LLM Task Planning Capabilities For RL

Evaluating Language Model Capabilities on MiniGrid Planning

Aruna Srivastava • Andy Yun

PAUL G. ALLEN SCHOOL OF COMPUTER SCIENCE & ENGINEERING

Introduction

Problems:

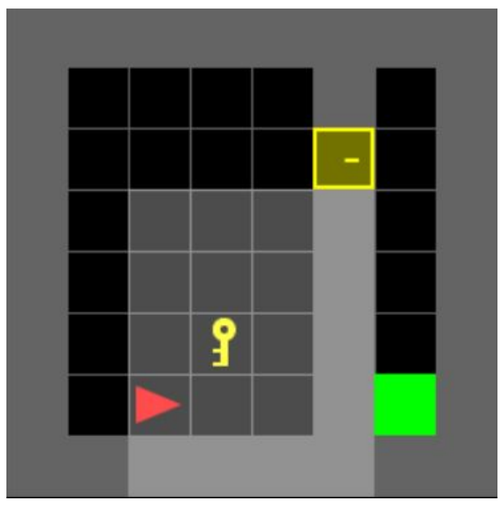
- *Efficient interaction between agents and LLMs in complex environments*
- *Efficient interactions between users and LLMs: Finding effective Task Planning procedures*

Existing LLM + RL work:

- **When2Ask Framework**
  - Knowing **when** to consult the LLM planner becomes crucial (π^{ask})
- **Planner-Actor-Mediator Framework**
  - Continually planning from LLM, regardless of new information

Hypothesis: *Can a combined approach using a foundation model and various prompting strategies improve planning efficiency?*

Methods



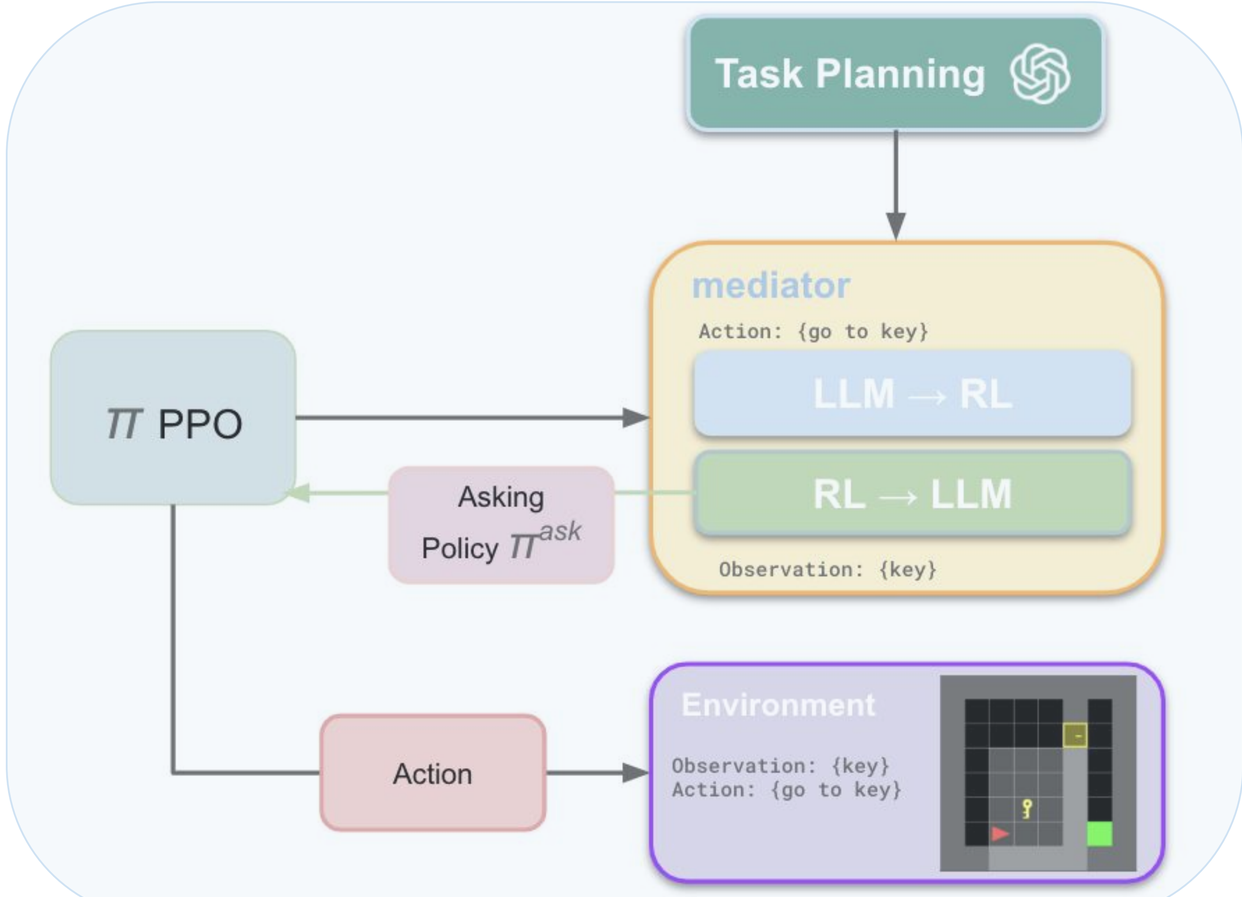
Observed Nothing

Observed Yellow Key

π^{ask}

Observed yellow door, unlocked with yellow key, arrived at green target

$$\max_{\theta} \sum_{t=1} \left[\gamma^t r_t - \lambda \mathbb{1}(y_t == Ask \wedge \omega_t == \omega_{t-1}) \right],$$



Results

Task Planning with GPT-3.5-Turbo

LLM Prompt: Do you like CSE 542?

