xAIM

Graduation report

Table of contents

1. Introduction

This document is intended to provide a report on the outcomes of the first cohort students graduated from xAIM master program until 31st October 2024 as part of the Action 2020-EU-IA-0098. This Action aimed at building a specific master program, entitled eXplainable Artificial Intelligence in healthcare Management (xAIM), dedicated to the use of explainable AI (xAI) in healthcare, to advance development of highly qualified professionals to address the lack of highly specialized digital skills in AI. The master is designed for anyone interested in understanding the needs of xAI in healthcare, and, in particular for health-related professionals, with a particular focus on the exploitation of the possible applications.

The master program is awarded by the University of Pavia and consists of 90 ECTS with a duration of approximately 18 months. It enables participants to effectively transfer to the job market a set of up-to-date highly specialized digital skills in AI. Participants were able to attend the modules, discuss case studies and assessments in an online environment. The content of the xAIM Program addresses a two-fold objective: participants learn which are the opportunities stemming from the AI applications to the healthcare setting and they appraise the challenges and risks associated with the use of AI in healthcare. In particular, participants are provided with methodologies and tools to effectively manage risks, while explaining the results of AI solutions to peers and patients in simulated real world contexts.

This document is structured into eight sections. After the introduction section, the timeline of the program and the application and selection procedure are discussed in Section 2 and 3. Section 4 puts forward the composition of the first cohort of

xAIM students. The next following Section provides an overview of the selected elective modules. Students' outcomes with regards to their study program are described in Section 6, while Section 7 provides the details of the graduation sessions. The final Section addresses concluding remarks.

2. Timeline of the program

In this Section, we are going to summarize the main steps that were followed from the xAIM master program inception to the graduation of the first cohort of students. The xAIM master program is a vocational master program recruiting graduates in either bachelor or master programs. As such, it was first approved by the governance bodies of the University of Pavia, then on 30th May 2022 the call for applications was published on the xAIM website.

3. Application and selection procedure

At the deadline for applications to the first edition of the xAIM master's, 29 prospective students applied.

4. First cohort of xAIM students

After careful consideration and assessment by the teaching committee, 24 students were selected and 23 enrolled into the xAIM first intake, of which 5 are female.

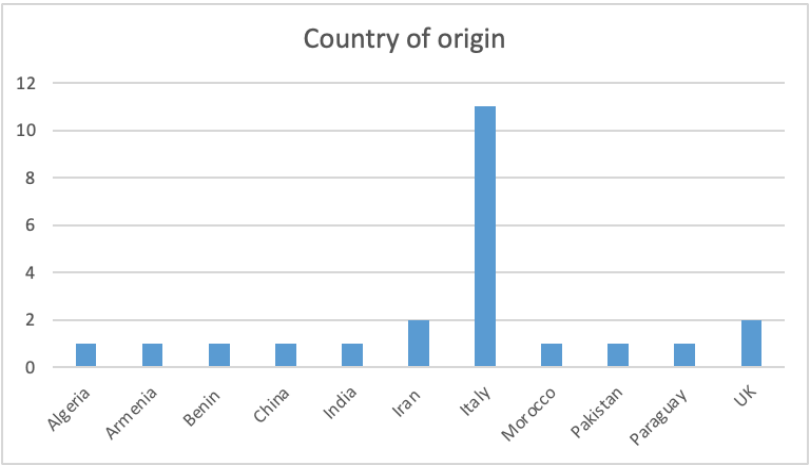
Descriptive statistics provided in FIgure 1 - Panel A shows that the most prevalent country of birth is Italy (12), followed by the UK and Iran (2 each). Panel B of the

same Figure reports that similar statistics apply to the country of citizenship.. With regards to students' background, medicine and healthcare are the most represented, which together account for 12 student's academic backgrounds, followed by engineering (6), chemistry (2), economics (2) and computer science (1). The average age of recruited students is 33.74 years.

