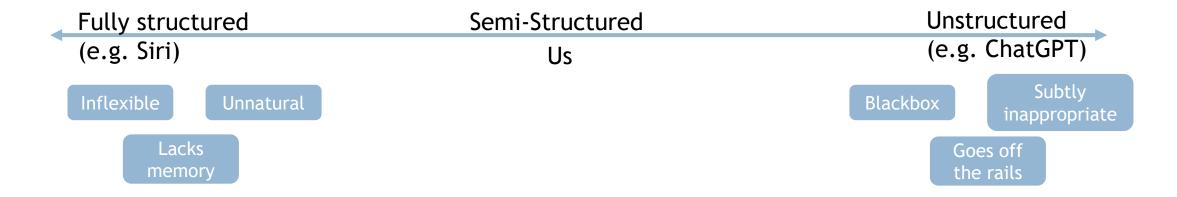
D3M ConvRec Demo

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Semi-structured Prompt-based Conversational Recommendation Assistant



Siri

Sure, I would recommend Penny's Hot Chicken on Yonge Street

Hmm.. I don't have an answer for that. Is there something else I can help with?

Can you give me some restaurant recommendation?

Do they have free wifi?

ChatGPT

Certainly! Here are some Japanese restaurants you might enjoy: Sushi Yasuda (New York City, USA) Jiro's Sushi (Tokyo, Japan) Zuma (London, UK) I would love to have some Japanese food.

Our recommendation system

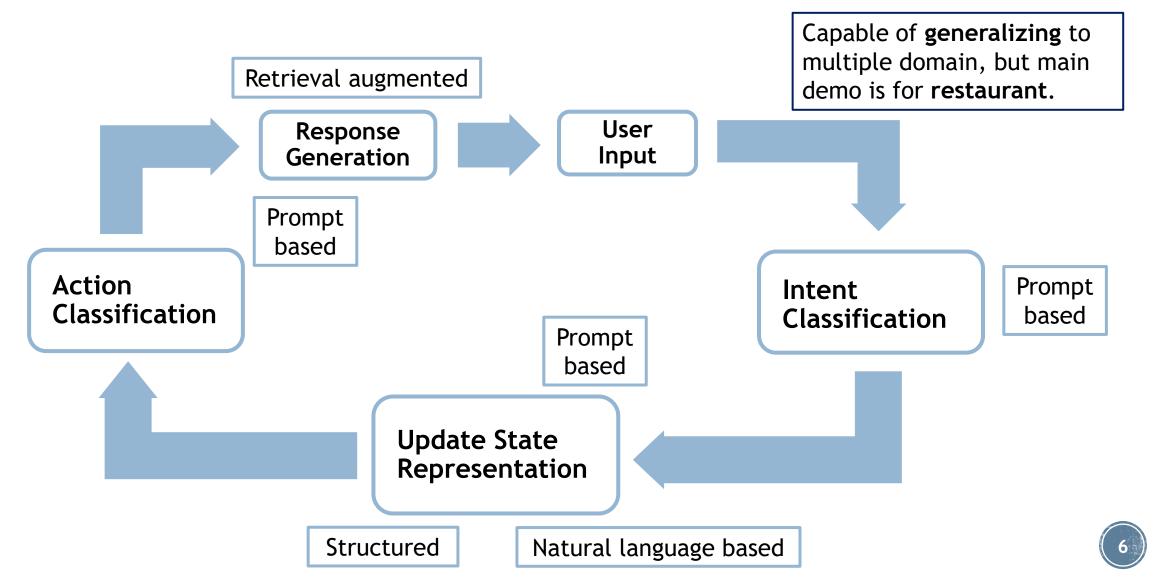
Can you provide the location?

How about checking out I Love Sushi for Japanese cuisine? It's great for families and has a casual yet classy vibe. And for more options, Let's Grill Sushi & Izakaya on Jasper Avenue is also worth considering. Both have excellent food according to customer reviews.

I would love to have some Japanese food.

Jasper Avenue

Semi-structured Prompt-based Conversational Recommendation Assistant



Demo

I am looking for Japanese restaurants that serve excellent sushi, preferably in a casual setting.

Can you provide the location?

Information gathering

Tower Road NW & Kingsway NW

How about trying Washoku Bistro for a comfortable and laid-back vibe while enjoying some delicious Japanese sushi? But if you're looking for something quick and easy without sacrificing taste, Tokyo Express is another great option near the same location.

What kind of menu do they offer?

Demo

For Washoku Bistro, they offer a lunch menu with bento boxes and entrées, with limited options. They also have sushi rolls, such as spicy salmon rolls and California rolls. As for Tokyo Express, they have a wide variety of options including bento boxes, sushi combos, feature rolls, tempura, and noodles.

I'm sorry that you did not like the recommendation. Is there anything else I can assist you with?

Rejects recommendation

Ok, then the first one doesn't seem to match my preference.

Demo

Tokyo Express has a parking lot.

Great! Enjoy your meal! If you need any more assistance, feel free to ask.

