A Generic Dialog Agent for Information Retrieval Based on Automated Planning Within a Reinforcement Learning Platform

Introduction
Finding relevant information in large data sets is often challenging - as one either needs knowledge of query languages or put manual effort. Our work makes use of natural language queries to help the user look for information. A chatbot is designed to assist the user in leading him towards his desired goal using Planning and RL. The user might ask the chatbot, "Give me the code associated with pliers" and our system used RL to identify the relevant data source and use planning approaches to control the conversation flow towards the goal. We show a system which can do this and demonstrate the viability of our approach on large datasets of UNSPSC (D1), ICD-10 (D2), and a small phone directory (D3).

Problem
The research problem is to make information lookup easy and accessible by making use of a chatbot. However, the current approach for building a chatbot is learning based which • require large training data • once trained and deployed, there is no control over the flow of conversations • hard to scale

Contribution
We present a generic and controlled dialog system interleaved with planning and RL for information retrieval. The major contributions are • Incorporating planning based dialog response generation in a RL based dialog framework. • Demonstrating a general, planning based approach for creating chatbots for information lookup • Exploring multiple RL and planning integration strategies. • Creating a test-bed to evaluate conversations between user and the chatbot

Approach
Figure 1 shows main components - ParlAI Core, Planner, and an Executor. The ParlAI core provides the interface for the dialog agent to interact with the user. The Planner, along with ParlAI core, helps in IntentIdentification. The policy learnt helps in automatic source selection based on the user’s query. The Planner then generates a plan for the Executor, to perform Information Retrieval from the selected data source. Figure 2 shows the sample conversation between user and the chatbot. The system has been evaluated using various metrics such as accuracy, intent recognition and task length. Figure 3 captures the evaluation of the system.

Future Work
The future steps involve • Exploring more interleaved RL and Planning strategies for dialogs • Performing a comprehensive evaluation of the approach.

Authors
Vishal Pallagani, Biplav Srivastava
{vishalp@mailbox, biplav.s}@sc.edu

Affiliation
University of South Carolina

Figure 1. Proposed System Architecture

Figure 2. Information Lookup on ICD10.
The user is searching for laceration of ulnar artery at wrist and hand level

Figure 3. System Evaluation