Hackathon: A Simple Chat Bot

Manish Shrivastava

Why chat bot?

- (Most?!!) Important AI problem
- Inherently challenging
- Saving grace
  - Can be solved
    - At different levels of difficulty
    - With different set of capabilities
  - The complexity of the problem is dependent on the domain
- But, general, open-domain chatbot is WAYYYY too difficult right now

Purpose

- AI/ML is about
  - Data Preparation
  - Collaboration
  - Uniqueness of solution (Bonus)
- Chatbot
  - Cannot train data heavy methods in one day
  - Purpose of the chat bot is
    - Get a taste of AI
    - Build meaningful tools in a short time

Complexities

- Even in a simplistic setting
  - Each task requires independent treatment
  - Knowledge/expertise hungry
- In all cases
  - Conversational Natural Language Understanding
  - Limited scope
- NLU
  - Can be made simple depending on task

Why is NLU challenging?

- Intents
  - Multiple ways to say the same thing:
- “Find me inexpensive restaurants with nice ambiance”
- “I am looking for an inexpensive restaurant that has relaxed atmosphere”
- “Locate cheap restaurants good for informal dinner”

An NLU module often needs to map many different surface texts onto the same meaning

NLU approaches

- Rule-based
  - Internal representation frames
  - Rules define how to extract semantics from a string/syntactic tree
- Statistical
  - Internal representation: intent and/or semantic tags
  - Train statistical models on annotated data
    - Classify intent
    - Tag domain-specific concepts

Natural Language Understanding

- With Frame model, there are many ways to handle the meaning of sentences
- For dialogue systems, most common is “Frame and slot semantics”.

Intent Classification

Intent: get_shows

What is playing in Lincoln Center
What movies are showing at Angelica Film center tonight
List movies at Film Forum after 7pm tomorrow
…

Intent: get_restaurants

Find inexpensive restaurants in Chelsea
Sushi restaurants in the Village
Brunch in Brooklyn Heights
…

Approach: supervised classification (SVM, CRF, Decision Tree, etc.)

Concept Labels

Intent: get_shows

What is playing in Lincoln Center/VENUE
What movies are showing at Angelica Film Center/VENUE tonight/TIME
List movies at Film Forum/VENUE after 7pm tomorrow/TIME
…

Intent: get_restaurants

Find inexpensive/PRICERANGE restaurants in Chelsea/NEIGHBORHOOD
Sushi/CUSINE restaurants in the Village/NEIGHBORHOOD
Brunch/CUSINE in Brooklyn Heights/NEIGHBORHOOD
…

Components of a Chatbot Framework

- Dialog Manager
  - Managing dialog state
- Natural Language Understanding
- Intent states
  - Understanding the intent of a users input
- Conversation FSA (usually a tree)

Task at hand

- Build chatbots to handle two different domains
- Perform action at the end of the chat

Grading Scheme

- For each of the two tasks:
  - 5 marks for dialog state population and understanding
    - We will run your chat bot 6 times, randomly varying the input sentences each time. The chatbot should correctly reach action state with all the relevant information at least
      - 3 times for 5 marks.
      - >0 times for 3 marks
      - Else 0 marks
  - 5 marks for information seeking from the group created DB
    - 2 marks for 100 diverse entries in the DB
    - 3 marks for Correct Query formulation for at least half the runs that reach action state else 0/3

Skills

- A skill is the ability to gather information required to perform a task and to actually perform that task
  - “With a custom Alexa Skill, you control the requests made by the user, as well as the words they use to trigger the Skill.” –Amazon
- Each of the tasks provided are a skill
- A simple yet complete task

Requirements

- Some parameters are required for a chatbot skill for a particular task
  - What are the “attributes”
    - What are the variables required to perform the task? (Source, Destination, time etc…)
  - What are the entities?
    - City names, store names, book names etc.
  - What are the Responses?
    - What should the bot say?
      - If destination is not set : “Where do you want to go?”
  - Possible user inputs
    - Bot cannot understand text: We need to prime it for understanding.
  - Dialog state
    - Some of the above would be dependent on where you are in the conversation
      - We have tried to keep it as flexible as possible.

