A.I., including Text Mining & Natural Language Processing, Computer Vision and Robotics.

Python development: I have extensive experience in Python, having used it for integration and evaluation of A.I. algorithms in production, for A.I. research, as well as for multiple university and personal projects. In particular, I am familiar with software development standards such as Object Oriented Programming and unit testing, as well as many libraries commonly used in machine learning, such as PyTorch, PyTorch Lightning, Scikit-learn, Pandas, Matplotlib, Numpy, etc.

Web development: I have worked with HTML, CSS and JavaScript for personal projects as well as for developing a Self-Learning Module for the Multivariable Calculus course at the School of Business and Economics in Maastricht University.

Problem solving & mathematics: Having completed the 4-year Mathematics course at the University of Cambridge, which includes the highly competitive Part III course (selective 4th year integrated master's), I have developed excellent problem solving skills. Moreover, I have a strong command of various pure and applied mathematical areas, including probability and statistics.

Linux & bash scripting: I have some experience with Linux and bash scripting, both as a power user as well as a developer.

MATLAB: I have used MATLAB in multiple projects for my degree in Mathematics.

LaTeX: I regularly use Latex to write technical and non-technical documents (including this one).

Awards

Association for Computing Machinery (student chapter), Aristotle University of Thessaloniki
ACM AUTh Days of Coding, First place *2022*
Team competition. Our submissions: `pk-470/acm-auth-days-of-coding`

Hellenic Society for Physics, Science and Education
26th Panhellenic Physics Competition, Third Prize *2016*

Hellenic Mathematical Society
33rd Greek National Mathematical Olympiad, Silver Medal *2016*

Kangourou Sans Frontieres
Kangaroo Hellas Mathematical Competition, Distinction *2016*

Mathematical Association of America
American Mathematics Competition - AMC 10, Distinction *2015*
Arrived in top 2.5% internationally.

Young Gifted Mathematicians Marin Getaldić
4th Junior European Mathematical Cup, Third Prize *2015*

Hellenic Mathematical Society
32nd Greek National Mathematical Olympiad, Silver Medal *2015*

Hellenic Society for Physics, Science and Education
25th Panhellenic Physics Competition, First Place *2015*

Union of Mathematicians of Macedonia
18th Junior Balkan Mathematical Olympiad, Bronze Medal *2014*

Hellenic Mathematical Society
31st Greek Junior National Mathematical Olympiad, Gold Medal *2014*

Hellenic Mathematical Society
30th Greek Junior National Mathematical Olympiad, Silver Medal *2013*

Selected projects from my A.I. master's

Automatic Music Sheet Page Turner - csotogd/Music-Score-Localization-2.0 *Sep. 2022 - Jan. 2023*
Our group developed an algorithm with the aim to localize a recorded song snippet as played by a human within the music score of the entire song. Our algorithm is based on the one developed for the app Shazam, while also including techniques such as Monte-Carlo Robot Localization.

Impasse AI - pk-470/impasse-ai *Sep. 2022 - Oct. 2022*
I created a search engine for the game Impasse by Mark Steere which uses Alpha-Beta search along with move ordering, iterative deepening and a transposition table. When matched with the engines of my classmates in a tournament my engine came 3rd overall, surpassing many engines which could search deeper within the allowed time due to being written in languages faster than Python.

Selected computational projects from my Mathematics bachelor's

Graph Colouring *Mar. 2020 - Apr. 2020*
I studied and implemented on MATLAB various techniques for efficiently bounding the chromatic number of a graph.

Simulation of Random Samples from Parametric Distributions *Dec. 2019 - Jan. 2020*
I used MATLAB to study and visualise the behaviour of random variables sampled from various distributions (exponential, gamma, normal, chi-squared).

Ordinary Differential Equations *Mar. 2018 - Apr. 2018*
I used MATLAB to study and compare three methods for solving ODEs (Leapfrog, Euler, RK4).

Essays & Presentations

Part III, University of Cambridge **Cambridge, UK**
NIP Theories and O-minimality - pk-470/nip-theories *Feb. 2021 - Apr. 2021*
As a part of my master's in Mathematics I worked on an expository essay on Model Theory, a branch of Mathematical Logic. This essay required extensive independent research and study of multiple papers, which I then had to condense and combine into a coherent and focused text.

8th International Week Dedicated to Maths **Thessaloniki, GR**
Inversion: Properties and Applications *Feb. 2016 - Mar. 2016*
While still being a student in Mandoulides Schools I independently worked on and presented a project on the properties of geometric inversion and how it can be used to produce imaginative solutions to very hard competition problems.

Extracurricular projects

Supermod - pk-470/Supermod *2022*
In order to teach myself Python I created a Discord bot whose duties include fetching and manipulating data from Google spreadsheets, extracting and formatting data from messages, interacting with the users and making posts periodically.

Languages

Greek (mother tongue), English (proficient), German (B1 level, can catch up if needed).

Additional interests

Rowing: I was a member of the Emmanual College Boatclub in Cambridge and I rowed in the 2018 Fairbairn Cup.

Music: For the past 7 years I have been playing and writing music for the electric bass (mainly) and the guitar.