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Automating Interactions: How Autonomous Vehicles Can Perpetuate Bias and Contribute to a Culture of Community Detachment

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Abstract: Autonomous vehicles (AVs) promise many benefits to transportation. To do so, they will have to make judgments about how to avoid accidents and optimize traffic. By choosing to value certain groups or metrics over others we leave groups behind. By automating away barriers such as parking, we further divorce individuals from their consequences. This paper discusses how AVs may create issues despite their technical abilities and how they hinder community interactions in the United States under the pretext of individualism. This paper was written as a part of Volume 2 in the Queered Science & Technology Center (Carbajo).

INTRODUCTION

Two hundred years ago, the transcontinental railroad facilitated the transfer of resources across the U.S. Half a century later, Model T helped usher in an era of personal vehicle ownership. America quickly became famous for its expansive highway network following infrastructure policies such as the Interstate Highway Act of 1956 ("Natl. Interstate"). In recent decades, autonomous vehicles have become one of the most anticipated developments in transportation. As early as 2016, over $80 billion was invested in self-driving cars (Kerry). The rationale is clear. The World Economic Forum estimates the industry will produce over $3.1 trillion in "societal benefits" (Weindelt).

When we refer to "societal benefits," we must consider how they are distributed. This brings us to the field of transportation equity. We define equity as a "consistent and fair, just and impartial treatment of all individuals, including individuals who belong to underserved communities…" as recently used by US Presidential Executive Order 13985 (Biden, Executive Order 13985). While this does not imply equality, it is often true that the systems that perpetuate inequality also uphold inequity.

Transportation inequity is not a new problem. In America, buses were infamously segregated for much of the 20th century. Less blatantly, how modes of transportation are valued by American society perpetuate inequity. Public transportation in the U.S. is often slower and less dependable than cars. For example, in the United States, average bus commute times took 46.6 minutes versus 26.4 minutes for cars in 2019 (Burd). This creates barriers to entry for jobs and leisure. Vehicle ownership is correlated with income (Nolan). Even when public transportation is available, it often fails to consider disadvantaged community needs and favors privileged groups. For example, in 1994, the LA Metro approved new light rail to wealthier Pasadena neighborhoods by raising bus fares, which were predominantly used by poorer riders (Bullard).

Besides the less wealthy, transportation experts such as Dr. John Falcocchio have also noted that the young, the old, and people with disabilities are disproportionately disadvantaged (Falcocchio). Due to legal and physical reasons, members of these groups may be unable to use private vehicles. Often, public transport is designed with economic considerations rather than serving those on the periphery.

Companies, researchers, and technologists have predicted many potential benefits to AVs. These include reducing accidents (Petrović), reducing traffic (Wu) and parking

(Millard-Ball), and making transportation more equitable (Dianin). Many technical problems still must be solved for AVs to be viable. This paper does not aim to address these. Instead, we will how the existence of AVs can perpetuate patterns of inequity by systematizing biases and shielding individuals from each other's' problems in the United States.

AUTOMATING ETHICS

One of the most touted benefits of AVs is safety. This is for good reason. Despite recent declines, traffic-related fatalities still reached 19,515 in the US in 2023 (Natl. Highway). While there have been numerous bad headlines of failures of AVs, such as Cruise cars blocking roads (Lu), there is still hope that further technical progress can lead to a safer world.

While we may be able to solve the technical problems, a more interesting question is how cars will prioritize safety when there are no good solutions. In 2016, researchers at MIT launched a platform known as "Moral Machine" which asked users to judge which people a self-driving car should prioritize the safety of in the event of an accident (Awad). These characteristics ranged from age, gender, fitness, "social value," and legality. This is immediately problematic. It is troubling to note that the study found a preference against saving those less physically fit and with lower perceived "social value" (Awad). When we discuss equity, we must place those who are already in the periphery at the forefront when considering issues. Disabilities activists have long focused on empowering those who are overlooked when considering traditional norms (Lee). This is not possible when machines are told to value certain lives over others. This is not to say humans operate without these biases. We are instead acknowledging it is much worse when it becomes systemic.

