

ELEMENTS OF AI – BROADENING THE PERCEPTION ON ARTIFICIAL INTELLIGENCE

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Abstract

Nowadays, artificial intelligence is everywhere around us: in our phone, in our tv set, in our car, in applications that sometimes we don't even know they are related to AI. In order to broaden the perception on the artificial intelligence – what is, when is, when it's not – the University of Helsinki and the Reaktor company joined forces and created a free online course: "Elements of AI". Later, the consortium attracted national organisms and created different language versions of the course, this way making the information more accessible across the Finnish borders.

In this paper we discuss the opportunity of the "Elements of AI" course in the European context related to the artificial intelligence and analyse the impact of several national platforms, including the Romanian language platform.

Keywords: Artificial Intelligence, EU initiatives, "Elements of AI" course

1. Introduction

Within the European Union's strategy entitled "Shaping Europe's digital future", the Commission runs and facilitate the development of a series of actions, a very important segment being dedicated to the Artificial Intelligence domain. It's a common effort of EU, together with Member States and private sector, and not least, individual initiatives to ensure the competitiveness, innovation, and growth of the EU.

We could mention here the "A European approach to Artificial Intelligence" initiative based on three pillars [1]:

- *"Being ahead of technological developments and encouraging uptake by the public and private sectors"*, launched in 2018, that allows a significant increase of funding in AI at EU Commission level, under the research and innovation programme Horizon 2020;
- *"Prepare for socio-economic changes brought about by AI"*, refers to labour and education policies in the Member States through a set of measures;

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- "Ensure an appropriate ethical and legal framework".

The "Coordinated Plan on Artificial Intelligence 'Made in Europe'", launched in December 2018, was aimed to support the common effort of the European States in boosting AI in Europe.

Also, the General Data Protection Regulation (GDPR) was an important step in the struggle to ensure fair and thrustable digital environment. The following step was the "Communication on Building Trust in Human-Centric Artificial Intelligence", initiative launched by the EU Commission in April 2019.

The AI White Paper, launched by the EU Commission at the beginning of 2020, as a public consultation action meant to assure an appropriate ethical and legal framework for AI in Europe [6].

A group formed with 52 experts on Artificial Intelligence (AI-HLEG) (academic, civil society, and industry representatives) was selected at EU level, in order to assure/mentor/coordinate the progress of the EU "Shaping Europe's digital future" initiative with respect to Artificial Intelligence [3]. As deliverable of the AI-HLEG commission: the "Ethics Guidelines on Artificial Intelligence" (2018) [4] and "Policy and Investment Recommendations" (2019) [5] can be mentioned.

AI Watch is a service created by EU for monitoring the evolution of AI and measure its impact for Europe [8]. The instrument monitors the AI segment through different perspectives: social or public sector perspective, key enablers, education and skills, s.o. Another important achievement of AI Watch is the "AI Landscape 2009-2018", a report on Artificial Intelligence at EU level [7].

2. The Finnish initiative

In the second half of 2019, holding the EU presidency, Finland announced the launch of a campaign by which 1% of Europeans would be taught fundamentals of AI. They targeted over five million people, and the instrument was an online course. They promoted "Elements of AI", created by the University of Helsinki, Finland (UoH) and a private company Reaktor, the course being already of an impressive success in Finland.

The rapid success of the course led to a global roll-out: it continued to be taught in various languages with the collaboration of different national organizations: in February 2019, Sweden became the first country that had a platform in national language. Next, Latvia and the University of Amsterdam in the Netherlands joined the project.

In the beginning of 2020, the Tallinn University of Technology joined the project as well and challenged some 20 Estonian companies to complete the course with their employees within the initiative "Accept the #AIchallenge". [10]

"The elements of AI" course has two parts: "Introduction to AI" and "Building AI". The first part is dedicated to all people, not requiring technical preparation of any kind. It is divided in six chapters [1]:

