Alexandru Buburuzan

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EDUCATION

The University of Manchester Sep 2021 – Jun 2025
BSc(Hons) Artificial Intelligence with Industrial Experience Manchester, UK

- First year: **90%** average grade (First-Class Honours), **ranked 2nd out of 486 (top 0.5%)** first-year CS students, recipient of the **Golden Anniversary and Netcraft Awards.**
- Second year: **86%** average grade, attending Prof. Tim Cootes' Computer Vision reading group.
- Courses: Probability 2, Machine Learning, Intro to AI, Knowledge-Based AI, Visual Computing, Data Science, Mathematics, Logic and Modelling, Programming (Python, Java, C, C++, Haskell), Algorithms and Data Structures, Software Engineering, Computation, Operating Systems, Computer Architecture and Computer Engineering.

"Grigore Moisil" Theoretical High School Sep 2017 – Jun 2021
Computer Science and Mathematics Timisoara, Romania

- **Valedictorian**, Romanian Baccalaureate with 10/10 in Mathematics and in Computer Science.
- **Bronze Medal** at the National Olympiad in Mathematics (Apr 2021) and Informatics (Apr 2018).
- Qualified for the National Olympiad in Informatics in 2021, 2020 (**9th in national ranking**) and 2018.

EXPERIENCE

FiveAI – acquired by Bosch Jun 2023 – Jun 2024
Research Engineer Intern Cambridge, UK

- Placement year in scene understanding for self-driving cars.

Rayscape Jul 2021 – Jul 2023
Research Engineer Remote

- Reduced the out-of-domain gap in multi-label chest X-ray classification by 32% for two industry-know covariate shifts using a novel domain generalization method, **LISA-topK** [2], that I presented at MICCAI UNSURE, in Vancouver.
- Developed a CE-marked 3D Deep Learning algorithm for the **segmentation of nodules on lung CT scans** that helps **radiologists from over 100 medical institutions and 5 countries** fare better at diagnosing lung cancer by providing precise measurements.
- Decreased the error of the predicted measurements (L1) by a factor of 2 compared to the previous model by using a decoder-style sub-network which exploits pre-existing feature maps and implements a **segmentation refinement mechanism**.
- Improved the metrics of a **nodule malignancy classification** algorithm by 3% using **Vision Transformers**.

Rayscape Mar 2020 – Sep 2020
Machine Learning Intern Timisoara, Romania

- Conducted interdisciplinary work with radiologists towards building a time-efficient Deep Learning model for the **detection of intracranial haemorrhages** meant for **speeding up the triaging process**.
- Developed three Computer Vision algorithms as part of my initial training: lung segmentation (U-Net), pathology classification (CNN classifiers) and foreign objects detection (Faster R-CNN) on chest X-ray scans.

PUBLICATIONS

[1] James Gunn, Zygmunt Lenyk, Anuj Sharma, Andrea Donati, **Alexandru Buburuzan**, John Redford, Romain Mueller, "Lift-Attend-Splat: Bird's-eye-view camera-lidar fusion using transformers" in *arXiv preprint arXiv:2312.14919*, 2023.

[2] Bogdan Bercean*, **Alexandru Buburuzan***, Andreea Birhala, Cristian Avramescu, Andrei Tenescu, Marius Marcu, "Breaking Down Covariate Shift on Pneumothorax Chest X-Ray Classification" in *International Workshop on Uncertainty for Safe Utilization of Machine Learning in Medical Imaging (MICCAI UNSURE)*, 2023.

[3] Bogdan Bercean, Andreea Birhala, Paula Ardelean, Ioana Barbulescu, Marius Benta, Cristina Rasadean, Dan Costachescu, Cristian Avramescu, Andrei Tenescu, Stefan Iarca, **Alexandru Buburuzan**, Marius Marcu, Florin Birsasteanu, "Evidence of a cognitive bias in the quantification of COVID-19 with CT: an artificial intelligence randomised clinical trial" in *Nature Scientific Reports*, 2023.

*Equal contribution.

SUMMER SCHOOLS & COURSES

Oxford Machine Learning Summer School – credential — Jul 2023

- Attended lectures on Computer Vision, Representation Learning, Graph Neural Networks, Medical Image Analysis.

Cambridge Centre for AI in Medicine Summer School – credential — Sep 2022

- Attended lectures on Interpretability, Graph Neural Networks, Causal Inference, Timeseries Forecasting.

Eastern European Machine Learning Summer School – credential — Jul 2022

- Attended lectures and tutorials on Graph Neural Networks for drug discovery, Deep Learning Theory, Reinforcement Learning, Computer Vision, Explainability, Speech Recognition, Natural Language Processing.
- **Mentored by Lucas Beyer**, one of the creators of Vision Transformers (ViT).

Introduction to Quantum Computing – credential — Oct 2020 – May 2021

- Organized by IBM Quantum and The Coding School, the course delivered a foundational understanding of quantum computing with topics including linear algebra, quantum algorithms and quantum applications.

PROJECTS

Manchester University Data Science Society — Jun 2022 - Present

- As a **Workshops Executive**, I am teaching an introductory course on Medical Image Analysis using CNNs.
- Prepared a Jupyter Notebook consisting of a PyTorch pipeline used to train an organ classification model.

Citadel European Datathon — Apr 2023

- Analysed a collection of datasets, including 1.8 million traffic stops in Philadelphia to identify racial disparities in policing, using Pandas for data manipulation and Plotly for visualisations.
- Argued how smart policing algorithms based on hot spot analysis could reinforce biases in segregated communities.

SaferWalk – first-year team project — Oct 2021 - May 2022

- Built a website capable of recommending safer routes to pedestrians based on data provided by the Police.
- Reduced the Flask API response time by a factor of 4 by approximating the heuristic function of the A* algorithm using Riemann sums and by pre-processing lattice points values.

Climate Hack.AI — Jan 2022 – March 2022

- Ranked 6^{th} out of the 25 top universities from the UK, US and Canada.
- Developed a **video generation** model for predicting near-term solar photovoltaic power production based on a short history of satellite images.
- Increased the receptive field of the sequence-to-sequence model using UNet-inspired components and improved the gradient flow of the network by making use of residual connections, which led to a 10% increase in the validation metric.

SKILLS

Mathematics, Artificial Intelligence, Machine Learning, Deep Learning, Computer Vision, Algorithms, Data structures

Programming languages: Python, C, C++, Prolog, Haskell

Frameworks and libraries: PyTorch, PyTorch Lightning, NumPy, Pandas, Flask, OSMnx

Languages: English (IELTS credential), Romanian (native)