IMPROVING AUTONOMOUS DRIVING BY COMBINING REINFORCEMENT LEARNING WITH IMITATION LEARNING

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Abstract

Road accidents contributes as one of the major causes of deaths in the world. Irresponsible driving behaviors such as not obeying road rules, driving under the influence of alcohol and drugs and driving when sleepy and tired accounts for most of the road accidents making human error the main reason. Tech giants in the industry such as Tesla, Baidu and Google are conducting immense research on autonomous driving to let artificial intelligence take the responsibility of driving because compared to humans it doesn't possess weaknesses such as being drowsy and distracted and it possess quality attributes such as faster decision taking. It could assist in bringing down the deaths happening due to road accidents drastically. As most of the research on this area is done in countries with disciplined drivers, it is hard to expect that they will perform the same in countries like Sri Lanka which has bad driving patterns.

An approach which has produced promising results in the area of autonomous driving is imitation learning which the actions of an expert driver is imitated. Despite the promising results, the approach could produce erroneous results on scenarios which the AI has not yet experienced. Reinforcement learning is a good approach to learn different type of scenarios by exploring the environment by itself. However, the research conducted in the autonomous driving area by using reinforcement learning alone hasn't produced promising results compared to imitation learning. In this paper it is focused to reduce the erroneous results of imitation learning in scenarios which the AI has not yet experienced by combining it with reinforcement learning.

Keywords: Autonomous driving, imitation learning, reinforcement learning