- What is AI? – introduces the concept with some practical examples of artificial intelligence from the real-world. The most important features of AI are defined. A list of fields where AI proved its utility is presented, also the taxonomy of the domain is described. In the end of the first chapter, some philosophical issues related to the AI are debated.
- AI problem solving – most common methods used in AI are introduced: searching through a space of states and the importance of game theory throughout the history of AI, defining strategies and specific methods.
- Real world AI – introduces uncertainty, presents mathematical concepts used in classification algorithms, such are: odds and probabilities, the Bays rule/formula and naïve classification based on Bayes rule.
- Machine learning – presents the types of automatic learning from data, such are: supervised learning, unsupervised learning, and reinforcement learning used to perform classification of data (predictions, clustering). Regression is another important way of describing relations between data.
- Neural networks are very useful in fields like natural language and image processing. The structure of a neuron is described, how neurons are interconnected, functionalities of artificial neural networks, examples of classifiers based on neural networks. Multilayer networks, the activation functions, and learning rules such as the backpropagation algorithm are debated. Also the Generative adversarial networks (GANs) are introduced.
- Implications. The last chapter of the first part is dedicated to various aspects of using artificial intelligence, such implications are various kinds of predicting the future, or ethic aspects in which the usage of AI played a role.

The second part of the course, "Building AI" is addressed to three levels of readers: beginners, intermediate, and advanced, i.e. from a general user to a user who has programming skills (Python programming language). It consists in five chapters:

- Getting started with AI
- Dealing with uncertainty
- Machine learning
- Neural networks
- Conclusions

The second part of the course is also a free course but getting a diploma in this case requires a small fee.

3. Impact of the Finnish initiative

In three years of activity, the course "Elements of AI" reached over 750.000 students. One important measure which led to this result was launching platforms in different languages, with the support of different national organizations. In this section, we study the impact at national level. Data analyzed is extracted from the redash.reaktor.education platform.

