

Title: Employing Game Theory in predicting human behavior in order to improve path planning methods in Human-Robot Interaction

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Nowadays, one of the technology trends underlying AI and robotics is H-Robot Interaction. It generally includes all aspects of actions and reactions which occur among humans and smart robots in all industries. Regarding this, one of the remarkable areas in which scientists try to deal with robots is robotic path planning. There are a lot of path planning methods containing heuristic methods like RRT, evolutionary approaches such as Genetic Algorithm, Reinforcement Learning, etc. Taking those into consideration, today, methods based on learning are more preferred than others. However, one of the important challenges those need to puzzle out is to move in the environments where have a huge amount of uncertainty within their dynamic models. In other words, such environments include some obstacles and disturbances that their dynamic model is requiring being learned by the robot want to maneuver there. There are some model-free methods in RL and Deep RL tackling such issues, but some drawbacks may hinder their progress, for example, extreme computational complexity that converts those problems to NP-hard or NP-complete and essentially impenetrable problems. Keeping this in mind, one of the most complicated and recognized obstacles that a robot must deal with is obviously human being, especially in outdoor applications. Therefore, since the robot will get into trouble with those interactions due to the limitations explained before, it would be a brilliant idea to predict human behavior somehow before starting the learning process. In this way, some research has been conducted, like prof. Tomlin's recent works in using CogSci at UC Berkeley. But, there are still a lot of developments required to carry out. To achieve those, one of the ways in which human behavior is more predictable is Game Theory, developed by some mathematicians like John Nash and Von Neumann. Referring to the research done before, I want to introduce the idea of predicting human motion for the purpose of having better collision avoidance in path planning.

Biography

Seyed Ali Eshtehardian has completed his MS in mechanical engineering (control and automation) at the age of 24 at Sharif University of Technology in Iran. Due to his expertise in robotic and AI, he is now working as a researcher and also an engineer in an innovation center where he tries to deal with technology trends in AI and smart systems. He is also preparing himself for attending an appropriate PhD position in 2022.

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