Assignment 4

Drugbot

Group 7:

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Introduction

The existence of the Chabot system has indeed helped most of the customers to provide automatic support for faster resolutions. In assignment 4, the chatbot designed to help individuals with medical questions, such as dosage information, side effects relating to certain medications, and but not limited to procedures for tapering off medications. By utilizing the Ontology structure in the medicine recommender system, we further generate the Competency questions and test cases to develop the Chatbot in Dialogflow.

Ontology

Figure 1.1 shows the basic ontology structure of our chatbot: medications can be divided into categories or subclasses; they can be evident as the large blue circles on the exterior of the knowledge structure. The blue boxes represent the object properties which are the relationship between different drugs. The green boxes represent the data properties which are independent for each different drug.

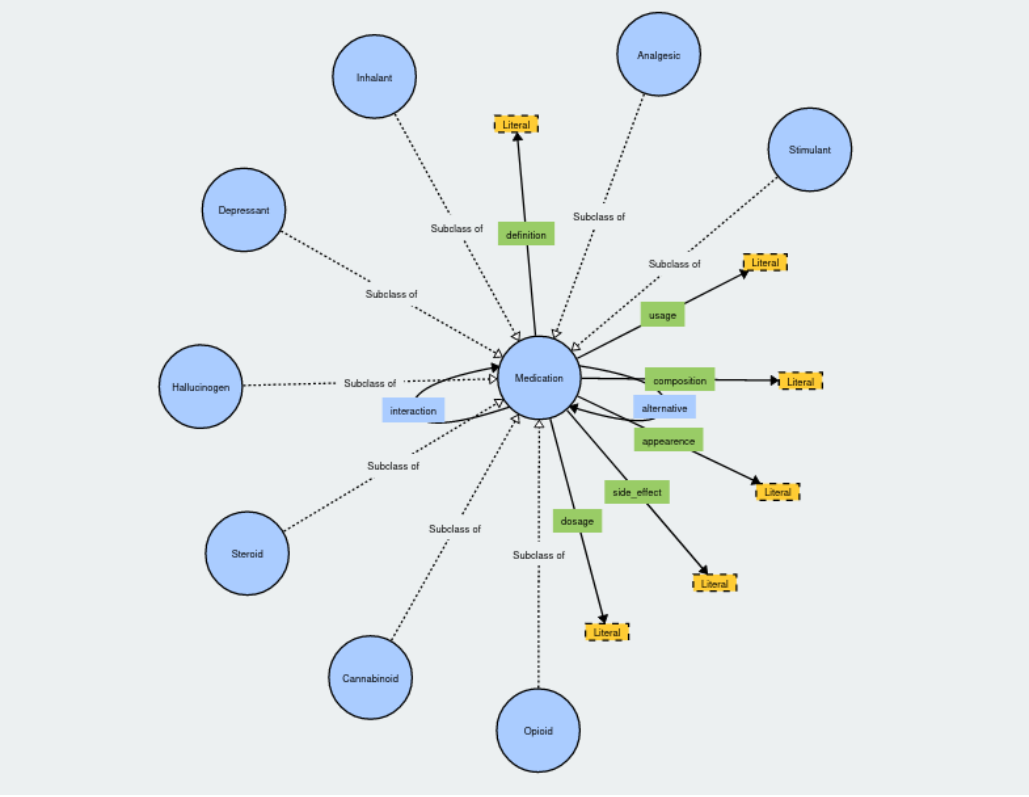

Fig 1.1

Competency Questions

Based on the ontology above, we here create our ten different competency questions in different scenarios as below.
We divide our users into persons looking for five different types of information:
1. Greeting
2. Descriptions of medications (appearance, definition, what they are used for and ingredients)
3. Dosage information
4. Interactions and Side Effects
5. Alternatives

Each subsection can be further subdivided by the type of medication (opioid, depressant, etc.) to increase the answers' accuracy.

Additionally, we assume users will occasionally utilize introductory vernacular. As such, we will also include competency questions to handle these scenarios.

1. What is Tylenol?
2. How soon can Tylenol be taken after a cocktail?
3. What is the adult dosage of Acetaminophen?
4. What can take the place of Acetaminophen?
5. What type of drug is Paracetamol?
6. What are the side effects of Paracetamol?

Test Cases to complement our competency questions, below is a list of alternative questions and answers for training under different scenarios in

1. Welcome Questions:
- Hi, how’re you?
- Hey
- Hello
- Yo
- Hi

Answers:
- Hello! Welcome to DrugBot!
- No not that kind of drugbot!
- How may I help you?