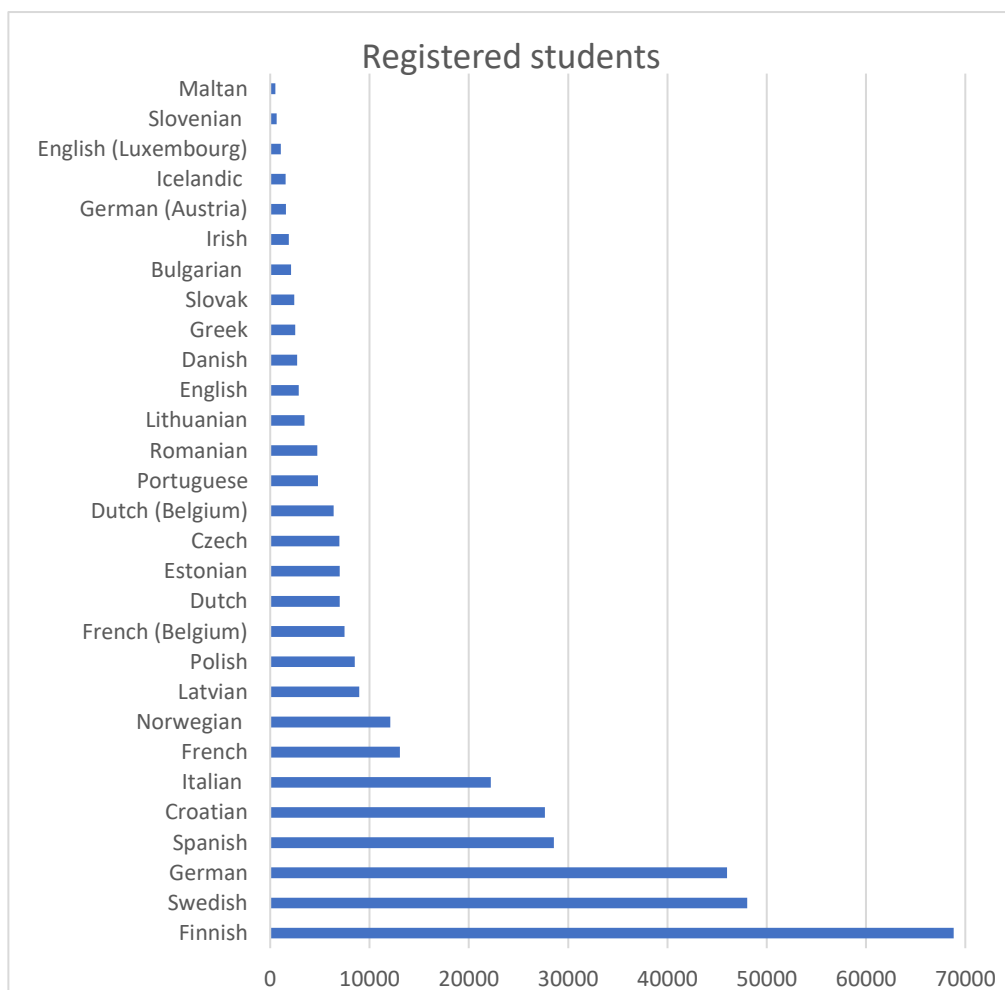


Figure 1. Registered students at the Elements of AI course (made by the authors with MS Excel, using data from redash.reaktor.education on 23.11.2021)

It can be noticed that almost 70.000 students are enrolled in the Finnish version, while in Slovenia and Malta are less than 1000 enrolled students. Also, it is worth mentioning that,

according to the Finnish statistics, more than 40% of the enrolled students are women, and even more: in the Nordic countries the percentage increases to almost 60%.

In its desire to spread the AI knowledge and awareness, the Finnish consortium attracted national organisms to create local versions/language of the course. An important number of students registered in the national versions. The table above refers to students who have enrolled either in the mother-tongue platform, or the English version, but they are residents of that specific country. The table below refers to students who enrolled in the national platform:

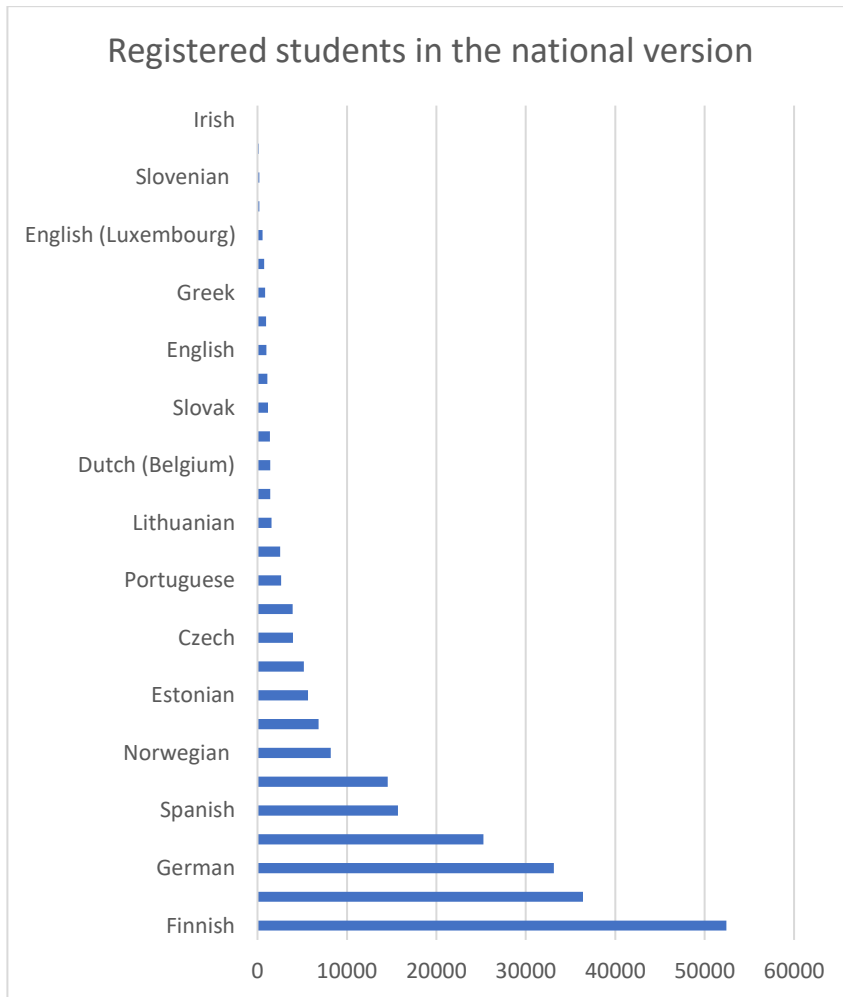


Figure 2. Registered students in the national versions of the course (made by the authors with Ms. Excel, using data from redash.reaktor.education on 23.11.2021)

