Digital Ethics Canvas 2023 - Software Design version - C. Hardebolle, V. Macko, V. Ramachandran, A. Holzer, P. Jermann

Context

□ In which context is the solution evaluated?

Embedded into an ITS to tailor education and learning material to each student

Embedded into an ITS to inform instructors of the students' learning gains

Beneficence

□ What are the expected benefits of the solution in this context?

Presenting students with questions or material they do not know to maximize learning gains

Presrnting instructors with learning status of each student to aid in intervention or improving teaching strategies

Non-maleficence

Risks	Mitigation
□ e use in ards p	Presenting material to students prematurely before they have learned the material and thus harming them
Confusing instructors into falsely thinking that students have learned a material, or vice versa	
□ cts c solution have?	
□ ctions does the solution h or misuse?	
Confidence scores can be provided, but not an ultimate solution	

Privacy

Risks	Mitigation
□ What data does the solu	The ITS must take care of data protection, but students can be still identifiable by their answering patterns -> we suggest an offline training on previously-collected and permitted data
Tracking student answers to questions over time, with access for instructors (must be accompanied with permission)	
□ sonal □ o the □ otecte □ disclo disclose private informatio	

Fairness

Risks	Mitigation
□ the s □ es m s? □ of th □ use □ cont discrimination against pe	Training on a certain context and region (database course in an Australian university) is not necessaily generalizable to other cultures and regions; using more datasets is needed
People with no access to ITS or weak internet connection may solve exercises offline, thus not helping the models in their inference and not benefiting as well	

Sustainability

Risks	Mitigation
□ What is the carbon footprint of the solution?	Human instructors should still evaluate all model responses on a case-by-case basis, accompanied with confidence scores, to avoid possible harms
□ What types of resource duce	
CO2 & water for training + inference	
□ an lab	

Empowerment

Risks	Mitigation
sta lim ma n th and how?	Not agreeing to provide information can reduce learning gains due to unpersonalized learning (can be partly solved by offline inference)
Automatic material selection in ITS limits users' autonomy and how they choose their material	
□ a	Deep networks are not explainable; transparent explanations on how the models work and their limits are necessary

Solution

□ What are the characteristics of the solution under evaluation?

ML models to trace the knowledge of the student over time, predicting the next answer of the student to the next question given previous answers