Figure 1 - Descriptive statistics and frequency distribution of enrolled students to the first intake of xAIM master's

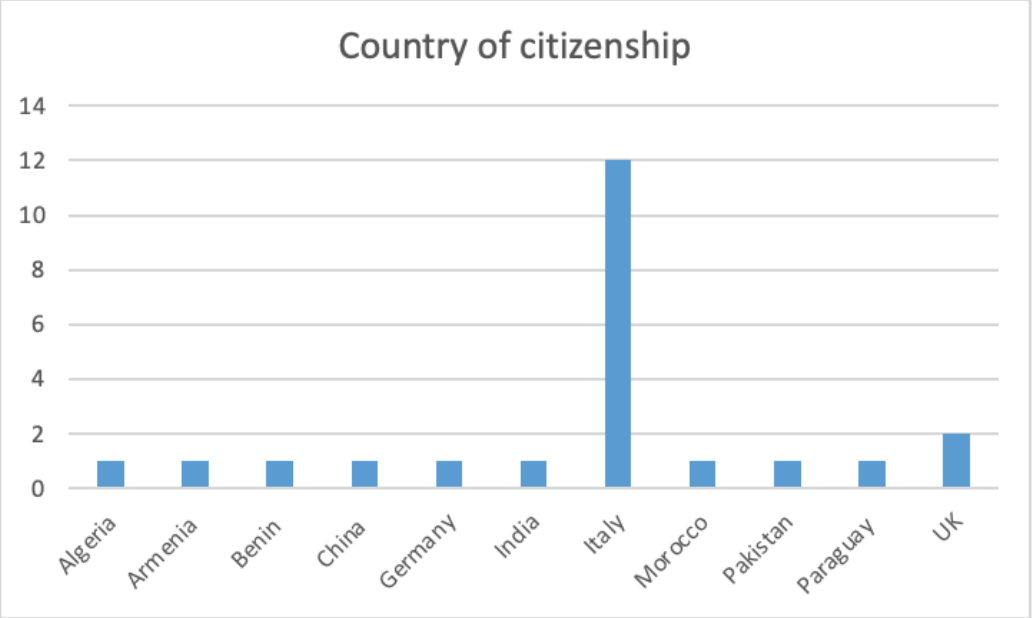
Panel A - Frequency distribution by country of birth

Country of birth	Count of Country of Birth
Algeria	1
Armenia	1
Benin	1
China	1
India	1
Iran	2
Italy	11
Morocco	1
Pakistan	1
Paraguay	1
UK	2
Grand Total	**23**



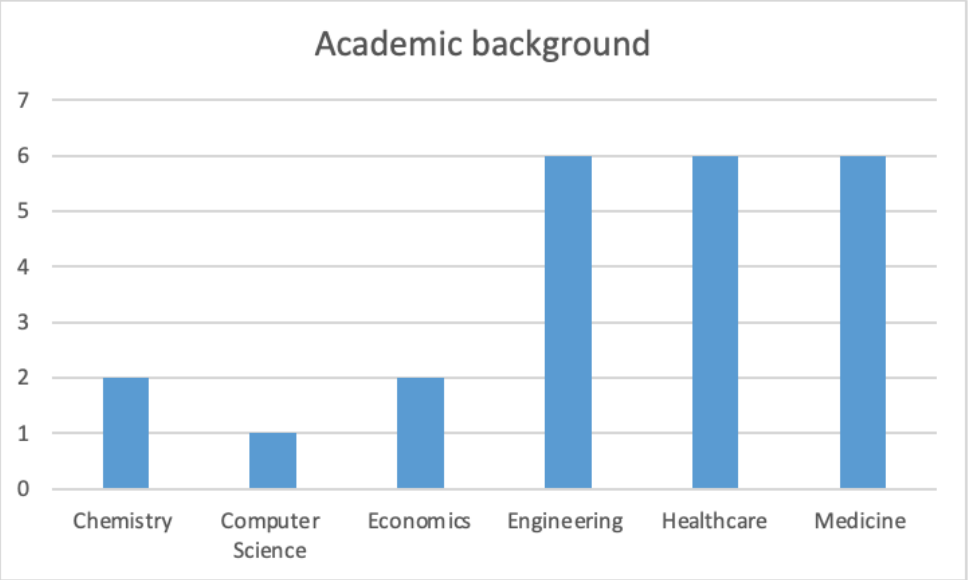
Panel B - Frequency distribution by country of citizenship

