Shashank Kapoor <s22022@students.iitmandi.ac.in>

[Announcement] Invitation to an open seminar by Mr. Shashank Kapoor (S22022)
2 messages

Varun Dutt <no-reply@iitmandi.ac.in>   Sun, Jan 19, 2025 at 1:16 PM
Reply-To: Varun Dutt <varun@iitmandi.ac.in>
Cc: sceeoffice@iitmandi.ac.in

Dear All,

You are cordially invited to attend the open seminar of M.Tech. by research scholar Mr. Shashank Kapoor (S22022) as per the following schedule:

Date: 20 January 2025, Monday
Time: 11 AM
Venue: A13 NKN Conference Room

Colleagues who want to attend virtually can join via this link: https://meet.google.com/cgm-twst-vth

Title: Optimizing Search Efficiency: Collaborative Dynamics in Multi-Robot and Human-Robot Teams via Reinforcement Learning

Abstract:
Prior research on search-and-retrieve tasks has primarily focused on improving model accuracy through supervised and unsupervised artificial intelligence (AI) methods, often neglecting the importance of collaborative dynamics in complex, real-world environments. This research addresses this gap by evaluating the performance of multi-agent and human-robot collaborations in search-and-retrieve tasks via reinforcement learning AI algorithms like the Proximal Policy Optimization (PPO) and Generative Adversarial Imitation Learning (GAIL).

In the first study, a collaborative robotic system comprising a PPO-trained agent and a GAIL-trained agent was tested in a semi-built virtual environment with 56 distractors (e.g., walls, tables) that imposed penalties and 112 targets (e.g., guns, laptops) that yielded rewards. Results revealed that the combined efforts of PPO and GAIL robots significantly outperformed individual performances, demonstrating that generative imitation learning can enhance reinforcement learning in cooperative settings. The second study investigated human-robot collaboration by pairing a PPO-trained robot with human participants (N = 15) in the first study's semi-built environment. Comparative scenarios—featuring human-only and robot-only performances—highlighted that human-robot teams achieved superior search efficiency and accuracy.

These findings emphasize the potential of leveraging imitation learning and human-robot interaction to enhance collaborative performance in complex environments. This research contributes to our understanding of multi-agent systems and human-robot interactions. It offers actionable insights for developing autonomous systems capable of efficient collaboration in simulated and real-world applications.

Best wishes,
Varun

Sender: Varun Dutt (varun@iitmandi.ac.in)

Varun Dutt <varun@iitmandi.ac.in>   Sun, Jan 19, 2025 at 1:18 PM
To: Shashank Kapoor <S22022@students.iitmandi.ac.in>

Fyki. Please update the title accordinglyy.
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