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Ethics: Why Software Engineers Can't Afford to Look Away

Brittany Johnson and Tim Menzies

From the Editors

Some people shy away from discussing ethics, believing it's not in the domain of software engineering. We want to steer the conversation in the opposite direction, and this column explains that such ethics-based discussions are crucial to our profession.

And for future issues, what do you want to see in this "SE for Ethics" column? Do you have an important insight or industrial case study? Something that could prompt an important discussion? Or, alternatively, something that extends or challenges significant ideas? If so, e-mail a one-paragraph synopsis to johnsonb@gmu.edu or timm@ieee.org (subject line: "SE for Ethics: Idea: [Your Idea]"). If that looks interesting, we'll ask you to submit a 1,000–3,000-word article (where each graph, table, or figure is worth 250 words) for review for *IEEE Software.—Brittany Johnson and Tim Menzies*

Our Personal Journeys Inform Our Views

To begin, we share our backgrounds as a reminder that perspectives on ethics are deeply personal and shaped by individual experiences.

We—Brittany, a Black woman from the Southern United States, and Tim, a senior white man of Anglo-Saxon heritage from Australia—bring our diverse life experiences to this conversation. Throughout our lives, we've witnessed hardworking individuals unable to succeed due to their environments. This injustice propels our advocacy for change.

Ethics in Software: More Than a Hypothetical

Not long ago, we attended a symposium where an affluent senior white male lauded the role of artificial intelligence (AI) in legal decisions, believing that it eliminated human biases. While that person has every right to express that view, we think that person was … ill informed. Experience with tools like the COMPAS risk assessment tool, which aims to predict potential reoffenders, has shown that AI models can exhibit biases against (for example) Black individuals. (COMPAS has a higher false-positive rate for Black than for white defendants. This means that, as a result of using COMPAS' recommendations, more white men got bail, and more Black men spent time in jail.)

COMPAS is just one example of the inherent bias in certain algorithms. Sadly, there are many other similar examples (see "Examples of

EXAMPLES OF UNFAIR SOFTWARE

The following points were taken from Cruz et al.[S1]:

- Women can be five times more likely to be incorrectly classified as low income.
- African Americans are five times more likely to languish in prison until trial rather than being given the bail they deserve.
- Proposals from low-income groups are five times more likely to be incorrectly ignored by donation groups.

The following point was taken from Canellas[S2] and Matthews[S3]:

- Forensic software used for DNA analysis is written so poorly that many people languish in jail, and some states have even banned the use of that software.

The following point was taken from the last chapter of Noble[S4]:

- A successful hair salon went bankrupt due to internal choices within the Yelp recommendation algorithm.

For more examples, see the rest of Noble[S4] as well as Rudin,[S5] Dastin,[S6] Hardesty,[S7] and Caliskan et al.[S8]

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S1. A. F. Cruz, P. Saleiro, C. Belém, C. Soares, and P. Bizarro, "Promoting fairness through hyperparameter optimization," in *Proc. IEEE Int. Conf. Data Mining (ICDM)*, Piscataway, NJ, USA: IEEE Press, 2021, pp. 1036–1041, doi: 10.1109/ICDM51629.2021.00119.

S2. M. Canellas, "Defending IEEE software standards in federal criminal court," *Computer*, vol. 54, no. 6, pp. 14–23, Jun. 2021, doi: 10.1109/MC.2020.3038630.

S3. B. Johnson and T. Menzies, "Unfairness is everywhere. So what to do? An interview with Jeanna Matthews," *IEEE Softw.*, to be published.

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Unfair Software"). Such biases aren't just unfair; they have real-life implications, such as people not getting the bail they deserve or businesses failing due to an algorithm's internal decision making.

Ethics: Beyond Just "Tools"

For the aforementioned problems, there exist automatic tools that can, to some degree, adjust these systems to enable them to function without some of these prejudices (https://cs.gmu.edu/~johnsonb/fairkit.html).[1] But we rush to add that ethics isn't a problem we can merely "fix" with automated software patches. We need to address the root societal, economic, legal, and cognitive conditions that birthed these biases. We need to recognize the broader impacts of the technology we create and use. We must also acknowledge that sometimes well-intentioned frameworks, such as intersectionality, can be diluted over time and lose their impact.[2]

For a more inclusive software landscape, we must do the following:

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and industrial settings. Implementing new policies and legislations that center on ethical considerations is another crucial step.

As software engineers, we make impactful decisions daily. The vast choices we make in system configurations offer an opportunity to shape the world ethically. Every design choice and management decision can profoundly affect society.

In essence, let's harness our power as software engineers. Let's lean into ethical considerations and make decisions that champion fairness, justice, and inclusivity. **ⓢⓦ**

> We must equip current and future developers with knowledge of ethical considerations.

- Diversify design teams to include multiple perspectives.
- Test software for potential biases against specific groups.
- Foster open communication with all stakeholders.
- Design better models that reduce the cognitive load required for their review.[3,4]

On the legal side, unbiased external review teams should regularly assess potentially discriminatory projects. Legislative mandates for software and AI system reviews are becoming crucial, especially since self-regulation doesn't always yield ethical outcomes (https://en.wikipedia.org/wiki/Volkswagen_emissions_scandal).

Elevating the Role of Ethics in Software Engineering

How do we prioritize ethics in our field? It starts with education. We must equip current and future developers with knowledge of ethical considerations. This doesn't just mean college courses but also professional

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