While the future of AVs may not encode these biases as explicitly as this experiment, discrimination is inevitable. While ranking certain lifestyles as having higher "social value" is extremely problematic by itself, it is also unclear how that would even be determined. The experiment uses symbols to represent medical professionals, the unhoused, and criminals, but these are not exact categories in the real world. It would be naïve to assume that these machines would not use proxies such as skin tone and race. AI models have been racist to people of color in the past. People with different body shapes and personal mobility abilities are just a few of the countless considerations that can be discriminatory by being overlooked.

OPTIMIZATION

Accidents are sadly still common. However, it is possible that once AVs have become sufficiently advanced, these incidents will become rare. Unfortunately, biases will necessarily be baked into daily operations. A commonly stated benefit of AVs is traffic optimization. In the current world of individual vehicle ownership, individuals operate within the bounds of their tolerance for danger and adherence to the law. This invites inefficiencies. For example, an individual may choose to force themselves into an exit lane on a highway to avoid needing to take a further exit. As other cars brake to accommodate this, it can lead to a traffic jam.

The very premise of traffic optimization will require an incredible amount of coordination, either through government regulation, rigorous standards, or even monopolies. Assuming it is feasible, the lingering question becomes for what, we optimize for. We could maximize the number of trips completed in a day or the global time spent commuting. These are rooted in the assumption that more trips and shorter commutes are good metrics. From a personal or economic standpoint, this may appear obvious. But many other objectives should be considered as well.

From an environmental view, it may be preferable to minimize energy usage. Even this still assumes that the ideal goal is objective and quantifiable. The fastest path or more energy efficient may not be the most enjoyable for individuals. As an example, the interstate

highway system allowed faster travel, but at the cost of seeing the country. As American author John Steinbeck mused "When we get these thruways across the whole country, as we will and must, it will be possible to drive from New York to California without seeing a single thing" (Steinbeck). While metrics such as speed or energy are quantifiable, they serve systems rather than individuals.

It is impossible to satisfy every goal. It can be argued that some be worthwhile to optimize for at the expense of other considerations. This can mitigate greedy behavior. But it also invites more possibilities for discrimination. What if the algorithm decides to never move an individual because it is too costly? Similarly, Dianin et al. point out that ride-sourcing AVs could choose not to pick up customers if they belong to demographics that are unprofitable (Dianin).

From an equality standpoint, it may be tempting to optimize for normalizing commute times. However, this strategy may cost lives if emergency vehicles are not prioritized, so it may warrant some form of priority scheduling. Unfortunately, this invites the possibility of more value propositions. Should trips that are "productive" be given priority? It is easy to argue that emergency vehicles may warrant prioritization, but what about shipping food or other necessities? In a perfectly controlled system, what should we optimize for? While there is no clear answer, two worrying possibilities seem likely. It is not far-fetched to imagine a future where companies will allow users to directly pay more to be prioritized more in their algorithms. Less direct, but equally insidious, it may be tempting to argue in favor of optimizing for something seemingly objective such as economic contributions. Tying monetary values to trips has the possibility of leaving just as many behind. The rich could conclude that they deserve better priority as their time is more valuable by seemingly objective metrics such as salary.

OFFLOADING RESPONSIBILITY

AVs have also been touted as a solution to parking problems. AVs promise to be able to ferry humans, then either drive off to find parking elsewhere or drive around until a human needs it. Professor Millard-Ball has argued that this encourages congestion by evading the parking pricing, which is used by some urban planners to control congestion. Ball suggests congestion pricing to enter a zone as a viable alternative (Millard-Ball). These proposals are good at solving the symptoms such as congestion. However, solutions like these do not directly address equity.

