42611 - Theory of science in engineering

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Assignment 4
Ethical Assessment of R&I in Engineering

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Assignment 4a: Ethical dilemmas in research

Ethical dilemmas are hard, as ethical commitments to all stakeholders should be fulfilled. If for some reason full ethical commitment to all is not possible, for example with a dilemma, stakeholders should be prioritized based on the situation.

Although it should depend on the situation, my opinion sways very often towards the greatest commitment to the public. The reason is that the public often involves a larger amount of people. If integrity breaches are inevitable, I think they should affect the least amount of people with the least ulterior motives.

Despite the funder being the reason for enabling a research project, I often feel the least ethical commitment to the funder. I find the funder to have the most amount of ulterior motives, such that research projects are only funded with a wish for specific results to be revealed.

These opinions are a product of an uncertain trend that I've observed the most, therefor the situation should be emphasized a lot when deciding upon prioritizing ethical commitment. Different scenarios would produce different prioritizations based on the situation and severity of the integrity breach. But bottom line is, that ethical commitment neglect should be avoided if possible.

The following fictitious scenario capture how I feel a greater commitment to the public and the least to the funder.

Scenario

An online social media platform company has funded a research project, to quantify the effects of its advertisement services. The company expects substantially noticeable sales increases from its advertisement. however, the results of the research reveal negligible positive effects. Publishing the results will very likely have a damaging effect on the social media platform, hence a wish to withhold or diffuse the results is made.

Without the funding, the results would never have been produced, should the results be withheld or diffused?

In this case, the public should be prioritized. To uphold research integrity, the researcher has the right and the duty to publish their results to the scientific community, relevant professionals and the public. Withholding or diffusing the results breaks the integrity by not having transparency or honesty with results and conclusions.

Assignment 4b: Ethics framework

Emerging technology

Text-To-Speech machine learning (ML) technology is steadily becoming more advanced, so advanced in fact that an open source project is now working to imitate an actual person's voice. The project works of Dan Ruta: xVA-Trainer and xVA-Synth are software projects that can train machine learning models which can then replicate the voice reminiscent of the voice which the model was trained with. The technology can with a good dataset and hardware, produce voices that are very easy to recognize and understand from the source voice. The produced voice is also quite natural sounding but is usually easy to identify as generated. The intended use of the project is to train and synthesize video game character voices, to be used in modded versions of games.

Benefits

The main benefit of the technology is to enable quickly produced and affordable voice lines for modded games like Elder Scrolls: Skyrim and Fallout. Skyrim and Fallout are story-driven games with an abundance of dialog in the form of text. The technology enables mods that replace the textual dialog with voice-lined dialog. Besides the production of voice line audio in modded games, it can potentially be used in regular small to large-scale game development. A voice model can be trained once, and then used to generate voice lines. This could potentially cut down voice line development costs, especially for the types of games with an abundance of dialog. In the same manner, audiobooks, presentation videos and other types of content like youtube videos could also potentially benefit from this technology. These benefits are deemed pretty substantial and very likely to happen.

Extrinsic concerns

With the ability to imitate a voice, a potentially concerning dual-use arises. It would become easier to record and train a voice model from a person unwillingly, which could then be used to generate speech with that person's voice. This dual-use could lead to identity theft issues.

With the advancement of naturally sounding text-to-speech ML technology, laws related to verbal speech should be revisited. Verbal agreements are binding and could become easy to fabricate with the technology.

There is also an indirect environmental concern related to advancement in text-to-speech ML. There is a pretty hefty computing cost involved when training a voice model. A rough estimate for a model training is as follows: dataset with 800 voice lines averaging 5 seconds, it takes approximately 3 days of full throttle for an RTX 2080TI NVidia graphics card. An RTX 2080TI NVidia graphics card consume about 277W [1]. $277W * 72h = 19944Wh = 71.79MJ$

If the energy used to power model training is not exclusively from sustainable green sources, it is a reason for concern. Although 71.79 MJ can be considered insignificant, in case the technology becomes widely used then the effect is compounded.

Power analysis

The technology empowers those with access to high-grade graphics cards or high-performance computing power and an objective to acquire voice lines fast and cheaply.