Citizenship	Count of Citizenship
Algeria	1
Armenia	1
Benin	1
China	1
Germany	1
India	1
Italy	12
Morocco	1
Pakistan	1
Paraguay	1
UK	2
Grand Total	**23**



Panel C - Frequency distribution by students' academic background

Academic Backgrou	Count of Academic background
Chemistry	2
Computer Science	1
Economics	2
Engineering	6
Healthcare	6
Medicine	6
Grand Total	**23**



5. Overview of the selected elective modules

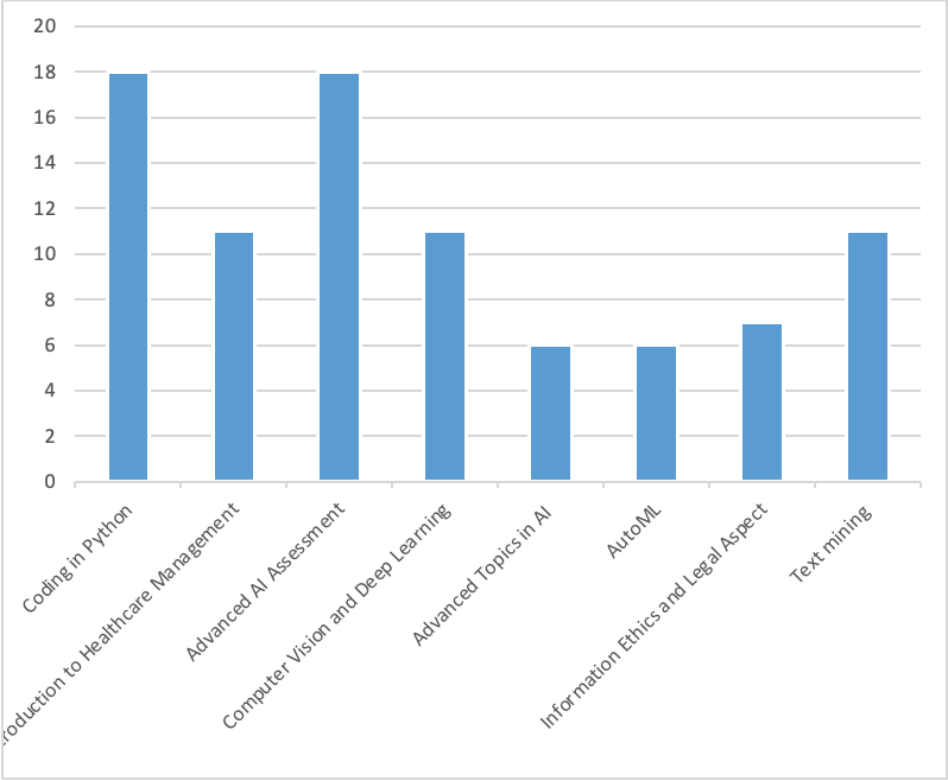
To allow flexibility in their study path, students were offered 6 mandatory courses and 8 elective ones, from which they had to choose 4, in order to complete their study plan.

The list of the elective courses is as follows:

1. Advanced AI Assessment;
2. Advanced Topics in AI;
3. AutoML;
4. Coding in Python;
5. Information Ethics and Legal Aspect;
6. Introduction to Healthcare Management;
7. Computer Vision and Deep Learning;
8. Text mining.

In Figure 2, the frequency of elective modules selected by xAIM students shows that the most preferred elective courses were Advanced AI assessment and Coding in Python (18 students each), while the least preferred ones are Advanced topics in AI and AutoML (6 students each).

Figure 2 - Frequency of the elective modules as selected by xAIM first cohort students



6. Students outcomes

First semester courses ran from February until June 2022, with the exam break from June until July of the same year, whereas the second semester courses ran from September through December 2022, with the second exam break from January until February of the following year.

Students on average scored a final grade of 27 out of 30, with the highest average in the Transforming healthcare and AI and healthcare workforce modules (30) and the lowest average grade in Advanced topics in AI (22). Students were only provided with a pass/no pass outcome in the Coding in Python exam.

