# Model and performance of simple autonomous agents learning to avoid incoming vehicular traffic for two observational learning algorithms

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In recent years, we have observed a rapid advancement in the development of autonomous driverless vehicles and other types of autonomous robots of various levels of sophistication. Autonomous driverless vehicles and many of the autonomous robots must learn how to operate in dynamically changing environments, e.g. to avoid other vehicles or various other obstacles. Building of autonomous driverless vehicles or autonomous robots requires their priory modeling, development and analysis of performance of various decision-making processes and learning algorithms before they are implemented to be used in the real world.

Individual autonomous robots (including autonomous driverless vehicles) can be identified with cognitive agents capable of performing cognitive acts; i.e. a sequence of the following activities: (1) Perceiving information in both the environment and that provided by other agents (2) Reasoning about this information using existing knowledge; (3) Judging the obtained information using existing knowledge; (4) Responding to other cognitive agents or to the external environment, as it may be required; (5) Learning; i.e. changing (and hopefully augmenting) the existing knowledge if the newly acquired information allows it.

In this talk, we describe a model of autonomous cognitive agent learning to avoid incoming vehicular traffic. The agent is a minimal cognitive agent that could be used as a virtual experimental platform to explore its ability to learn. The emphasis is on minimal storage and logical primitives. Thus, formal methods of computational intelligence and established algorithms such as reinforcement learning algorithms are not used in this model. Instead, inspired by biomimicry, simple learning algorithms based on an observational social learning principle, i.e. each agent learns from observing the outcomes of the decisions of the other agents, are designed and their performance is investigated. We provide the mathematical description of the model and consider various statistical performance indicators to assess the agents performance in learning to avoid incoming vehicles for two decision-making algorithms. We investigate the effects of the agents knowledge base accumulation through observation and repetition on the success of their decisions.

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