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Autonomous vehicles simple learning strategies abstracted from collision avoidance decision-making algorithms

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No day passes that the media does not give us content about autonomous vehicles. The reality of large numbers of autonomous vehicles on the road is not a matter of "whether" but a matter of "when". Indeed, autonomous vehicles have already become a reality on our roads but they are still limited in number to experimental quantities. However, only the final part of the experiments is carried on with actual autonomous vehicles, as most of the work is carried on through modeling and simulation of the autonomous vehicle as a robot modeled as a cognitive agent. This vehicle agent must exhibit flawless self-operation in: (1) collision avoidance; (2) "programmed" and "adaptive" learning; (3) direction finding and following; (4) route planning and following; (5) user interaction.

The absolute highest priority is safety, represented by collision avoidance algorithms. All other goals, functionality, and performance are sacrificed (if necessary) to achieve safety. A certain number of algorithms are taught to the autonomous vehicle prior to any deployment (i.e. programmed learning), but the majorities of the other is learned after deployment (adaptive learning) and are specific to the road situation of the environment where the vehicle is expected to operate. This is no different from what a driver does: he/she learns basic driving rules and skills and later tailors them to the actual environment where he/she is driving.) Direction finding and following, route planning and following, and user interaction are mostly technological problems for which there is already a lot of accumulated knowledge, and practical solutions already in use in conventional vehicles or in autonomous vehicles operating at levels 0, 1, 2, and 3 of the SAE classification.

In this talk we will present a short review of established algorithms for both collision avoidance and adaptive learning for safety augmentation and we will describe our research based on simple observational social learning strategy.