2. Get Description Information (specific to Tylenol but can be expanded)

Questions:
- What is Tylenol
- What type of drug is Tylenol?
- What is Tylenol used for?
- What does Tylenol look like?

- What is the brand name of Acetaminophen?

Answers:
- Tylenol (brand name), Paracetamol, or Acetaminophen is an Analgesic (pain reliever) used to relieve mild to moderate pain from headaches, muscle aches, menstrual periods, colds and sore throats, toothaches, backaches, and reactions to vaccinations (shots), and to reduce fever. Typically comes in the form of a pill.

3. Dosage information

Questions:
- How much Tylenol should I consume?
- How many pills of Tylenol for an adult?
- Children's Tylenol Dosage?
- Tylenol dosage

Answers: The adult dose of Paracetamol is one or two 500mg tablets at a time up to 4 times in a 24-hour period and should be taken with food. *Always leave 4 hours between doses*. For children, various dosages exist. Please *read* the packaging carefully to determine the correct dosage.

4. Interactions and Side Effects

Questions:
- Can I have alcohol with Tylenol?
- What are the side effects of Paracetamol?
- What do I do if I have more Acetaminophen than recommended?
- What happens if your child ate a Tylenol tablet?

Answers:
- Drinking a small amount of alcohol while taking Paracetamol is usually safe. Try to keep to the recommended guidelines of no more than 14 units of alcohol a week. A standard glass of wine (175ml) is 2 units. A pint of lager or beer is usually 2 to 3 units of alcohol.

- Paracetamol rarely causes side effects if you take it at the correct dosage. If you notice:
- skin rash that may include itchy, red, swollen, blistered or peeling skin
- you're wheezing
- you get tightness in the chest or throat
- you have trouble breathing or talking
- your mouth, face, lips, tongue, or throat start swelling You are most likely suffering from an allergic reaction. Seek medical help immediately.
- In case of overdose, get medical help or contact a Poison Control Center immediately. (1-800-222-1222) Quick medical attention is critical for adults and children, even if you do not notice any signs or symptoms.

5. Alternatives

Questions:
- What are some alternatives to Tylenol?
- Natural alternatives to Paracetamol?
- Home remedies like Paracetamol?

Answers:
- Ibuprofen or Aspirin (brand name) is used in a very similar way to Paracetamol; it treats pain but can also treat fever. The main difference is that ibuprofen reduces inflammation. Ibuprofen is a type of drug called a non-steroidal anti-inflammatory (NSAID)
- Ginger and Tumeric have been shown to exhibit some pain relief properties, though their effects will be lesser than pharmaceutical alternatives

Dialog Flow

1. Agent
We have created an agent named Drugbot in Dialogflow. It is a virtual agent that handles concurrent conversations for patients with drug related questions, it is designed for easy, virtual access for simple questions which would otherwise require travel and access to health professionals.

2. Entity
The entity is the type of intent parameter, which dictates exactly how data from an end-user expression is extracted. In our Drugbot, our entity would be the type of drug for which questions the chatbot would be answering about. In our example, we chose Tylenol as it is one of the most common drugs in the world, with a variety of uses. It should also be noted that we used fuzzy matching and synonym matching for our entities, this enables approximate parameter matching as opposed to exact parameter matching. Fig 2.1. depicts our entities.

