ISSN: 2090-4908
International Journal of Swarm Intelligence and Evolutionary Computation

Short Communication

Reinforcement Learning Strategies in Autonomous Robotic Surgery

Mohammed Shaeen*

Department of Computer Engineering, Islamic Azad University, Dezful, Iran

DESCRIPTION

The robot is an important part of realizing intelligence, but manipulators can only perform simple tasks in a structured environment, such as sorting and packing. In light of the existing problem, this paper presents a state-of-the-art survey of an intelligent robot capable of autonomous decision-making and learning the main achievements and research of the robot, which were primarily based on breakthroughs in automatic control and hardware in mechanics [1]. Many pieces of research have made further advances in adaptive and robust control as artificial intelligence has evolved the most recent research in deep learning and reinforcement learning has paved the way for robots to perform highly complex tasks. While the robot can currently perform some simple repetitive tasks well, it cannot adapt to a complex environment with shielding or changing lighting conditions in real time. With the growing demand for intelligent robots, it is critical to develop a robot grasping solution with independent decision-making and learning capabilities. As a result, the robot is a high-level physical embodiment of artificial intelligence, and automation is the foundation of intelligence. The rapid development of artificial intelligence technology that incorporates uncertainty models propels adaptive and robust control forward. Analytical and empirical approaches are primarily used in these machine learning algorithms for object grasps [2]. These methods are effective, but they are based on hand-crafted features and simplify the grasping environment.

As a result, they are laborious, time-consuming, and incapable of adapting to complex environments. It is necessary to develop a universal swarm robotic solution for various environments that can make decisions and learn on its own [3]. Deep reinforcement learning is currently the primary method of intelligent decision-making and control for robots, allowing robots to learn a task from the ground up. This method necessitates numerous trials and incurs numerous errors, making it difficult to apply to actual robot manipulation. It is proposed to use imitation learning and transfer learning [4]. It is hoped that, in the end, an end-to-end neural network can be built to output the motor control of each joint simply by inputting the observed image. Learning to manipulate objects based on visual perception schemes is currently a research focus for data-driven methods. The method of extracting features from images provides a new direction for learning robot manipulation and swarm communication, but traditional methods of feature extraction rely heavily on prior knowledge, so only a portion of the information can be effectively utilized [5].

CONCLUSION

Because of deep learning's significant breakthrough, the robot can now extract more generalized features autonomously. The deep learning network has achieved fantastic results in machine perception and image processing due to its excellent feature extraction capability. At the same time, deep learning can be combined with mathematical modelling to learn robot manipulation, but the biggest limitation remains the lack of an overall system model. As a result, Deep Reinforcement Learning (DRL) is proposed to realize end-to-end learning from perception to robot manipulation. Following that, this article discusses cutting-edge robot research based on RL, such as dexterous manipulation, navigation, trajectory and route tracking, path planning, demonstration and imitation learning.

REFERENCES

1. Vadakkepat P, Peng X, Quek BK, Lee TH. Evolution of fuzzy behaviors for multi-robotic system. Rob Auton Syst. 2007;55(2): 161.
2. Sarker IH. Machine learning: Algorithms, real-world applications and research directions. SN Comput Sci. 2021;2(3):1-21.
3. Dorigo M, Birattari M, Brambilla M. Swarm robotics. Scholarpedia. 2014;9(1):1463.
4. Stirling T, Wischmann S, Floreano D. Energy-efficient indoor search by swarms of simulated flying robots without global information. Swarm Intell. 2010;4(2):117-143.
5. Campion M, Ranganathan P, Faruque S. UAV swarm communication and control architectures: a review. J Unmanned Veh Syst. 2018;7(2):93-106.

Correspondence to: Mohammed Shaeen, Department of Computer Engineering, Islamic Azad University, Dezful, Iran, E-mail: shaheen@azad.edu.ir

Received: 21-Nov-2022, Manuscript No. SIEC-22-19442; **Editor assigned:** 23-Nov-2022, Pre QC No. SIEC-22-19442 (PQ); **Reviewed:** 07-Dec-2022, QC No SIEC-22-19442; **Revised:** 16-Nov-2022, Manuscript No. SIEC-22-19442 (R); **Published:** 26-Dec-2022, DOI: 10.35248/2090-4908.22.11.290.

Citation: Shaeen M (2022) Reinforcement Learning Strategies in Autonomous Robotic Surgery. Int J Swarm Evol Comput. 11:290.