

Autonomous cars: in favor of a mandatory ethics setting

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Introduction

- The introduction of autonomous cars as well as the development of ever more capable driver assistance systems
- Many companies like BMW, Ford, GM, Toyota, **Google** are currently working on projects
- From an ethical perspective, the introduction of autonomous cars promises huge progress

Introduction

- According to a study by the ENO Center of Transportation, about 93 % of the 5.5 million crashes in the U.S. have been attributed to human error as the primary cause of the crash
- “Google car” has managed to drive autonomously for over 1.7 million miles of testing with just 11 minor incidents
- Automated driving poses new ethical challenges: ‘trolley problems’
- Right ethics setting
- Should we mandate a specific ethics setting for the whole of society, or should every driver have the choice to select his own ethics setting

Ethical Issues

- When we think of a human driver who suddenly finds herself in a scenario like tunnel, we do not expect her to follow a certain moral guiding principle
- With autonomous cars:
 1. Computer is not a human, not influence by adrenalin .
 2. Computer has the ability to take huge amounts of information into consideration.
 3. It has to have some kind of default reaction if there is no specific order on how to react in a case like the tunnel case

Ethical Issues

- The issue is how should an autonomous car react in a trolley situation?
- Autonomous car react according to deontological or utilitarian considerations.
- Consideration the broader of machine ethics, the question becomes: how should we proceed given widespread normative disagreement about the appropriate ethics setting of autonomous cars?

Personal Ethics Setting (PES)

- The common solution is to partition the moral decision space, which is leave it to the individual to decide
- A personal ethics setting reflects the value of autonomy and is in that sense sensitive to the moral views of the members of society
- Neither the government nor the automobile manufacturers have the moral authority to decide these questions

Mandatory Ethics Setting (MES)

- Mandatory ethics setting (MES) is actually in the best interest of society as a whole
- A choice situation that models:
 - (a) strategic interaction
 - (b) iteration
 - (c) the fact that we could be subjects and objects of targeting.
- A more appropriate way : in terms of game theory

Mandatory Ethics Setting (MES)

- Two players : cooperation and defection
- Maximize the social good by choosing to cooperate
- A higher payoff if select defect

Fig. 1

| | | Player 1 | |
|----------|-----------|-----------|--------|
| | | cooperate | defect |
| Player 2 | cooperate | 3,3 | 0,4 |
| | defect | 4,0 | 1,1 |

The Prisoner's Dilemma

Mandatory Ethics Setting (MES)

- Johanna, plays the game against all other people who participate in traffic. If every participant chooses the moral PES, traffic would be maximally safe for everyone
- Consider three people with two cars
- The probability of each person occupying any single car are the same.
- Selfish PES:

$$E(PES) : 0.5 * 2 + 0.5 * 1 = 1.5$$

Mandatory Ethics Setting (MES)

- Setting the car according to a (mandatory) MES setting
- Since $1 < 1.5$ the social outcome of a PES is worse compared to the MES world

$$E(MES) : 0 * 2 + 1 * 1 = 1$$

Mandatory Ethics Setting (MES)

- The standpoint of each individual, the expected value to die in a dilemma for EMS and PES are:

$$E_{MES}(I) : \frac{1}{3} * 1 + \frac{2}{3} * 0 = \frac{1}{3}$$

$$E_{PES}(I) : \frac{1}{3} * 0.5 + \frac{2}{3} * 0.5 = \frac{1}{2}$$

Mandatory Ethics Setting (MES)

- Coming back to Johanna, the problem is that even if Johanna believes that everyone else set their PES setting to minimize harm, she still has a strong reason to set her car's ethics setting privately to value her life above all
- At the same time, choosing the selfish PES is the best strategy for Johanna and other people
- The selfish agents end increase the risk of all the people

Thinking

- Accepted.
- presented two ways of dealing with moral disagreement about trolley dilemmas
- Allowing for a PES, will likely lead to a situation that has the structure of a prisoner's dilemma.
- MES is in the considered interest of everybody

Discussion

- Which method do you support? PES or MES? Why?
Any other ideas?



Thank you !