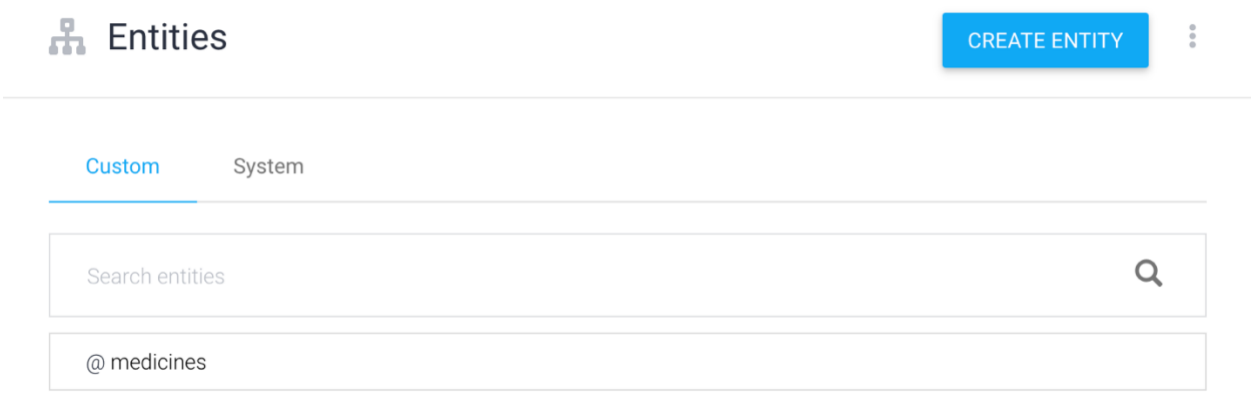

Fig 2.1

3. Intent

Intent categorizes an end-user's intention for one conversation turn. When an end-user writes or says something, referred to as an end-user expression, Dialogflow matches the end-user expression to the best intent in your agent. Based on our competency questions, we have created 5 intents. These include a default welcome intent, drug description, drug dosage, drug interations and side effects, and finally drug alternatives. For each intent, we included multiple questions along with multiple answers. Fig 3.1 depicts our intents.

Fig 3.1

4. Instances

Our Drugbot link is: https://bot.dialogflow.com/694793ea-233d-4500-b57f-9a60f4058bbe

As you can from Figure 4.4, our Drugbot is working well as expected. When asking questions about Tylenol description information, dosage information, interactions and side effects, and finally alternatives, the correct informative answer is given by our chatbot.

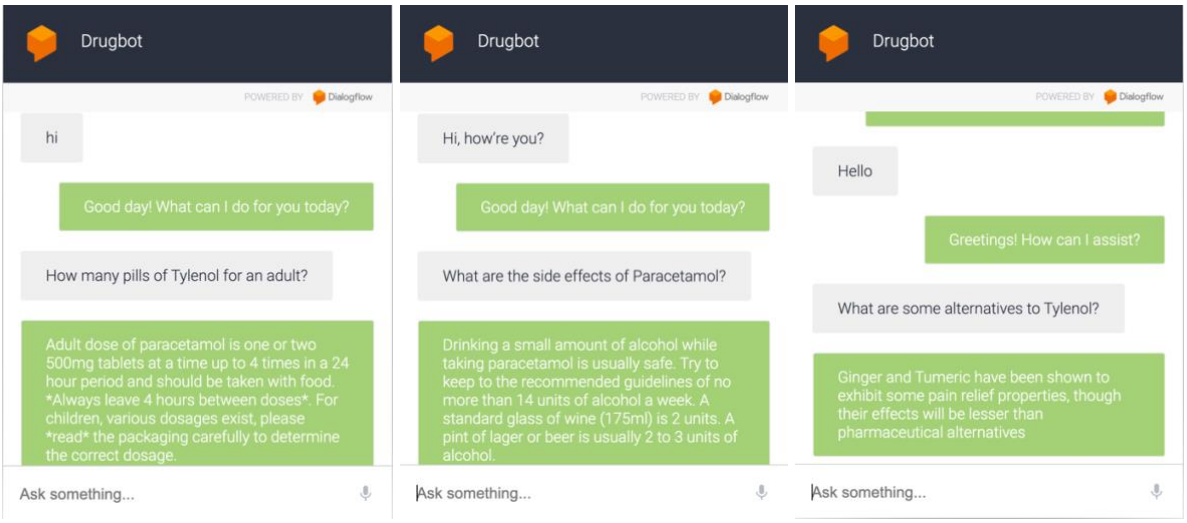

Fig 4.4

Strengths and Weaknesses

Strengths of our Drugbot include providing a quick and remote service for crucial information regarding drugs which could potentially improve one's quality of life or in some cases save a life. In certain parts of the world, access to health professionals is unobtainable, this Drugbot would be able to answer numerous questions which would otherwise require in person access to a health professional.

As there are tens of thousands of available prescription drug types in the world, a weakness could include the Drugbot might not have certain information regarding a specialized drug. Therefore, someone's health could be at risk if they do not have access to a health professional and are taking a specialized drug in which, they have questions about said drug.

Conclusions

Drugbot is a simple Chatbot that provides patients with crucial information about prescription drugs. The Chatbot is built based on the ontology structure, competency questions, and test cases. However, the system is right now only utilized for Tylenol, in the future we could optimize our Drugbot to include different drugs and categorize them based on type as previously mentioned in our ontology structure.