"CSE542 is an awesome RL class taught by Abhishek Gupta, and I absolutely love it!" 🌟📚😊

Future Works

- Using Encoding scheme instead of raw text inputs
- Increase Environment Complexity: Virtual Home, AI2-Thor, and real-world robots
- Common Sense & Theory of Mind for Task Planning

References

Hu, B., Zhao, C., Zhang, P., Zhou, Z., Yang, Y., Xu, Z., & Liu, B. (2024). Enabling Intelligent Interactions between an Agent and an LLM: A Reinforcement Learning Approach.

💜 **Anish @ Brev, Hu Bin @ Zhejiang Lab, Professor Gupta**

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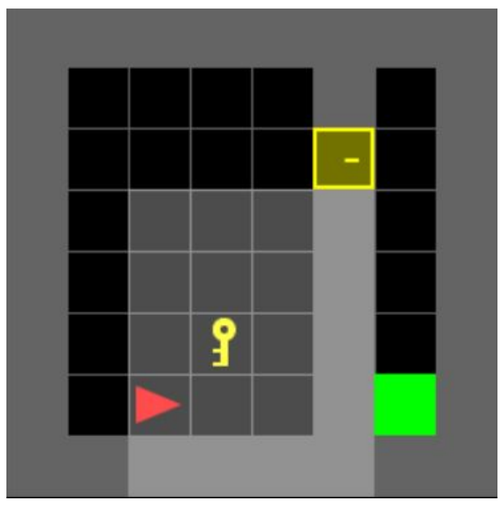

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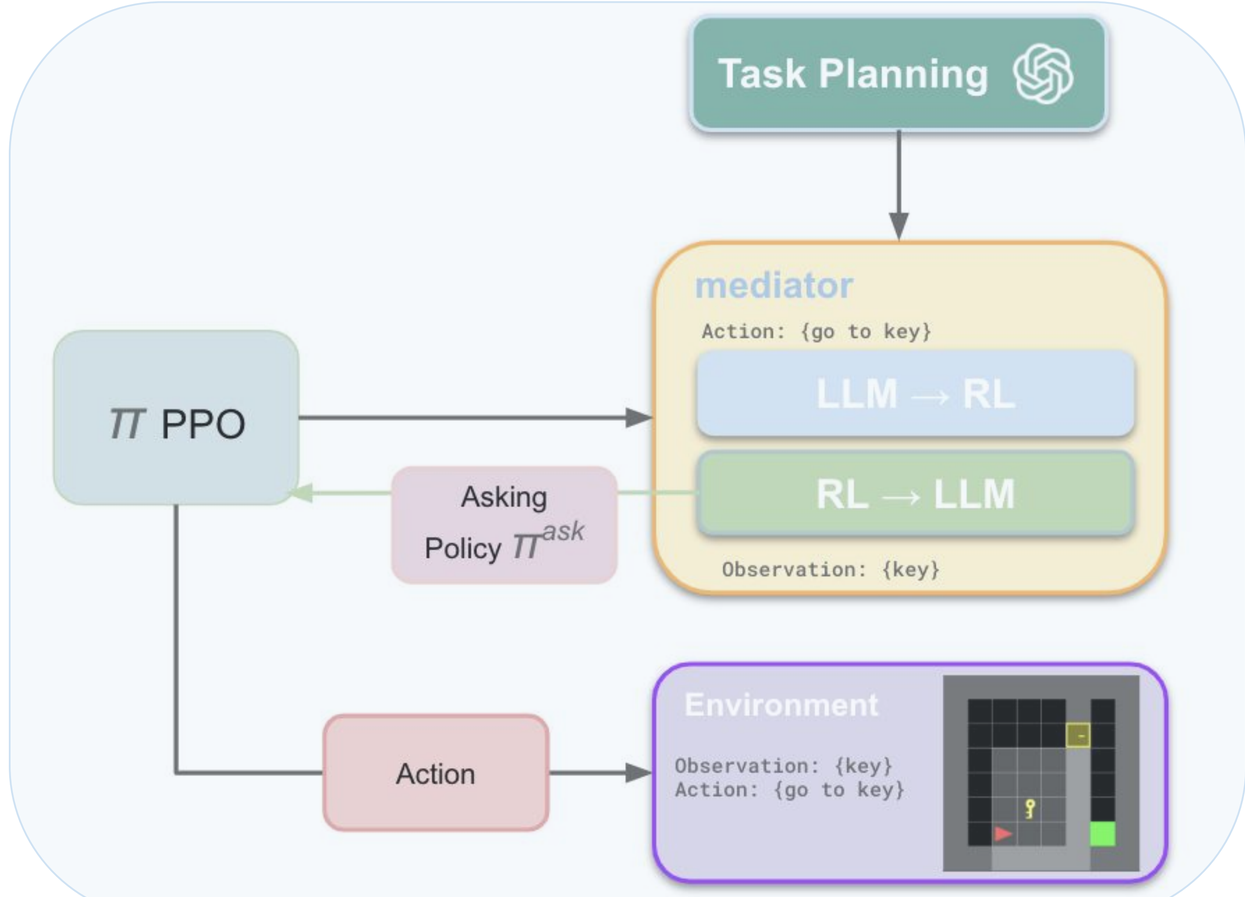

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