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FACTORS AFFECTING THE ADOPTION OF SELF-DRIVING CARS

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ABSTRACT

Automated vehicle acceptance is being promoted by linking it to improving road safety, minimising congestion, reducing emissions and, most importantly, fatalities. However, the acceptance of Self-Driving Car users is also mainly concerned with the security of their data, the processing of tragedies reported in the media, and the moral and legal programming of the vehicle and its association with their own value system. As long as personal experience is lacking, there is no clear data protection regulation and moral programming is vague, the acceptance of Self-Driving is also influenced by the imagination of the user.

KEY WORDS

self-driving cars, improving adoption, cybersecurity, media impact, ethics

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INTRODUCTION

Recently, significant advances in machine learning and optimisation algorithms have enabled researchers to extract valuable knowledge from multidimensional data sets. Machine learning models can be trained on large datasets from the literature or databases, but their performance is often hampered by negative results or lack of metadata. In fact, by summarising metadata, we could obtain a much larger amount of data of much higher quality, and with open data management, this data could be used by the research community to reproduce experiments, perform deeper analysis or provide a basis for further studies. Accordingly, high-quality open data sets increase the accessibility and reproducibility of science [1-3].

Self-Driving Cars, as information-gathering systems, are able to collect a wealth of information about their surroundings as they travel along the route, which is of enormous value for traffic control in the long term, but for the human user, this data, even personal data, can seem daunting and unpredictable [4, 5].

ADOPTING SELF-MANAGEMENT FOR CYBERSECURITY

When Self-Driving Cars first emerged, studies showed that individuals with health problems could be unduly exposed to the stresses of Self-Driving Cars. In autonomous vehicle simulations, psychophysiological stress was indexed by skin conductance and trapezius muscle tension. Results showed that users showed more signs of physiological stress when the vehicle was autonomously driven. The results also indicated that stress increased when the passenger reported low confidence in the autonomous vehicle based on a prerecorded questionnaire. These results suggested that health professionals and manufacturers need to be aware of the physiological impact of self-driving technology on humans [6-9].

In order to reduce stern reactions, the vehicle must be both controllable and accountable. The public should also be made aware of the ways in which a self-driving vehicle can be attacked and what the user of the vehicle can do in this night. People must not feel that they are completely at the mercy of the vehicle in the event of an attack. There must be a way for the passenger to stop the vehicle, to immobilise it in the event of an emergency.

Today, it is no longer a question of how many miles the car has driven without incident, but under what circumstances it has done so. One company CEO's metric was 'miles per shutdown', where a shutdown is a moment of system failure. The number of fatalities per mile may be one such figure, but how many people are we letting die at the hands of machines in the interests of technological progress? How will vehicles calculate the movement of balloons, ducks, wheelchairs, pedestrians or animals? What does it mean for a technology to work? What exactly does safety mean to whom? How will safety be measured? Research has concluded that basic perception mechanisms need to be taken into account when designing Self-Driving Cars, which cannot simply be used as living rooms, offices or entertainment venues on wheels [10, 11].

In order to ensure effective control of the data generated, retrieved and used by Self Driving Cars, it is necessary to clearly define what constitutes basic vehicle data. If it contains personal and private data, it should be anonymised, aggregated and secured as far as possible to protect the privacy of drivers, passengers and other road users. Even if the data are not sensitive, they should be protected so that they cannot be retrieved, stored or used without the consent of the data subjects.

Governments need to effectively embed the principles of the GDPR into the car industry to effectively reassure citizens that their personal data is protected, even when using Self Driving Cars. A cornerstone of this is whether this data can be used for advertising, personalised pricing or to sell additional products to the customer [12].

The owner of the car should be informed about the processing of the data, so that he or she can make a statement about their future use.

Legal anomalies arise when Self Driving Cars are used for malicious, illegal and fraudulent purposes. Self Driving Cars can endanger the safety of passengers, pedestrians and cities if they are controlled or hacked by criminals or terrorists. Police authorities should be allowed to identify illegal Self Driving Cars activity, as long as it does not violate the privacy of innocent citizens [13-15].