To complete their program, students were required to accomplish an internship of 450 hours which is worth 18 ECTS, and the defense of their final thesis in front of the graduation committee.

7. Graduation sessions

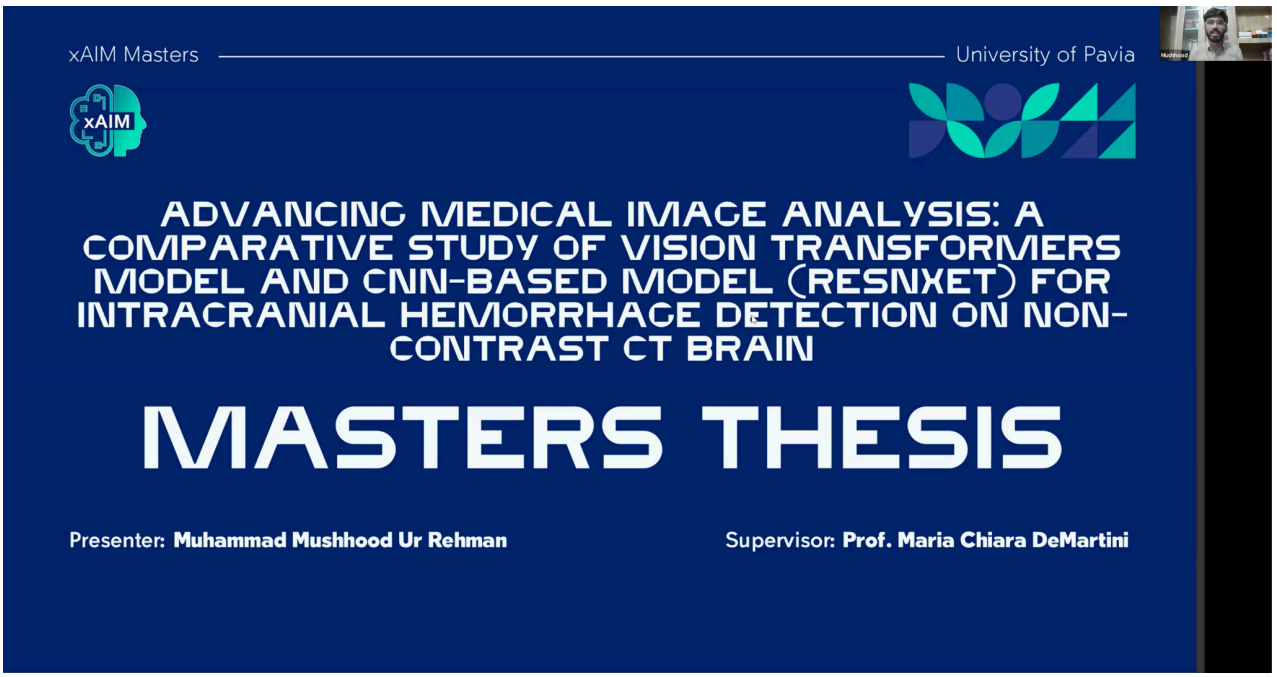
As of 31st October 2024, 20 students from the first xAIM intake successfully graduated in three graduation ceremonies.

