

## Machine Intelligence and Higher Education

A large survey of experts in artificial intelligence (AI) recently suggests there is a 50% chance of AI outperforming humans in all tasks within 45 years [1]. In our lifetime, more and more human jobs today will be lost to robots with machine intelligence. What will Applied Sciences and Arts curriculum look like at the end of the 21st century? How are we going to teach 50 years later? What impact and implication of machine intelligence to higher education?

Machine intelligence has entered a new stage of development after more than sixty years of evolution. New breakthroughs and new results have been accelerated in various application fields including transportation, health, finance, and the military, coupled with technical advances in big data intelligence, deep learning, quantum computing, multimedia intelligence, multi-agent intelligence, brain-computer interface, and autonomous intelligent systems. A recent example is a computer beat the world's top professionals at one-on-one matches of Dota 2 game under standard tournament rules. With the advancement of brain science and computer hardware, machine intelligence has become a new frontier of science and technology, a new engine for economic development, and a new opportunity for Applied Sciences and Arts faculty and students. We are seeing profound changes in the way business work with high-level machine intelligence. This paper is concerned with the nature and role of machine intelligence in education, focusing on post-secondary education in the fields of applied sciences and arts.

Disruptive changes to learning methods and learning models will have a profound impact on the higher education landscape over the second half of the 21st century. Many of the major drivers of transformation currently affecting global industries are expected to have a significant impact on university teaching. Among others, smart teaching assistant (STA) and intelligent tutor system (ITS) are two noticeable applications of machine intelligence. STA will help professors prepare lectures and grade student homework. ITS can track the mental steps of the learner during problem-solving tasks to diagnose misconceptions and estimate the learner's understanding of the domain. It can provide timely guidance, feedback and explanations to the learner and can promote productive learning behaviors. It can also prescribe learning activities at the level of difficulty and with the content most appropriate for the learner. Individualized learning will become common practice and assessment of learning and customized tutoring will be the most important jobs of university professors.

[1] Katja Grace, et. al, When Will AI Exceed Human Performance? Evidence from AI Experts, arXiv:1705.08807, May 30, 2017, <https://arxiv.org/abs/1705.08807>.

[2] Jim Grossman, Imagining Ph.D. Orientation in 2022, The Chronicle of Higher Education, accessed August 31, 2017.