ETHICAL, MORAL AND LEGAL ASPECTS OF THE ADOPTION OF SELF-DRIVING CARS

The ethics of AI must also be considered in the context of the culture, ideology and public opinion of the country, considering the social differences between collectivist and individualist principles. Future research should provide a comprehensive picture of the moral and ethical issues related to Self-Driving Cars and road safety [16].

Confidence in AI-based systems should be increased by informing users in advance about the moral and ethical values on which self-driving vehicles base their decisions. Passengers need to be prepared for situations where they would perceive a situation differently from the self-driving car and therefore make a different decision, but once comprehensive legislation is in place, the algorithm will take this into account.

Car sharing is also mainly organised along ethical and moral principles, future research should look at the barriers to the use of shared electric vehicles, including financial, technological, linguistic and cultural barriers.

PROGRAMMING ON A MORAL BASIS

One of the most difficult challenges in artificial intelligence is how to build ethical autonomous machines, as we will soon be giving millions of vehicles autonomy to make decisions. The field of experimental ethics can provide key insights into the moral, cultural and legal norms people expect from algorithms in Self-Driving Cars.

As a first step, we should decide as a community what we consider right or wrong, so that in the future, machines – unlike humans – will infallibly follow accepted moral preference.

The next step is to formulate a social framework agreement, a set of standards, which will provide clear guidelines on who is responsible for different types of accidents, how control and enforcement will be carried out in the case of Self-Driving Cars.

Consideration of ethical strategies is also a major dilemma for manufacturers. The self-protection strategy – the car protects its occupants – may offend the public, while the utilitarian strategy – the car saves as many lives as possible – may discourage consumers. To gain trust, people need to accept that there will be accidents caused by Self-Driving Cars, but for the long-term safety of transport, we need to expect them. Closely linked to this issue are hacking, liability and labour displacement, which further complicate social, legal and economic regulation.

In an ethical dilemma, it is necessary to take into the account the needs, preferences and possibly conflicting goals of the participants, as well as their personal and social context. AI systems are becoming more and more autonomous, the number of possible situations, choices and influences on their actions is growing exponentially, but it would be necessary to integrate some kind of “ethical sensor” into autonomous systems [16].

Attempts to define ethical principles have therefore recently surged across the world. Scientific and technological organisations have set up AI governance committees, which publish principles for the governance of AI.

The principles emphasise that the development of AI should be driven first and foremost by the enhancement of the common welfare of humanity. Human rights, respect for privacy, fairness, transparency – which are the operating principles of AI – accountability – accountability in both the development and deployment of AI systems – the importance of collaboration and agility to manage new and emerging risks was also highlighted.

The principle of consistency of rights and responsibilities emphasises the need for data to be properly captured and monitored, while commercial entities must be able to protect their intellectual property. In the private sector, one of the most emphatic ethical frameworks comes from Tencent CEO Pony Ma. This framework emphasises the importance of AI being accessible, trustworthy, understandable and verifiable.

RIGHTS

Policy makers have found that while Self-Driving Cars offer the possibility for more people to use them (e.g. elderly, disabled and blind people), there is also a challenge in who to deny the right to use them.

However, over the years we have slowly come to the point where we should ban non-autonomous driving when we reach a stage where Self-Driving Cars can safely and easily replace non-autonomous driving. US and UK road safety authorities have indicated that this is inevitable in the next 50 years. Meanwhile, groups such as Humans Against Autonomous Vehicles (HAAV) are strongly opposed to Self-Driving Cars as not safe enough to drive.

AUTONOMY

Autonomy can also be compromised in AV, with a loss of choice and control in car navigation. In China there have been cases where the vehicle has taken control from the driver in non-automated mode. The feeling of freedom to drive will also change, because Self-Driving Cars are programmed to obey speed limits and road conditions, so the freedom to drive will be lost. In other cases, Self-Driving Cars have been programmed to obey speed limits and road rules, so the freedom to drive has been removed. In California, a pregnant woman went into labour and had to be transported to the hospital, but the Self-Driving Cars speed limit regulation caused significant delays, almost causing damage to the newborn's brain capacity.