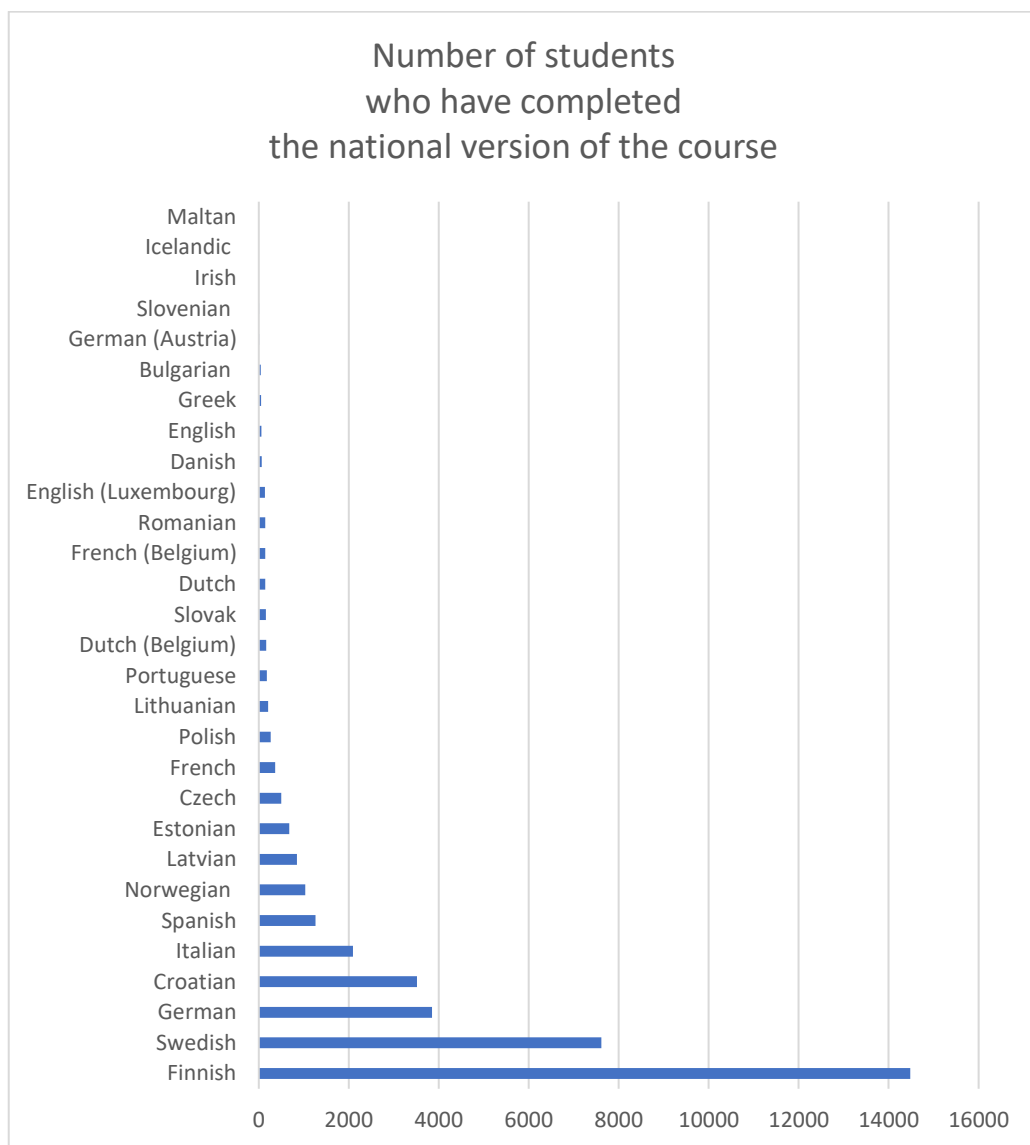


Figure 3. Number of students who have completed the national version of the course (made by the authors with Ms. Excel, using data from redash.reaktor.education on 23.11.2021)

Finland, the leader of the initiative, is also the leader regarding the number of students who completed the course in the national platform: more than 14.000 students got the Elements of AI certification. Meanwhile, in Austria, Slovenia, Ireland, Iceland and Malta, the number of graduates is still reduced.