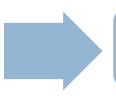
Does Tokyo Express have a parking lot?

Accepts recommendation

Great. I will go there then. Thanks!



Response Generation



User Input

Prompt based

Action Classification

- Request Info
- Recommend
- Answer

Overall Flow

A single interaction loop

Update State Representation

- Constraints
- Preferences
- Current restaurants
- Accepted/Rejected Restaurants

Intent Classification

- Provide Preference
- Inquire
- Accept/RejectRecommendation

Prompt based

Prompt based

Intent Classification Update State Representation Action Classification

False

False

True

Response Generation

Multi-label Intent Classifier

Intent Classification Prompts LLM Output

Utterance

"Does Tokyo Express have a parking lot?" Provide Preference

Accept Recommendation

Reject Recommendation

Inquire

This is a restaurant recommender. Given a user input, please respond with **True or False** for whether the user input contains an intent of "Inquire": User wants more information regarding a specific restaurant... + <few-shot examples>

True

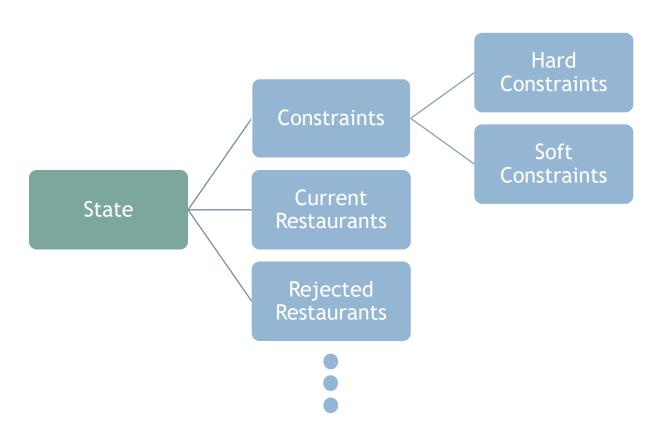
Provide Preference + Inquire

Result

Intent Classification Update State Representation Action Classification

Response Generation

State Representation



Question: How should we update the constraints?

Answer: Use LLM!

- Input: Previous hard/soft constraints + user's input
- Output: Updated hard/soft constraints

Intent Classification Update State Representation Action Classification

Response Generation

Updating Constraints

You are a restaurant recommender. Please give me the updated hard and soft constraints towards restaurants based on the user's current input. Hard constraints are...

Here are the **descriptions** of each constraint categories that you have to extract:

•••

<few-shot examples>

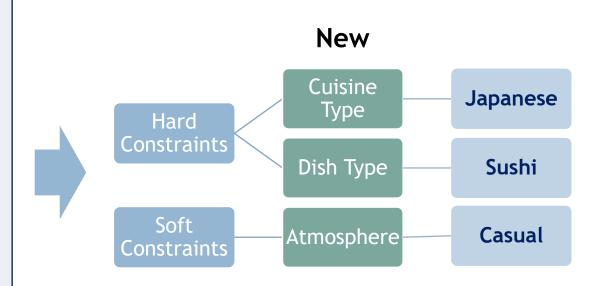
Old Hard Constraints:

None

Old Soft Constraints:

None

User's Current Input: "I am looking for **Japanese** restaurants that serve excellent **sushi**, preferably in a **casual** setting."



Intent Classification Update State Representation Action Classification

Response Generation

Updating Constraints

You are a restaurant recommender. Please give me the updated hard and soft constraints towards restaurants based on the user's current input. Hard constraints are...

Here are the **descriptions** of each constraint categories that you have to extract:

•••

<few-shot examples>

Old Hard Constraints:

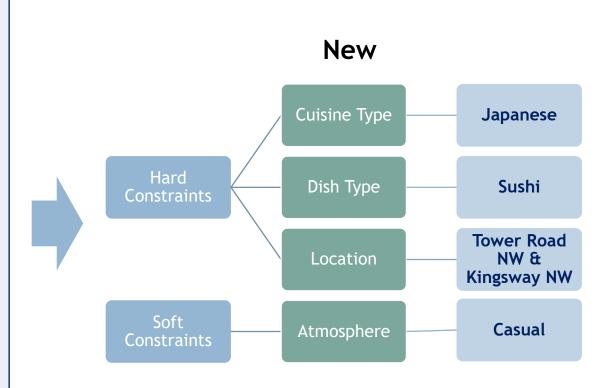
- cuisine type: "Japanese"

- dish type: "Sushi"

Old Soft Constraints:

- atmosphere: "Casual"

User's Current Input: "Tower Road NW & Kingsway NW"