Expectations

- Each team needs to do the following things
  - Understand the code (naturally!!)
  - Provide necessary entities
  - Provide necessary attributes
  - Provide the prompts for each attribute
  - For each intent list of possible user inputs
    - Simplistic assumption
  - Create a DB for the task (ex schema : {model, brand, size , ram }
  - Using the attributes fire a query to the DB to fetch the relevant tuple(s)
    - Select * from mobile_phones where model=$model AND…

Skills to be developed:

- Two skills
- Common Skill:
  - Restaurants booking : Book a restaurant based on cuisine , cost type (cheap, medium, expensive), location (east, west, north, south). Final action booking

Skills:

- Buying a laptop. The user should be asked questions about Brand, RAM, Screensize, Hard Disk Size/Type, OS and other such parameters. The bot should give a final selection
- Buying a mobile phone. The user should be asked questions about Brand, Size, Accessories and other parameters. The bot should give a final selection

Skills

- Buying Vegetables/Fruits. The bot should ask which items and for each item get additional details. For example, California Grapes, Green Grapes …Simla Apple, Washington Apple, Fuji Apple ...
- Library. After getting information about author, title, subject and so on the bot should pick the book

Skills

- Jukebox. After getting choices of Genre, Style, Artist, Album etc., the bot should pick the song
- Cab Booking: Assuming that the starting point is fixed as HYD Airport, the bot should gather information about your destination, number of people, luggage quantity and pick a cab for you

Skills

- Movie Choice: The bot should gather your preferences: language, Actor, Genre and the date you want to go (today tomorrow, coming Tuesday) and suggest the movie and offer the Movie hall choices
- Baby Name Selection: The bot should find out the parameters such as Ethnic Group, Region, Religion, Gender, Starting Letter, Other Numerology constraints and offer a few choices

Skills

- Hotel Room Booking: After gathering parameters such as Star~~, With/Without Restaurant~~, Location, Tariff the bot should offer the choice
- Doctor Appointment Booking: Gather Speciality, Hospital, Location, Time of Day, Date information and check if a Doctor is free or not

Skills: SMALL CHANGE

- Ticketing System: The bot should help automate generating issues/tickets in an issue tracking system, by asking questions about the department, issue type, necessary information and finally a description of the problem and generate a ticket in the issue tracking system.

- Ticketing System: The bot should help automate status checking issues/tickets in an issue tracking system, by asking questions about the department, issue type, find status of a ticket in the issue tracking system.
  - Resolved, pending etc…

Points to consider

- Consider only discrete values
  - Range, regular expressions – Bonus
- Provide enough samples
- You HAVE to have at least two attributes before action state excluding action and greeting states
- Spelling mistakes handling not present in the current version-Bonus
- Other Bonus tasks

Regarding DB

- DB can be text file (JSON, XML, CSV etc) or MySQL DB dump
  - Submission needs to have the DB file
- As of now, there are no DB file provided in the shared code
  - DB is a listing of items with their individual attributes
    - Sample tuple: {Mantra Restaurant, chinese, cheap, north}
  - Provided config file are not the same as DB
- Read each and every one of the config files carefully
  - Understand their functionality

Bonus tasks

- Changing an attribute value already given
- Range, regular expressions etc for getting attributes
- Spelling mistakes handling
- Graceful restart at any stage of the chat
- Adding word2vec for intent identification (replacing ngram match)
- Add a branch based on an incoming attribute value

Logistics

- Groups 1 through 40 in TalentSprint
  - IIIT-H (NOT 105); rest
- Support available from 9:00am – 6:00pm
- Submission: A zip file containing
  - A text file called Team.txt containing the team member names
  - All data, configuration and code files
  - To be submitted on the LMS by 8pm tomorrow
- Lunch
  - At IIIT Mess and TalentSprint
- Hackathon work on personal machines.