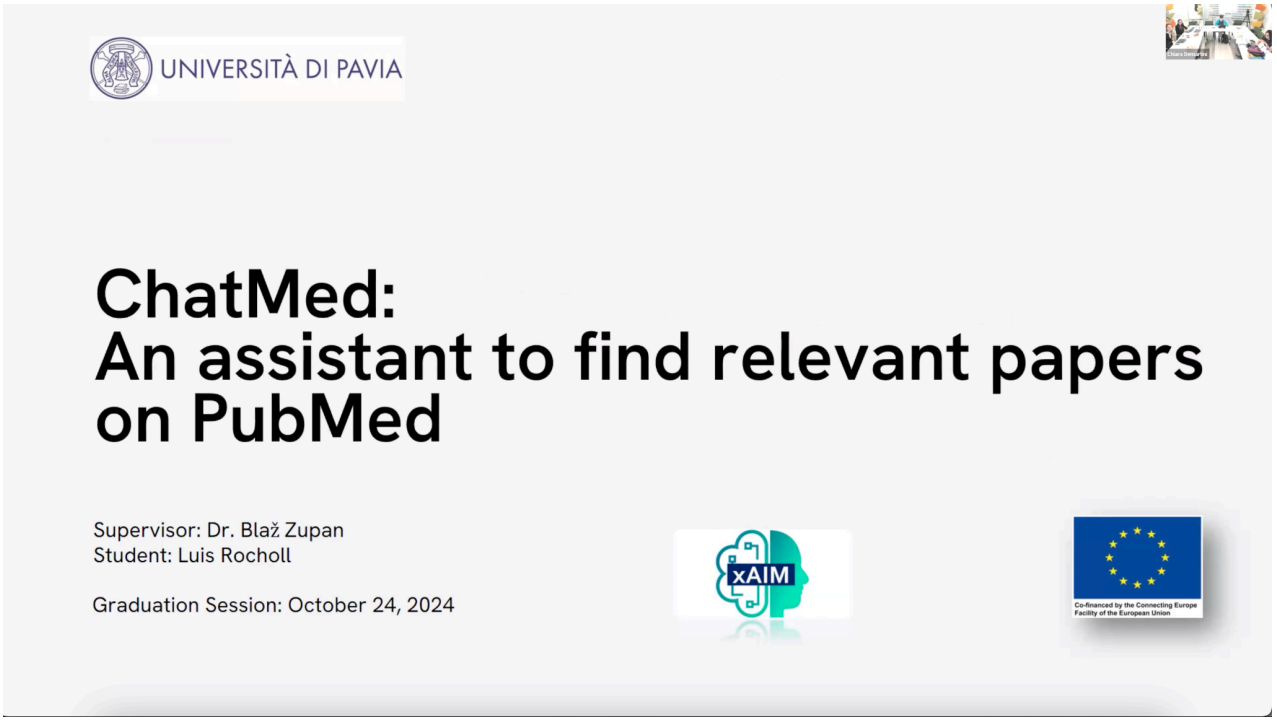
These ceremonies occurred on 23rd April 2024 (Figure 3), 24th September 2024 (Figure 4) and 24th October 2024 (Figure 5) both at the premises of the University of Pavia and online. In the first graduation session, 11 students graduated; whereas in the second and third sessions, 7 and 2 students respectively graduated.

Figure 3 - First xAIM graduation ceremony

Figure 4 - Second xAIM graduation ceremony

Figure 5 - Third xAIM graduation ceremony





The list of some thesis titles is presented below:

- Ethical and Regulatory Challenges of Generative AI in Healthcare;
- Evaluating the potential role of artificial intelligence to reduce the economic burden of cardiovascular disease;

- Investigating Gender Bias and the Intersectionality of Bias in AI and Digital Health Tools: Transforming Diversity Challenges into Business Opportunities;
- Artificial intelligence in robotic rehabilitation;
- Intelligent Signal Processing: an Auto-ML Approach to Noisy Segments Detection in ECG;
- Leveraging Transformer-Based Foundation Models for Decoding Genome;
- XAI ALFABETO: Human Perspective on Explanations for AI Classifications Across Different XAI Techniques;
- Application of AI to Colonoscopy;
- Addressing Trustworthy AI Governance Challenges in Secondary Care: A Systematic Review and Survey;
- Integrating ai and environmental factors in the diagnosis and management of MPOX: an evaluation;
- AI in the use of automated ASPECTS in suspected acute ischemic stroke patients: a radiographer's perspective in our first experience.

8. Conclusions

Students recruitment and graduation for the first intake identified some challenges and opportunities for the following editions of the program. First, the master's awareness is still limited and additional promotional activities could further develop the visibility of the program at the global level. Second, students are usually employed full-time when they start their program. Hence, they might feel under stress throughout the program, and especially during exam breaks. Social contacts among students are limited, inhibiting to some extent student

engagement. Hence, offering the in-presence option for the graduation session was highly appreciated by students. Building from the learning on the first intake of xAIM master's program, future editions could improve student's experience and impact of the training in xAI in the healthcare field.