Titre : ***Teaching Artificial Intelligence to High School Students: An Exploratory Didactic Approach in the Context of Immersive Learning Programs at the Futuroscope***

Description :

This thesis focuses on teaching artificial intelligence (AI) concepts to high school students. It is part of the I²School project, which aims to develop educational activities on AI within the framework of immersive learning programs. The challenge is to explain advanced algorithms and their mathematical foundations in ways appropriate for secondary-level students. The doctoral research also aims to analyze the practical application of AI knowledge, closely tied to questions of mathematics and computer science didactics. This work sits at the crossroads of computer science, mathematics, and educational sciences.

The I²School project was selected in the second wave of the AMI IFS initiative on July 4, 2023, which funds part of its action plan over five years. It is led by the GIP FCIP of the Poitiers academy in collaboration with partners such as the Vienne Prefecture, the Poitiers Rectorate, the Vienne Department, the Futuroscope, the University of Poitiers, Réseau Canopé, IH2EF, ISAE-ENSMA, VR Connection, SEMPAT 86, CRITT Sport-Loisirs, and private companies like Samsung France, Idruide, Easytis, and Vittascience.

The I²School project focuses on several goals:

- Promoting digital citizenship education (covering topics such as AI, ethical and sustainable digital practices);
- Teaching robotic programming;
- Developing cognitive science skills related to learning principles ("learning how to learn").

The project incorporates a physical embodiment of the “school of the future” within the iconic pavilion at the Futuroscope, under the Campus Numeria initiative. By hosting school groups in immersive learning programs at the Futuroscope, the project aims to reach 10,000 young people annually from across France.

On the scientific front, the University of Poitiers engages several research laboratories to support the design of student learning pathways. This doctoral work fits into this context.

Currently, the available literature provides either "general public" content on using AI-based solutions or highly technical material accessible only to professionals. However, there is a strong societal demand, particularly in education, to introduce students to computer science and AI. The goal is to develop computational skills that enable young people to understand the implications of AI in their personal, professional, and civic lives.

AI, rooted in both computer science and mathematics, requires identifying which aspects can be made accessible to high school students and how to effectively teach these concepts. This research will result in the design of educational pathways enabling high school students to understand the underlying principles of selected AI methods, as well as their computational implementation and societal impacts.

The study will address the following questions:

- Among the variety of existing AI methods, which are most suitable for high school education?
- What mathematical and computer science knowledge is required for understanding these methods?
- How can these concepts be made accessible to students?

The research will build on work related to computational thinking (e.g., [1-2,6]) and programming education (e.g., [3-5]). It will also draw on approaches to AI education in higher education (e.g., [7-9]) and non-formal contexts such as science communication activities without computers (e.g., [10-11]). Additionally, the research methodology will take inspiration from studies in computer science didactics conducted in various contexts (e.g., [12]).

This project offers a unique application framework and significant opportunities, including access to advanced technological resources not typically available in traditional classrooms. It also provides a rich context for evaluating the educational approaches implemented.

Candidate Profile: The ideal candidate should have a strong foundation in computer science, ideally with expertise in machine learning, as well as a keen interest in digital citizenship education and pedagogy. The candidate must demonstrate adaptability and communication skills to work at the intersection of multiple research communities (computer science, mathematics, and education sciences) and with educators and students involved in testing the proposed activities.

Hosting Laboratories:

XLIM (Poitiers) with LINE (https://line.univ-cotedazur.fr/)

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Start date : dès que possible

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