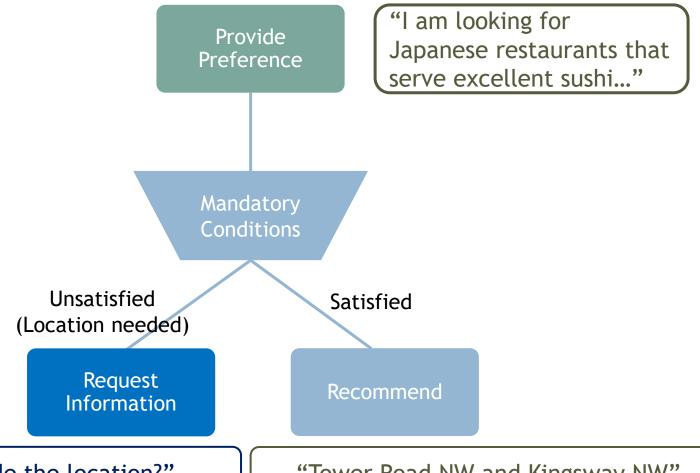


Intent Classification Update State Representation

Action Classification

Response Generation

Classify Recommender Action



"Can you provide the location?"

"Tower Road NW and Kingsway NW"

Recommend + QA

Recommend: Information Retrieval with Late Fusion



Recommend: Format Response with Explanation

Washoku Bistro

Tokyo Express

Get explanation for each restaurant

You are recommending a restaurant called <restaurant-name> that has the following information and reviews.
Information: <restaurant-information> Reviews: <reviews>

Using a few concise sentences, tell me why <restaurant-name> is good for the following context.

•••

Hard constraints: <hard-constraints>
Soft constraints: <soft-constraints>

Format final response

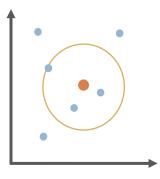
"How about trying
Washoku Bistro for a
comfortable and laidback vibe while enjoying
some delicious Japanese
sushi? But if you're looking
for something quick and
easy without sacrificing
taste, Tokyo Express is
another great option near
the same location."

Question Answering

"What kind of menu do they offer?"

Answer question from metadata?

Embedding Space for 1 Restaurant



- Query Embedding
- Review Embedding

Standard dense retrieval



You are responsible for answering questions about <current-restaurant-name> based on provided information. Answer the question below.

••

Question: <question-from-user> Information: <top-k-reviews>

Answer:

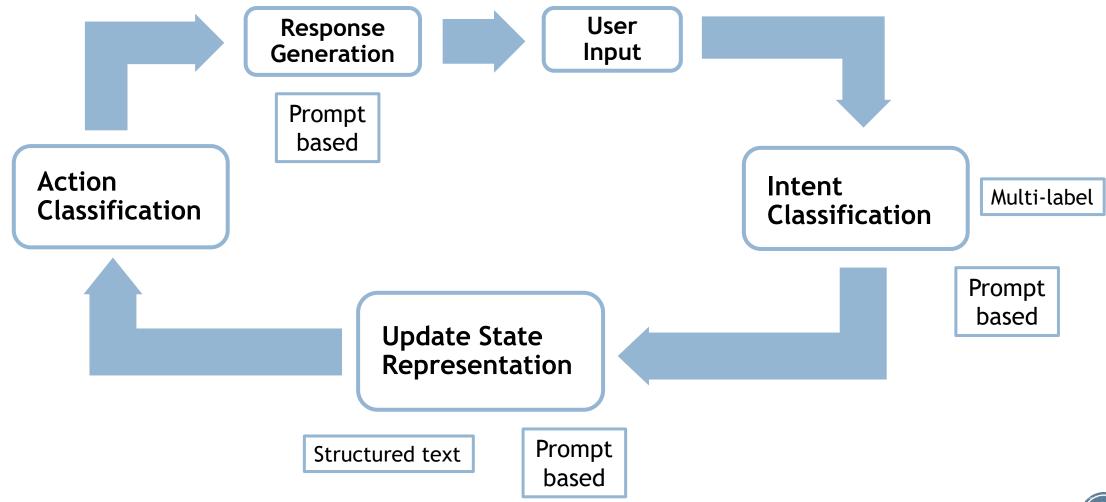
Extract answer from reviews

"For Washoku Bistro, they offer an affordable lunch menu with a decent selection of entrees such as bento boxes and sushi rolls that come with some spicy options. However, their menu can be limited, and they don't have many traditional items. For Tokyo Express, they have a variety of options available, including bento boxes, sushi combos, feature rolls, tempura, and noodles."

How does the LLM size compare?

Test type	GPT3.5-175B	Alpaca Lora-7B
User Intent Classification	Passed 105 / 114	Passed 9 / 114
Constraints Updater	Passed 99 / 134	Passed 6 / 134
Current Item Extractor	Passed 14 / 14	Passed 3 / 14
Accepted Item Extractor	Passed 10 / 10	Passed 3 / 10
Rejected Item Extractor	Passed 10 / 10	Passed 0 / 10
Answer Extract Metadata Category	Passed 7 / 10	Passed 4 / 10
Answer Separate Question	Passed 12 / 15	Passed 0 / 15

Summary



Try it! Code is open sourced with MIT license.

Google Colab Demo



https://apoj.short.gy/d3m-llm-convrec-demo

Github Repository



https://apoj.short.gy/d3m-llm-convrec-git