Byte-sized edtech research

Augmenting human decision-making in education

Fig. 1: Using AI to augment human decision-making in education

Human Decision-Making

Augmented Decision-Making

- In many professional areas there are still debates about when and where AI technologies are appropriate for use, or indeed whether they are appropriate at all (Floridi et al., 2018). Education is one of the areas in which AI technologies and their impact is currently not fully understood.
- Although AI can be used to internalise or extend human cognition, in AI research the purpose is often to externalise human cognition, and create machines that can mimic or replicate human behaviours (Vold & Hernandez-Orallo, 2019).
- Cukurova et al (2019) argued that perhaps a more appropriate role for AI in education is to provide opportunities for human intelligence augmentation.
- In 2019, Cukurova et. al did a case study of debate tutoring, the aim of which was to develop a potential approach to using AI in the service of human decision-making, rather than using AI to fully automate the decision-making process itself.
- On recruiting candidates for a tutor role at an educational institution, the study recorded discussions and evaluations conducted by the expert tutor interviewing panel, and revealed that many candidate skills were judged through an intuitive decision-making process, where expert tutors relied upon their own experience and observational clues.
- When questioned on what they thought made a good tutor with respect to the candidates' 'social and emotional skills' (a domain identified as essential by the recruitment team), the expert tutors struggled to even define these terms.

Table 1: Expert tutors' interview notes on potential candidates

Notes taken by expert tutors to justify their scores on '**social and emotional skills**' of the observed candidates:

Energetic, engaging, good sense of humour, good audience interaction, not inspiring, very confident, academic, friendly, nice and fun, teaching-oriented, cool vibes, needs more interactivity, kids will like her, seems socially awkward, controlled the class well, very interactive, good commitment and effort, a bit shy, high energy, authoritative, sweet

- Within the contexts of poorly-defined educational constructs, humans find it very hard to untangle our knot of knowledge, skills, emotions and perceptions, due to our intuitive nature.
- Decision-making processes in computing systems, however, are analytical by definition. In these systems, it is possible to trace multiple inputs whatever the source, and to understand what scores are given to each calculation, and to what extent they have contributed to the decision-making process overall.
- The authors of the study therefore believe that identifying the synergies between machines and human cognition would further reinforce a 'subservient' role of AI in education, allowing AI to assist human decision-making, rather than replace or mimic it.

01 Decision-making processes in humans

Different mechanisms are suggested for the process of decision-making (Evans, 2008). There is, however, a consensus about the process nature of it.

Broadly, there are two categories: one is mainly associated with heuristic processes that operate autonomously and automatically (Kahneman & Frederick, 2002). These are processes that function without conscious control and cannot easily be accessed for inspection. Furthermore, they can process multiple pieces of information in parallel (Betsch & Glöckner, 2010).

The other category is mainly associated with analytic processes, that are, in contrast, performed step-by-step. The sequence and direction of these processes can be deliberatively controlled, and the individual is consciously aware of performing these processes and thus able to reflect on them (Betsch, 2008).

Intuitive decision-making is faster and less effortful, but as a result, it is subjected to decision biases, which makes the outcomes suboptimal or simply wrong (Evans, 2003; Kahneman, 2003).

Analytical decision-making is slower, more deliberative, reflective, has more normative outcomes (Evans, 2003), and is able to guard us against biases in intuitive decision-making (Kahneman & Frederick, 2002).

02 Educational constructs

In education and training settings, some constructs, particularly those that relate to so-called 21st-century skills, and/or social and emotional learning, are neither well-defined nor are they widely understood.

Concepts such as creativity, empathy, self-awareness, social awareness or ethical responsibility can all be considered as ill-defined constructs. Even some fairly well-defined, studied and understood constructs, such as collaborative problem solving (CPS), when considered as generic skills, are extremely complex skill sets (Scoular, Care, & Hesse, 2017). They should be considered as "a bundle of skills, knowledge and abilities that are required to deal effectively with complex and dynamic non-routine situations in different domains" (Funke, Fischer, & Holt, 2018, p. 42). Therefore, it is safe to assume that educators sometimes find themselves in situations where they cannot help but make intuitive decisions when evaluating such complex constructs.

03 Data-informed decisions backed by AI

With regard to the Cukurova et al. (2019) debate tutoring case study, one candidate in the interviewing process, 'Jane', was scored initially by the expert tutor interviewing panel. The qualitative notes taken by the expert tutors to justify their decision on the social and emotional aspects of tutoring were very intuitive and were not detailed enough to provide Jane with appropriate feedback, nor were they explicit enough for the expert tutors to reflect upon their own decisions.

In this case, using an AI-informed multimodal model in the process helped examine these specific human intuitive decisions, and proposed possible explanations about Jane's previous experience and personality data that had contributed to her scoring. Predictions from the model alone scored Jane differently to the expert tutors, but after including an audio analysis of her performance, she was scored the same.

The explicability, embedded in the analytical nature of some of the models built, provided the human evaluators with the opportunity to track and monitor each factor's contribution to Jane's scoring decisions. Additionally, Jane's level of arousal in parts of the interview, for example, as spotted by the audio analysis, could have been utilized as a feedback tool for Jane to reflect upon her future performances and potentially better regulate her emotions in similar contexts.

Conclusions and implications for practice or policy

Although AI is currently available and used to automate evaluation tools in education systems (Moser, 2015), the value of using it for this alone is questioned (Baker, 2016). Augmenting human cognition may be a more appropriate role for AI in education.

In Cukurova et al. (2019)'s case study on debate tutoring training, it was shown that the transparent classification models can potentially support the intuitive decision-making processes of expert tutors when evaluating other tutors. Such transparent modeling approaches, particularly when they are combined with other more "aggressive" AI techniques to model complex data sources, can yield more informed reflection and feedback opportunities for learners and educators. However, there is currently limited work in this space.

We need more work to explore the ability for AI-human complimentary systems to cope with the complex social contexts in education.

Implications for practice and/or policy:

- One potential role for AI in education is to support advanced reflections and feedback on human decision-making processes, rather than automating them.
- Computer models can give educators the opportunity to reflect upon their complex decisions and provide learners with more advanced feedback, particularly with ill-defined educational constructs.
- Multimodal data collection and analysis is suggested in investigations of complex educational constructs.