DIALOGUE LEARNING WITH HUMAN TEACHING AND FEEDBACK IN END-TO-END TRAINABLE TASK-ORIENTED DIALOGUE SYSTEMS

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The team from Carnegie Mellon University and Google introduced a new approach to train a task-oriented dialogue system. In particular, they suggested a hybrid imitation and reinforcement learning method, where the agent is firstly trained in a supervised manner from dialogue corpora, and then, continuously improves its performance by learning from users that demonstrate the right action to take when the agent makes mistake and give positive vs. negative feedback at the end of a dialogue. The experiments show that imitation learning combined with the reinforcement learning based on the user feedback significantly improves the agent's performance.

CORE IDEA OF THIS PAPER

Introducing a neural network based task-oriented dialogue system that:

- is pre-trained in a supervised manner from dialogue corpora;
- collects new dialogue samples through interaction with users, i.e. when the agent makes mistakes, the system asks users to correct these mistakes and demonstrate the expected actions for the agent to make;
- gets a positive reward for successful tasks and a zero reward for failed tasks based on the user feedback at the end of a dialogue.

KEY ACHIEVEMENT

The dialogue system pre-trained in a supervised manner, followed by 1000 episodes of imitation learning, followed by reinforcement learning gets:

1. roughly 65% of tasks completed successfully;
2. a score of 4.63 from human evaluators on a scale of 1 (frustrating) to 5 (optimal way to help the user).

Dialogue state tracking accuracy goes up from 50.5% to 67.5% after only 500 imitation dialogue sessions.

FUTURE RESEARCH AREAS

Exploring other, more natural ways to integrate human teaching and feedback into the agent's training process.

POSSIBLE BUSINESS APPLICATIONS

Improving the performance of task-oriented chatbots by incorporating human teaching and feedback into the model.

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