A Framework for Flexibly Guiding Learning Agents (poster)

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A Framework for Flexibly Guiding Learning Agents

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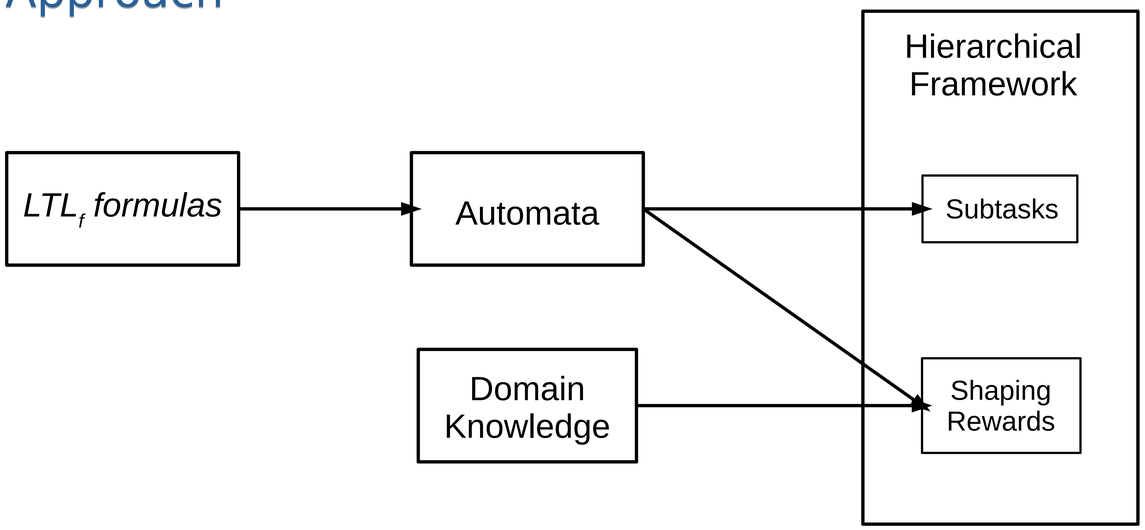
Problem Definition

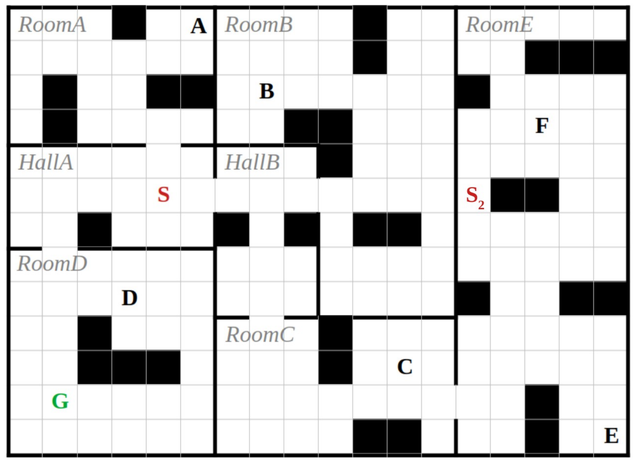
- A Reinforcement Learning (RL) agent typically takes **a huge number of trials** until it can reach a satisfying policy.
- This renders RL **unpractical in real world** applications e.g., robotics.
- We propose a framework to **flexibly communicate prior knowledge** to the learning agent**.**

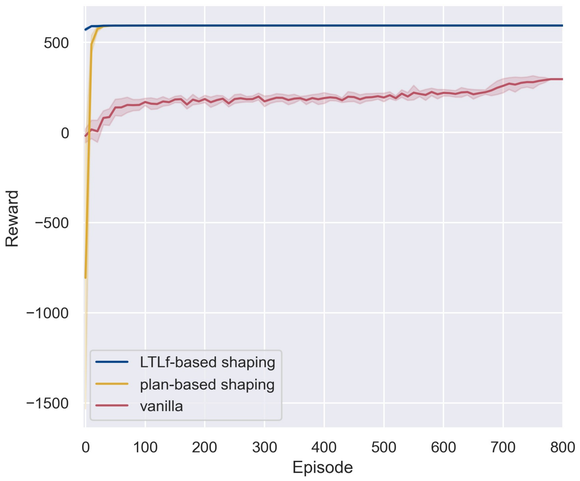
Approach



Experiments

- We demonstrated our approach in several benchmark problems e.g., **flag collection domain**.
- The agents need to cooperate to collect the flags in the minimum number of steps.
- The user can have only **partial knowledge** of the optimal solution e.g., which agent should collect which set of flags.





- **Scenario**: the user knows which agent should collect which set of flags except for flag B.
- **LTLf advice:** the user guides the agents to choose between two solutions

$$F(\phi_1 \wedge \phi_2) \vee F(\phi_3 \wedge \phi_4)$$

The first proposed solution: the 1st collects flag B

$$\phi_1 = \langle have\_flagA, * \rangle \wedge XF(\langle have\_flagB, * \rangle \wedge XF(\langle have\_flagD, * \rangle))$$

$$\phi_2 = \langle *, have\_flagF \rangle \wedge XF(\langle *, have\_flagE \rangle \wedge XF(\langle *, have\_flagC \rangle))$$

The second proposed solution: the 2nd collects flag B

$$\phi_3 = \cdots, \phi_4 = \cdots$$

Work-in-progress

- Demonstrating our approach on a **machine tending task**: a team of mobile robots cooperate to pick up and deliver items during predefined time windows.

This work is part of the Flanders AI research program
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