The impact of using a national platform can be sustained with the next chart that illustrates the evolution of the number of enrolled students in Romania:

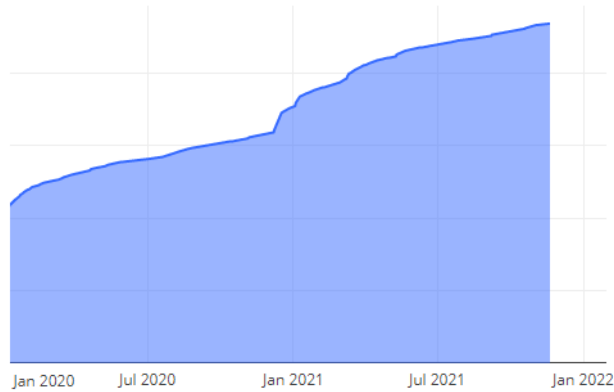


Figure 4. Enrolments in Romania in the last 2 years
(source: extras form redash.reaktor.education, 23.11.2021)

In December 2020, the Romanian project started: the Finnish consortium: the University of Helsinki together with Reaktor joined forces with Romanian partners: Romanian-American University and Bucharest.AI and they launched the Romanian version of the course. The impact of the launching event can be noticed in the above chart: in less than a month, the number of enrolled students increased by more than 10%. Also on the long term, the result is significant: the number of enrolled students significantly increased from around 3200 in December 2020 to almost 4500 in the next 6 months after the launch.

If we consider the overall figures, we can notice that only 23% of the registered Romanian students chose to have the course in Romanian, compared to the average of 65% for the other countries where the course has been launched.

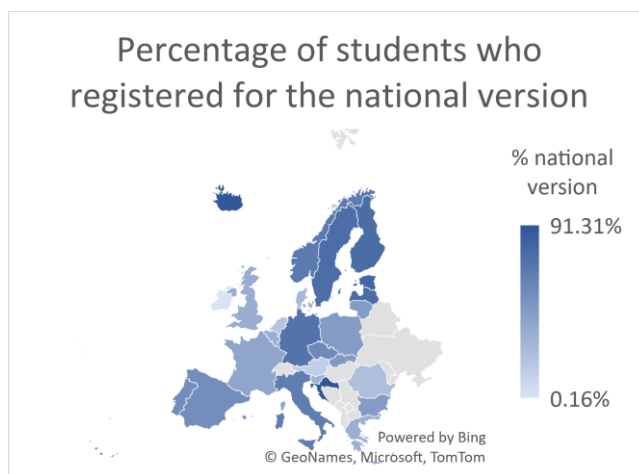


Figure 5. Percentage of students who had chosen the national version
(made by the authors with Ms. Excel, using data from redash.reaktor.education on 23.11.2021)

On the other hand, if we consider that out of the 1700 new enrolments after December 2020, more than 1100 students preferred to have the course in Romanian, we can conclude that the overall impact of the launching event for Romania was much higher and the preference for the Romanian version is dominant.

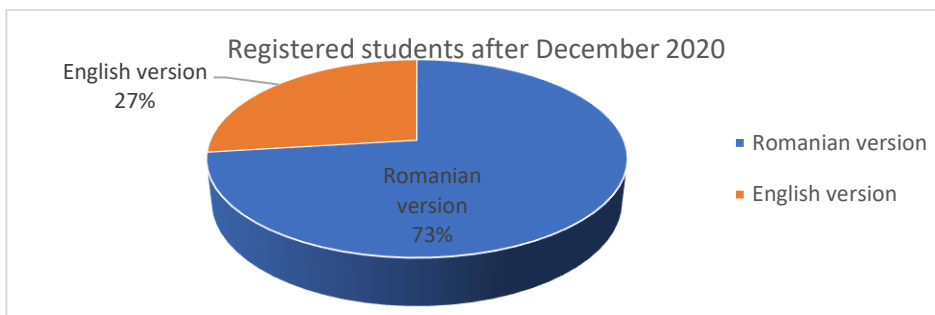


Figure 6. Percentage of students who had chosen the Romanian version vs. the English one
(made by the authors with MS Excel, using data from redash.reaktor.education on 23.11.2021)

