Autonomous agents with risk takers and risk avoiders performance in learning to cross CA based highway

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With the rapid development of autonomous robots operating in dynamically changing environments, e.g. autonomous driverless cars, drones, swarm robots, it is important to study how robots learning performance may be affected by various parameters. Some of these studies may be carried out through modeling and simulations in which autonomous robots are 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.

We consider a model of cognitive agents learning to cross a cellular automaton based highway under various traffic conditions. The agents use an observational social learning strategy in which agents learn by observing the performance of other agents, mimic what worked for them and avoid what did not in the past. Our work focuses on simplicity of the agents learning algorithms in which their decision-making process depends only on the evaluation of the agents crossing decisions, or both crossing and waiting decisions. We investigate how the presence of risk takers and risk avoiders in a population of agents affects their success in learning to cross the highway without being hit. The agents learning performance is measured by various statistical indicators. Also, we investigate the effects of transfer of agents knowledge base built in one traffic environment to the agents learning to cross in a different traffic environment on their success and their decisions. We consider various statistical indicators to assess these effects. We present variety of simulation results and outline the future work.

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