The issue becomes who bears the benefits and who bears the brunt of the costs. While the current system of private vehicle ownership and parking has its issues, there is a "localization" of effects. Areas that want to be destinations such as business and tourist areas are forced to find ways to facilitate travel there. Those who choose cars are forced to find places to park that are reasonable to walk to. This is not without its problems. For example, groups that cannot afford parking may be forced out. But AVs simply push this problem to the outskirts and force other areas to subsidize these costs. Communities have the potential to suffer from acting as proxy parking lots for others. Whether cruising to avoid parking or driving away to other places to park, it seems likely that AVs remove the spatial penalties of parking far away. Who this affects the most depends on how these cars are programmed.

Additionally, this system detaches the individual from the problem. A car may park or idle in communities far away from the initial destination and passenger. Locally, this may give the appearance of the problem being solved. But globally, it only creates problems for other people that the passenger does not have to personally deal with.

AUTONOMY, ISOLATION, AND IDENTITY

While this paper has focused on problematizing metrics, AVs do have the potential to help the disadvantaged. Public transportation unfortunately often fails those who depend on it. For example, even when buses are wheelchair-accessible, poor conditions such as a lack of

usable sidewalks at bus stops often severely hinder those who rely on wheelchairs (Liu). Self-driving cars have a strong argument that they can alleviate this issue. Personal vehicles may be modified for individual needs and considerations. Removing the necessity of driving opens ways for those historically disadvantaged to use existing infrastructure. Rather than relying on insufficient public infrastructure, they can take their concerns into their own hands.

While we previously stated the economic impact of self-driving vehicles, there is also a cultural aspect. The United States has over 270 million private vehicles (Federal Highway Administration), second only behind China which has more than four times the population (Ning). Whether as a result or a cause, there is a strong car culture in the United States. To many, personal vehicles are an expression of identity. Cars can be status symbols that highlight personal property ownership. They can be decorated and customized. In non-autonomous vehicles, driving gives a sense of autonomy. One can choose which route to take and change it on a whim rather than relying on pre-defined global schedules. Why is it then, that there is such a cultural enamorment with getting rid of this decision-making?

We argue that much of this idea of independence is already an illusion. For most people, driving is their daily commute. There, they travel alongside pre-determined routes at pre-determined times. Most people already rely on technology to route their path for them (Smith). The schedule of traffic may not be as concrete as the bus schedule, but it exists all the same. Automating the actual driving is just another step in the process.

If not autonomy, what do cars provide? We argue that what personal vehicles provide is isolation. While thousands of cars travel the same highways, metal and glass separate drivers from one another. While the drivers must communicate, they do not have to do so face-to-face. This provides a sense of detachment. The isolation and illusion of independence foster a culture of personal rather than communal responsibility. Certainly, AVs will allow those with unique needs to participate in the current transportation system more easily. But this places the burden on the individual to create a space that can accommodate them without inconveniencing other individuals. The choice to delegate day-to-day operations and moral decision-making to machines reflects a greater desire to be unbothered by the concerns of others.

CONCLUSION

Autonomous vehicles are one of the most anticipated technologies in transportation. Regardless of how much safer or faster they are, they will have to make decisions with moral consequences. While individuals can be discriminatory, any system of rules we encode into a vehicles will create systemic discrimination. Those unseen or devalued by society stand to lose the most. While using metrics such as global fatalities are convincing arguments, they are also convenient excuses. AVs provide an easy way to offload problems onto others. Inherent spatial limitations such as parking can be sidestepped allowing individuals to ignore inconveniences. While cars in the United States have become a symbol of freedom of self-expression, they only represent so in a superficial sense. Already, they are dictated by algorithms and traffic dynamics. Instead, the illusion of freedom is used to justify further isolating individuals from the problems of the community.

While this technology will likely continue to develop over the near future, adopting it into daily life in its current form will have consequences. They attempt to put global solutions to individual problems, which ends up with systemic bias and rewards isolating members of the community. Locally, there will not be a one-size-fits-all alternative to equitable transportation. In some areas, it may be to address problems in public transportation to fit the needs of the community. In others, it may be to establish local carpools. In others, it may be to rethink how work can be done in communal spaces. However, finding more ways to use machines to avoid these interactions is not the solution.

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