

Integrating AI in Education and Training: How much is known about AI algorithms?

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Abstract:

The interest in the development and application of Artificial Intelligence (AI) models, supported by algorithms, in Education and Training has increased in recent years. This field of development is positioned as the next major research area complementing use of digital technologies to improve learning. AI presents several types of algorithms, which process data or structured information through ontological search, optimization and/or other methods. This concise paper addresses the essence of AI algorithms and analyses and describes possible applications and developments of these tools in the teaching strategies due to the different characteristics of each family of AI algorithms. It is intended to alert educational researchers about the possibilities of the AI tools to match the teaching needs.

AI has become a frequently used term in audiovisual media, conferences, debates, political and economic events. In fact there is no real intelligence but algorithms that mimic the human standards of practice and brain processes. For example, a thirty year old software that optimized a reinforced concrete frame design was AI?. It was a structural optimization program, but in the current context it could be classified as an AI program. It ends up defining autonomously (it is artificial?), without any user intervention, the choice of the best solution (is it intelligence?) among many possible acceptable solutions (Soeiro).

Some so-called AI programs are known for being free and easy to use. ChatGPT is an example of an application based on the architecture of linguistic models (LLM) that respond to a wide variety of simple or complex questions (Openai). ChatGPT uses a reinforcement learning algorithm called Proximal Policy Optimization (PPO) to emulate human behavior, taking into account a database composed of various texts and previous interactions with users. It is basically an optimization algorithm that minimizes error in the response. As shown in Figure 1, there are other types of algorithm models besides the LLM (Symbolists) like the Analogizers, Bayesians, Evolutionaries and Connectionists (Domingos).

Analogizers algorithms are based on the formulation of a function to be optimized and the constraints imposed on the solution and use optimization methods. Bayesians algorithms are probabilistic methods that use networks to determine the best solution considering the relationships between the different options. Evolutionaries algorithms use genetic algorithms to find the best solution. Connectionists algorithms use the maximum gradient method to find the best solution.

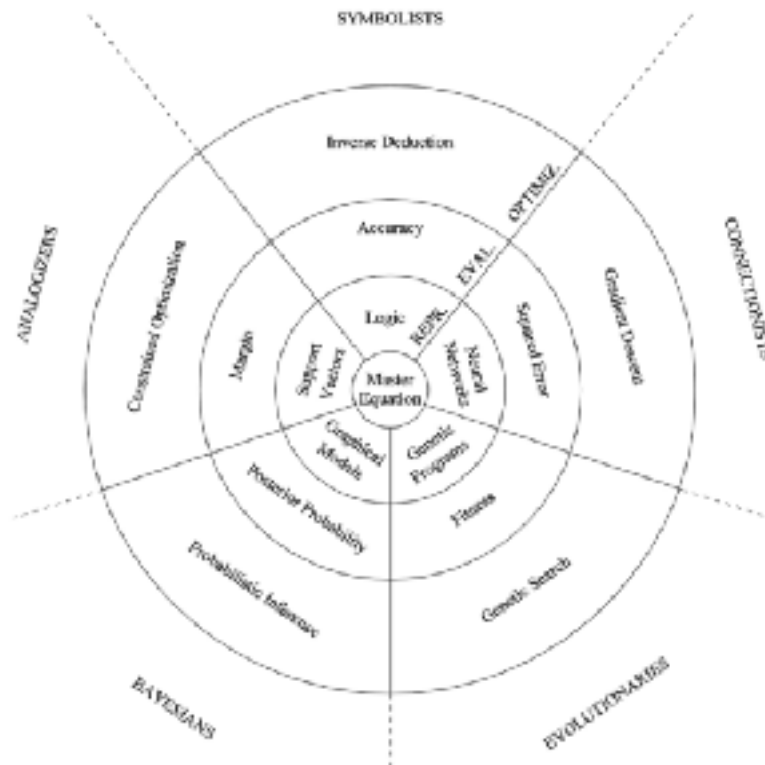


Figure 1: Different types of AI algorithms (Domingos)]

Therefore, effective and efficient uses of AI tools in teaching need to choose the right AI tools in accordance with the context of the intended learning. Teachers and learners need to consider data available, the expected learning outcomes and indicators, the evaluation methods and the learning styles of the learners. There are not many commercial AI tools developed explicitly to improve learning or teaching. More dedicated research is needed to assert the possibilities of each type of AI tool in learning. At the moment some teaching functions are being replaced by AI tools, like assessment of learning and mentoring of learners.

Keywords: AI, algorithms, learning, teaching, ChatGPT, assessment.

References

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