If we analyze the completion rate of the course for Romania, the percentage of Romanian students who have finished the course is only 9.2% (in either the Romanian or English version), which is much lower than the overall average of 16.6%

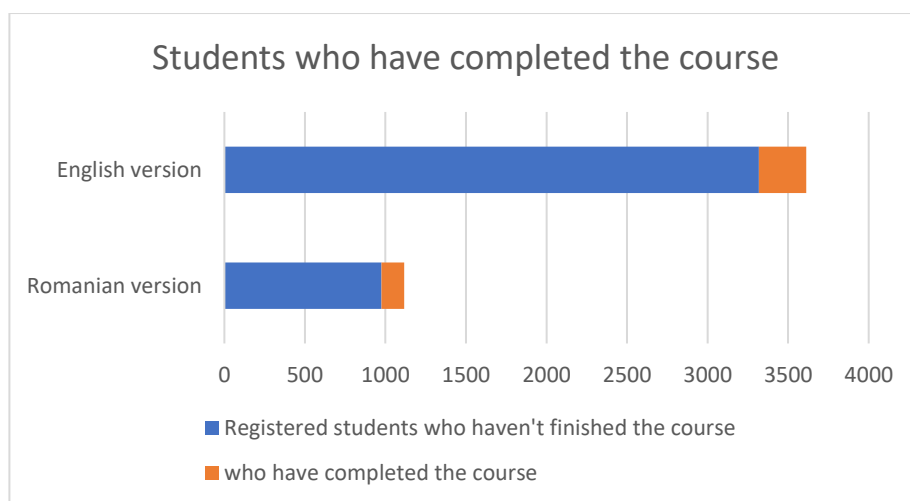


Figure 7. Romanian students who have completed the course
(made by the authors with Ms. Excel, using data from redash.reaktor.education on 23.11.2021)

However, we can notice that the rate of completion of the Romanian version (12.6%) is higher than the one of the English version (8.1%) that the Romanian students took. This comes to emphasize the positive impact of launching the platform in Romanian.

4. Conclusion

In the context of Finland's Presidency of the European Council between July and December 2019, and in line with its priorities to invest in citizens skills and knowledge, Finland has set the ambitious goal of teaching 1% of Europeans the basic concepts of Artificial Intelligence, through the free online course "Elements of AI".

The course, designed and developed by the University of Helsinki and the technology company Reaktor as a MOOC (massive open online course), was initially launched in May 2018, with the goal of reaching 1% of the Finish population. The course proved to be a real success and the goal of training 1% of the Finns (about 55.000 people) in the basics of AI was achieved in just a few months.

The initial success of the course in Finland led to the idea of spreading the AI know-how outside the Finish boarder; this, combined with the opportunity of Finland's Presidency to the European Council, created the context of launching the course in other languages, to make it available to all Europeans.

The course is available in English for people worldwide, so far reaching over 750.000 people from 170 countries [13]. But in order to reach the European objective of educating 1% of the population in the AI basics, the course had already been translated to almost all official EU languages (except Hungarian), as well as Norwegian and Icelandic. The translation has been provided by the European Commission. The efforts of Finland did not stop here. For a higher impact, the University of Helsinki and Reaktor collaborated with local partners to prepare launching events in different countries and increase the visibility of the course at local level.

For Romania, the launching event took place in December 2020, with the involvement of the local partners the Romanian-American University and Bucharest.AI. The launching event was a success, in less than a month the enrolled Romanian students increased by more than 10%. We also need to mention that the Romanian version was preferred to the English one, almost three quarters of the students chose to take the course in Romanian, once this version was available.

Even if the objective of reaching 1% of the Europeans (about 5 million people) by the end of 2021 is far from being reached, the Elements of AI is undoubtedly a success, managing to broaden the perception on Artificial Intelligence by "demystifying AI".

References

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(All online resources were retrieved in November 2021)