RESPONSIBILITY

The tendency for owners of autonomous vehicles to shift the responsibility to themselves and to be exempted from liability by driving in autonomous mode may be a cause for concern.

INSURANCE AND DISCRIMINATION

Cars can interrogate a wide range of driving habits, patterns and behaviours, so if insurance companies have access to this information, they can tailor insurance policies to individuals' driving performance. Insurance companies defend this as a way to offer better insurance premiums to safer drivers, but access to this data violates people's right to privacy by creating a sense of constant surveillance inside the vehicle.

Owners of manual cars have rejected Self-Driving Cars precisely because of the insurance imbalance – because insurance companies offer more favourable terms to Self-Driving Car drivers who allow their data to be monitored.

SELF-DRIVING AND THE IMPACT OF MEDIA

Positive media coverage significantly increases people's confidence and willingness to use driverless cars. The media influence self-efficacy and subjective norms and thus change

people's confidence and behaviour. People are more willing to accept driverless cars. In order to promote self-driving cars, individuals need to trust the mechanisms more than themselves, which is a self-awareness challenge.

Therefore, in the future, energy should be devoted to comparing human driving capabilities with those of self-driving vehicles, and to clearly inform users about the functions in which the machine outperforms human cognitive capacity, the way in which it makes decisions and the situations it handles differently from a human driver.

Mass media is increasing consumer perception bias with reports of accidents, injuries and deaths involving self-driving cars. The potential impacts of autonomous vehicles on urban tourism, which have captured the imagination of the media and the public, are linked to unrelated opportunities and concerns such as sex, recreation, illegal work, and terrorism and tourism. This suggests that the media and the public experience autonomous vehicles not necessarily through the lens of inevitability and a desire for transport efficiency, but rather by linking them to uncertainties whose effects have the potential to both promote and hinder economic life.

It is therefore important to make people aware not only of the anomalies of self-driving cars, but also of the potential for abuse, which could lead to misuse of the vehicle, and to separate the negative effects of possible abuse from the benefits of self-driving.

Already, research published in 2018 has alerted car manufacturers that people are more accepting of self-driving vehicles after they have used prototypes, with early personal experiences with prototypes less likely to influence later use. User interface design will play an important role in the introduction of Level 2 and Level 3 self-driving vehicles.

However, it should be noted in relation to research on Tweeter data that algorithms measuring it can discriminate very well. In this context, a separate discipline has emerged and developed the concept of "algorithmic correctness". Racial and gender groups are most affected by algorithmic fairness because they are most often harmed by algorithmic inequalities. If our demographic characteristics predict how we should behave, then algorithm designers need to be more demographically sensitive and representative if they are to reflect the population as a whole.

Therefore, race, ethnicity, religion and gender should be carefully addressed with all target groups, so that self-driving vehicles are not accused of being the "fad" of white, higher-educated, technologically savvy men.

Excessive media coverage of rare accidents will trigger a distorted perception of passenger risk, which may irrationally overshadow the greater safety benefits. In the future, it is essential that the media also report on situations where a self-driving car clearly performs better than a human driver. Car manufacturers should expand their marketing strategies to include information where a self-driving vehicle is clearly safer than a human driver.

AV manufacturers need to address not only production, but also how their innovations are covered by the media. For manufacturers and other stakeholders, it will be important to ensure that the public is presented with facts and not opinions influenced by media gatekeepers. Australians, for example, are more open to autonomous vehicles if they are informed about their public health benefits. A factual balance between the advantages and disadvantages of the technology needs to be provided to the public so that they can make credible decisions.

CONCLUSIONS

Automated vehicle acceptance is being promoted by linking it to improving road safety, minimising congestion, reducing emissions and, most importantly, fatalities. In the absence of personal experience, without a single privacy policy, the adoption of Self-Driving Cars is influenced by the user's imagination.

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