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Research Question

How can a driverless car be equipped to disobey the Highway Code if it has an ethical reason to do so?

Background

The UK Highway Code specifies how drivers should behave on UK roads. Most of its rules are in the form of recommendations rather than hard and fast rules. RoTRA [1] is a tool which takes a description of a road traffic situation and returns the recommendations of the highway code that apply to that situation. At the moment RoTRA has been tested on very simple examples around road junctions expressed in a grid world based simulation with simple driving protocols that either obey all the recommendations, none of the recommendations, or only those recommendations that are hard and fast rules.

In [3] Milan-Blanquel considers how an ordering of ethical concerns can be matched to various ethical theories in order to help a driverless car decide upon an appropriate course of action in a situation where it can not avoid a collision.

Approach

The object of this project would be to implement a driving protocol that obeyed the RoTRA recommendations unless it perceived there to be an ethically imperative reason to disobey them. This would involve integrating the legal recommendations into the ordering of concerns in Milan-Blanquel's framework and then showing how this affected the behaviour of the vehicle.

There is an implementation of ethical concern ordering (similar to Milan-Blanquel's) in a BDI language tool which might serve as a suitable implementation platform [2].

Milestones

1. A theoretical framework showing how RoTRA recommendations rank as concerns in the ethical theories identified by Milan-Blanquel

2. An implementation of her framework in a suitable programming environment and linking it to RoTRA and the Grid World in which RoTRA has been tested.

3. A set of scenarios to illustrate the behaviour of the system,

References

[1] COLLENETTE, J., DENNIS, L. A., AND FISHER, M. Advising autonomous cars about the rules of the road. In *Proceedings Fourth International Workshop on Formal Methods for Autonomous Systems (FMAS) and Fourth International Workshop on Automated and verifiable Software sYstem DEvelopment (ASYDE), FMAS/ASYDE@SEFM 2022, and Fourth International Workshop on Automated and verifiable Software sYstem DEvelopment (ASYDE)Berlin, Germany, 26th and 27th of September 2022* (2022), M. Luckcuck and M. Farrell, Eds., vol. 371 of *EPTCS*, pp. 62–76.

[2] DENNIS, L. A., FISHER, M., SLAVKOVIK, M., AND WEBSTER, M. P. Formal Verification of Ethical Choices in Autonomous Systems. *Robotics and Autonomous Systems 77* (2016), 1–14.

[3] MILLÁN-BLANQUEL, L., VERES, S. M., AND PURSHOUSE, R. C. Ethical considerations for a decision making system for autonomous vehicles during an inevitable collision. In *28th Mediterranean Conference on Control and Automation, MED 2020, Saint-Raphaël, France, September 15-18, 2020* (2020), IEEE, pp. 514–519.