عنوان مقاله:

Autonomous Navigation of Mobile Robots in a Dynamic and Partially Observable Environment Using Deep Reinforcement Learning

محل انتشار:

بیست و نهمین همایش سالانه بین المللی انجمن مهندسان مکانیک ایران و هشتمین همایش صنعت نیروگاه های حرارتی (سال: 1400)

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خلاصه مقاله:

A new approach to the navigation of mobile robots in a dynamic and partially observable environment is proposed. The environment contains an unknown number of stationary and randomly moving obstacles and is partially observable to the robot's sensors due to their limited visibility ranges. The robot receives information about the environment, including the instantaneous relative positions of the stationary and moving obstacles within its visibility range as well as the position of its target via its LiDAR scanner. The information is fed to a Double Dueling Deep Q Network (D³QN) that uses an augmented reward function to learn the optimal policy to take the shortest collision-free path to the target.Results from multiple simulated tests in PyGame environment with various levels of complexity show that the proposed approach outperforms existing classical and AI-based navigation strategies in terms of convergence rate and the level of complexity it can handle.

کلمات کلیدی:

Autonomous mobile robots, Navigation, Obstacle avoidance, Reinforcement learning

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