Zero-Shot Prompting for Implicit Intent Prediction & Recommendation with Commonsense Reasoning

MIULAB

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https://github.com/MiuLab/ImplicitBot/

Motivation

✓ <u>High-level intention</u> may span several domains
✓ Users interact via high-level descriptions and the system learns <u>how to plan</u> the dialogues

Task

• Input: a user high-level intention utterance
• Output: 1+ task-specific bots for fulfilling the intention

User High-Level Intention Utterance

> I want to plan a trip to Seattle.

Implicit Tasks/Intents

> Flight Ticket Booking; Room Reservation

> *EVA Airline Bot can book a flight ticket for you. When will you travel there?*

> Sure. I want to fly on ….
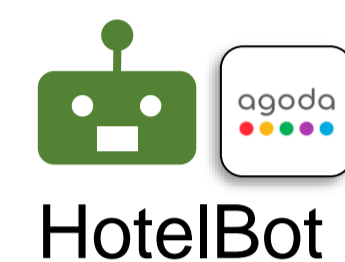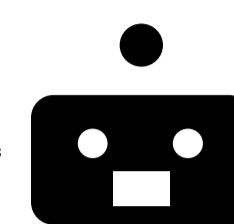
> Here are the flights: …

> *Agoda Bot can reserve a room for you. Do you want to specify your preference?*

> Oh, yes. I want 5-star for 2 people.

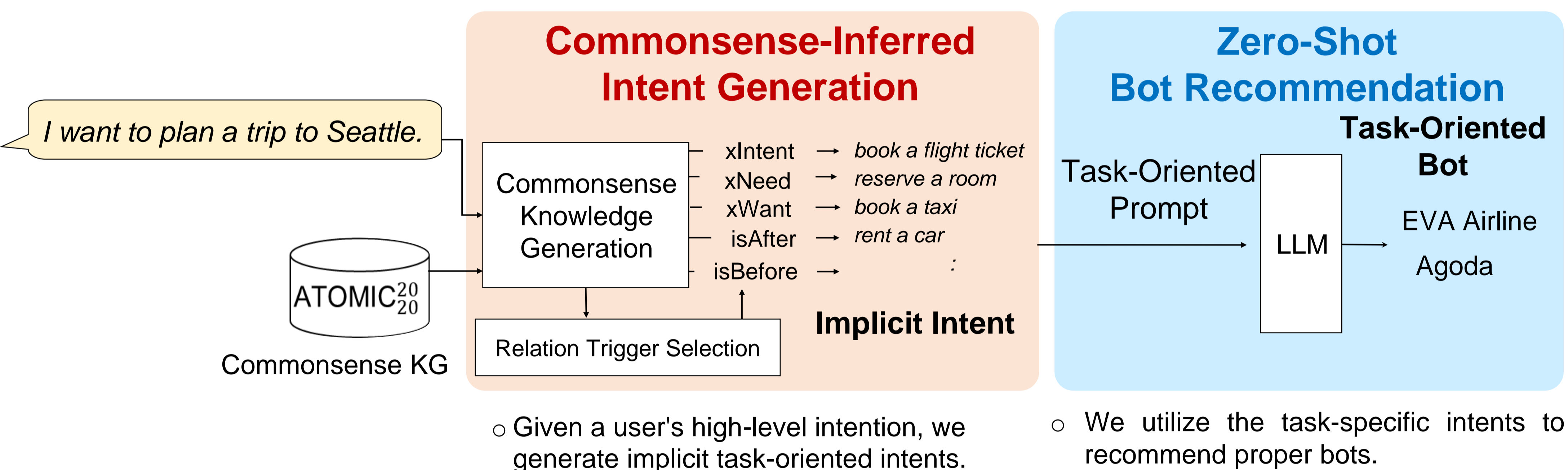> Here are the 5-star hotels with available rooms: …

AirlineBot

HotelBot

Idea: utilize implicit intents to bridge a high-level description and task-specific bots

Proposed 2-Stage Framework
1) Commonsense-Inferred Intent Generator & 2) Zero-Shot Bot Recommender

Commonsense-Inferred Intent Generation

> I want to plan a trip to Seattle.

ATOMIC²⁰₂₀

Commonsense KG

Commonsense Knowledge Generation

Relation Trigger Selection

xIntent → *book a flight ticket*
xNeed → *reserve a room*
xWant → *book a taxi*
isAfter → *rent a car*
isBefore → *:*

Implicit Intent

Zero-Shot Bot Recommendation

Task-Oriented Prompt

LLM

Task-Oriented Bot

EVA Airline

Agoda

○ Given a user's high-level intention, we generate implicit task-oriented intents.

○ We utilize the task-specific intents to recommend proper bots.

Q1: Is adding implicit intents (2-stage) for bridging useful?

A1: YES

Method	P	R	F1	Human Score
1-Stage Baseline	30.3	20.6	23.7	1.73 ± 1.03
2-Stage GPT-3 Prompting	28.6	**41.7**	31.8	2.11 ± 0.46
Our 2-Stage Commonsense	**36.0**	35.7	**32.9**	**2.18 ± 0.34**

(1) Irrelevant
(2) Acceptable
(3) Useful

Q2: Is commonsense KG better than GPT-3 prompting?

Q3: Is adding reasons more convincing for recommendation?

A2: YES

Method	Win	Lose	Tie
Ours vs. 2-Stage GPT-3 Prompting	57.6	40.2	2.2
Ours vs. Ours w/o Reasons	55.1	38.8	6.1

A3: YES

We are planning to celebrate friend's birthday at a restaurant in [City].		Score
1-Stage Prompting	Tinder (Lifestyle), Grindr (Lifestyle)	1.83
2-Stage Prompting	Zomato can help to book the restaurant in advance. WhatsApp can find out about their contact information.	2.00
Ours	WhatsApp can help have a good time and to celebrate a friend's birthday. OpenTable can help book a table at the restaurant and go to the restaurant.	2.67
Ours w/o Reasons	WhatsApp (Communication), OpenTable (Food & Drink)	2.17