Building Conversational Apps Customers Will Rely On and Love

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Director of Research
Step 1: Select the Right Use Case

Service Desk Concierge
JUNE 12, 7:06 PM

Hello, Pat. Would you like to book a service appointment for your 2011 Honda CR-V?
- Yes
- No, another car

Tell us a few words to describe the problem or enter the code shown on the in-car display.
- a1

OK. It looks like your vehicle needs an Oil Change Service. Tap or type your drop-off time.
- Tue 7-9am
- Thu 7-9am
- Tue 1-2pm

Great. That time is available. Would you like to confirm Thursday, June 16 at 12:00pm?

My Booking Agent
JUNE 21, 11:35 AM

Hello, Jim. I can help you book a hotel. What city are you visiting?
- nyc

Got it. Hotels in New York City. What is your check-in date?
- this friday for 3 nights

OK. There are 53 hotels in New York City available from Friday, June 24 to Monday, June 27. Want to filter by location or price?

<table>
<thead>
<tr>
<th>Location</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midtown</td>
<td>$$</td>
</tr>
<tr>
<td>Chelsea</td>
<td>$$$</td>
</tr>
<tr>
<td>Soho</td>
<td>$$$$</td>
</tr>
</tbody>
</table>

- $$$ in midtown

Here are hotels in Midtown between $150 and $280 per night.
- GRAND HYATT
  - 4 stars
  - $275/night
- ROW NYC
  - 3 stars
  - $233/night

“I want to listen to the latest episode of Radiolab”

“Play my eighties music playlist in the kitchen”
Step 2: Script Your Ideal Dialogue Interactions

- Design the conversation flows that define the user experience
- Remember to handle corner cases and exceptions
- Decide the desired language and tone for the experience

Hello, Pat. I can help you find store hours for your local Kwik-E-Mart. How can I help?

When does the store on Elm Street close today?

The 23 Elm Street Kwik-E-Mart opens at 7am and closes at 9pm today.

Where is the nearest Kwik-E-Mart?

Your nearest Kwik-E-Mart is located at Pine and Market.

When does that store open tomorrow?

The Pine and Market Kwik-E-Mart opens at 6am and closes at 10pm tomorrow.

Have a nice day.
Step 3: Define the Domain, Intent, Entity and Role Hierarchy

**Domain Classifier:**
- Will it rain tomorrow? \(\rightarrow\) **Domain:** weather
- Play my jazz playlist. \(\rightarrow\) **Domain:** music

**Intent Classifiers:**
- Wake me up at 7am \(\rightarrow\) **Intent:** set-alarm
- Who sings Thriller? \(\rightarrow\) **Intent:** get-artist-name

**Entity Recognizers:**
- Book a flight to Miami. \(\rightarrow\) **Entity:** Miami
- Films with Tom Hanks. \(\rightarrow\) **Entity:** Tom Hanks

**Role Classifiers:**
- Schedule a meeting from 10am to noon \(\rightarrow\) '10am' **Role:** start, 'noon' **Role:** end
Domain-Intent-Entity Hierarchy for Kwik-E-Mart App

DOMAINS:

ENTITIES:

location  day

greet  get_store_hours  find_nearest_store  exit  help
Step 4: Create the Knowledge Base

<table>
<thead>
<tr>
<th>Store Name</th>
<th>Open Time</th>
<th>Close Time</th>
<th>Address</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Elm Street</td>
<td>7am</td>
<td>9pm</td>
<td>23 Elm Street, Suite 800, Springfield, OR 10001</td>
<td>541-555-1100</td>
</tr>
<tr>
<td>Pine and Market</td>
<td>6am</td>
<td>10pm</td>
<td>750 Market Street, Shelbyville, OR 94001</td>
<td>541-555-4500</td>
</tr>
<tr>
<td>Central Plaza Store</td>
<td>8am</td>
<td>10pm</td>
<td>100 Main Street, Suite 800, Capital City, OR 10001</td>
<td>458-100-1100</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Step 5: Generate Representative Training Data
Collect representative data for each supported intent

