Learning to Query Internet Text for Informing Reinforcement Learning Agents

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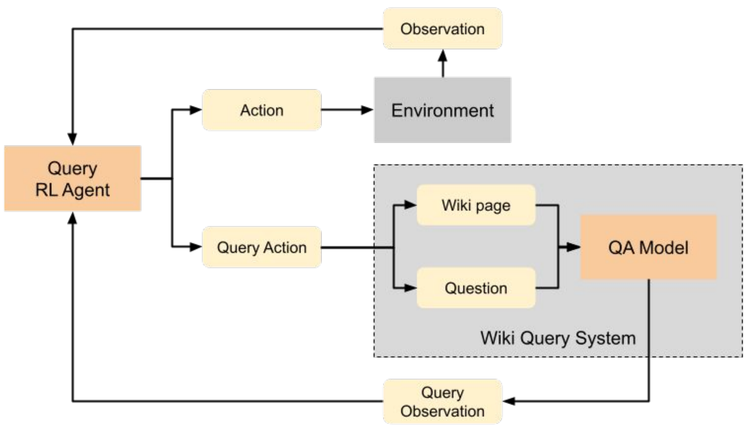
Objectives

- Extract environment knowledge from external wiki-style knowledge base
- Minimize calls to expensive resources such as language models

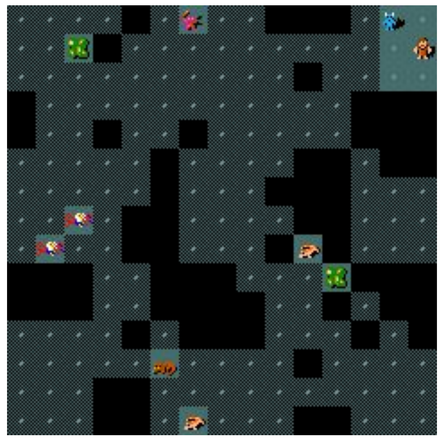
Challenges

- Unstructured, non-task-specific text
  - Noisy, difficult to extract knowledge
- Limited amount of natural text
  - Requires zero/few-shot learning
- Pretrained language models (LMs) are slow at inference time

Query Agent



Environment



- Agent attacks with fire or cold weapon
- Monsters have fire or cold resistance
- Rewarded for slaying monsters

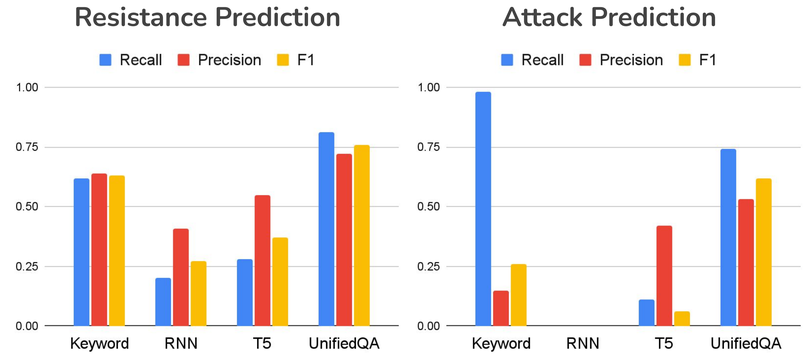
Wiki

- 3,000+ total pages
- 393 monsters
- 9 resistance and 9 attack types

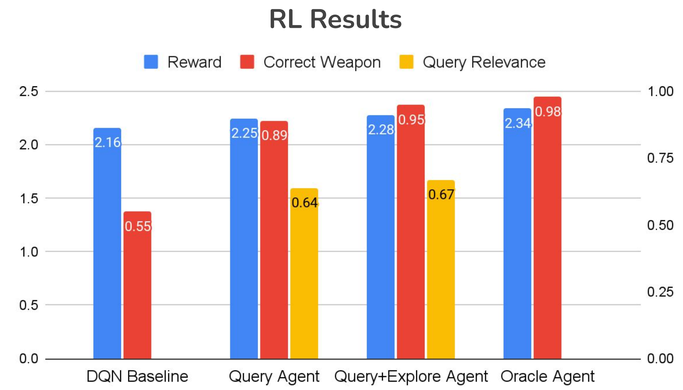
"Balrogs have [...] **resistances to fire** and poison."

"Ice trolls are **immune to cold**, and one of their attacks deals cold damage."

Analysis



- LMs are necessary for generalization



- Learns to query the ambiguous states
- Query-specific exploration increases convergence speed by x4

Summary

- Nethack for testing NL informed RL
- QA models for zero-shot knowledge
- Learning *when* to query improves inference latency