**Intent: greet**
- Hello
- Good morning!
- How are you?
- Greetings
- How's it going?
- What's up?

**Intent: exit**
- Bye
- Good bye!
- See you later.
- Quit
- Sayonara

**Intent: get_store_hours**
- What are the hours for the Kwik-E-Mart on E Street?
- The store at Central Plaza – Is it open now?
- Is the Main St store is open on Sunday?
<table>
<thead>
<tr>
<th>Intent</th>
<th>get_store_hours</th>
<th>Entities:</th>
<th>location</th>
<th>day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What are the hours for the Kwik-E-Mart on {E Street</td>
<td>location}?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The store at {Central Plaza</td>
<td>location} – Is it open now?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the {Main St</td>
<td>location} store is open on {Sunday</td>
<td>day}?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intent</th>
<th>exit</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bye</td>
<td>Good bye!</td>
<td></td>
</tr>
<tr>
<td></td>
<td>See you later.</td>
<td>Quit Sayonara</td>
<td></td>
</tr>
</tbody>
</table>
Collect comprehensive data for entity name variations

<table>
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<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Elm
Elm Street
Springfield Shopping Center

Central Plaza
Main Street Plaza
100 Main Street
...
Millions of representative training examples may be needed.

Crowdsourcing

Live User Data
Step 6: Train the Natural Language Processing Models

HIGH-QUALITY TRAINING DATA

STATE-OF-THE-ART MACHINE LEARNING ALGORITHMS

NLP PIPELINE WITH NEAR-HUMAN ACCURACY
Classifying the user intent

INPUT

“Order one large squishee and a dozen donuts from the Elm Street Kwik-E-Mart”

DIALOGUE HISTORY

USER CONTEXT

OUTPUT

TARGET INTENT: ORDER

Order
Get Store Hours
Get Nearest Store
Help
Greet
Exit
Recognizing Entities

“Order one large squishee and a dozen donuts from the Elm Street Kwik-E-Mart”

INPUT

DIALOGUE HISTORY

USER CONTEXT

TARGET INTENT

OUTPUT

one
large
squishee
a dozen
donuts
Elm Street

CONFIDENCE: 0.976
CONFIDENCE: 0.941
CONFIDENCE: 0.982
CONFIDENCE: 0.913
CONFIDENCE: 0.891
CONFIDENCE: 0.992

CONFIDENCE: 0.891
CONFIDENCE: 0.913
CONFIDENCE: 0.891
CONFIDENCE: 0.992

CONFIDENCE: 0.992
“Order one large squishee and a dozen donuts from the Elm Street Kwik-E-Mart”
### INPUT

"Order one large squishee and a dozen donuts from the Elm Street Kwik-E-Mart"

### DIALOGUE HISTORY

#### USER CONTEXT

#### TARGET INTENT

#### RESOLVED ENTITIES

### OUTPUT

#### ORDER DETAILS

<table>
<thead>
<tr>
<th>ITEM 1</th>
<th>ITEM 2</th>
<th>SELECTED STORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIGNATURE SQUISHEE:</strong> SKU 5</td>
<td><strong>GLAZED DONUT:</strong> SKU 70</td>
<td><strong>23 ELM STREET:</strong> STORE 27</td>
</tr>
<tr>
<td><strong>QUANTITY:</strong> 1</td>
<td><strong>QUANTITY:</strong> 12</td>
<td></td>
</tr>
<tr>
<td><strong>SIZE:</strong> LARGE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 8: Implement / Train the Question Answerer

**INPUT**
- TARGET INTENT: GET_NEAREST_STORE
- USER CONTEXT

**OUTPUT**
- RESULTS
  - 1. SPRINGFIELD MALL: STORE 11
Step 8: Implement / Train the Question Answerer

INPUT
- TARGET INTENT: GET_STORE_HOURS
- ENTITIES: MAIN STREET (STORE LOCATION)
- USER CONTEXT

OUTPUT
RESULTS
1. 234 MAIN STREET: STORE 46
2. 10 S MAIN STREET: STORE 89
3. CENTRAL PLAZA: STORE 8
Step 9: Implement the Dialogue States

Hello

When does the store on Elm Street close today?

Where is the nearest Kwik-E-Mart?

When does that store open tomorrow?

Goodbye

DIALOGUE STATE: welcome
REPLY: Hello, {name}. I can help you find store hours for your local Kwik-E-Mart. How can I help?

DIALOGUE STATE: send_store_hours
REPLY: The {location} Kwik-E-Mart opens at {open_time} and closes at {close_time} {date}.

DIALOGUE STATE: send_nearest_store
REPLY: Your nearest Kwik-E-Mart is located at {location}.

DIALOGUE STATE: say_goodbye
REPLY: Have a nice day.
Step 10: Deployment and Integration

CONVERSATIONAL AI PLATFORM

(Private Cloud or On-Premise Deployment)

CONVERSATION GATEWAY

Native Apps

Messaging Platforms

Virtual Assistants
The Conversational AI Playbook

mindmeld.com/docs