NLP Applications II

Conversational Systems

What are conversational systems?

Conversational systems are applications that allow users to interact in Natural Language

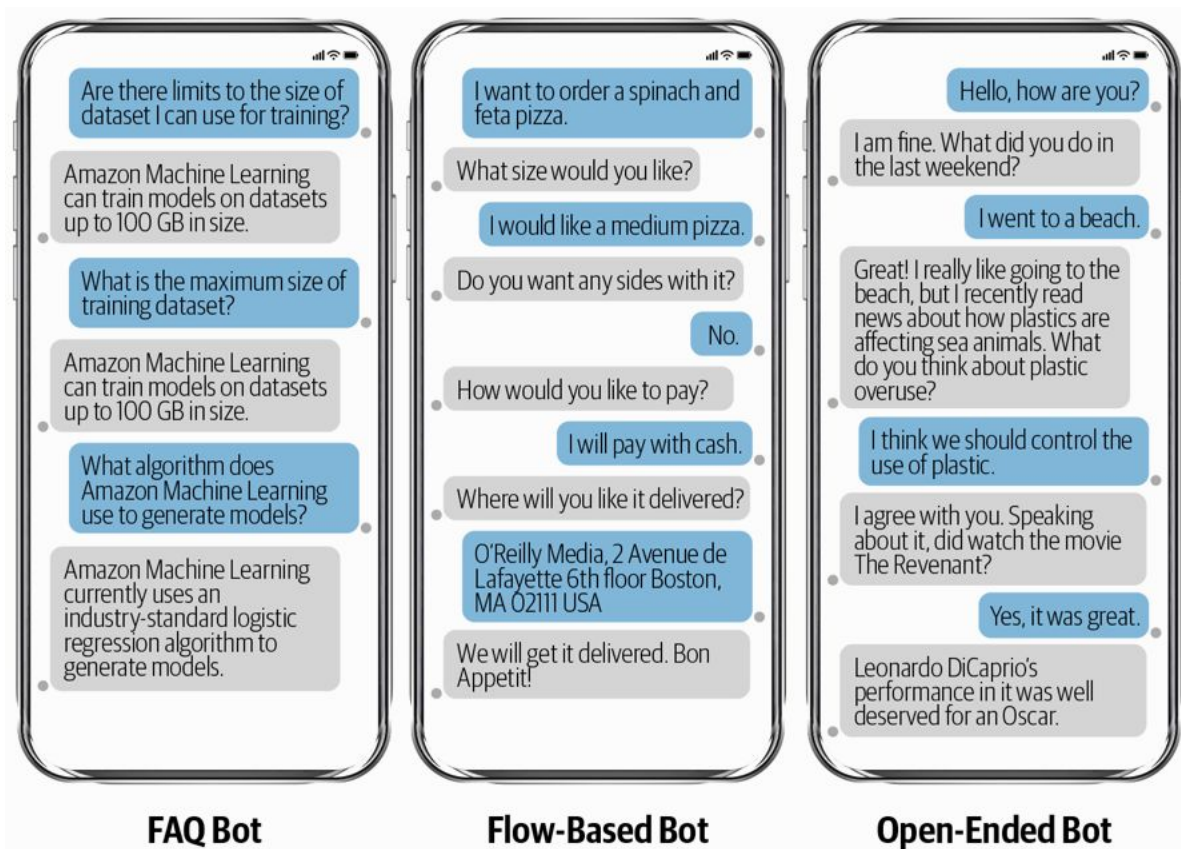Many companies are using conversational systems to implement their virtual assistants

Example: Coronavirus self checker

Taxonomy

Source: *Practical Natural Language Processing*. S. Vajjala, B. Majumder, A. Gupta, H. Surana. 2020. O'Reilly

- **Considering how they interact with the use**
  - FAQ
  - Flow-based
  - Open-ended
- **Taxonomy**
 - Goal Oriented
  - Chitchat

Examples

FAQ Bot

- Are there limits to the size of dataset I can use for training?
- Amazon Machine Learning can train models on datasets up to 100 GB in size.
- What is the maximum size of training dataset?
- Amazon Machine Learning can train models on datasets up to 100 GB in size.
- What algorithm does Amazon Machine Learning use to generate models?
- Amazon Machine Learning currently uses an industry-standard logistic regression algorithm to generate models.

Flow-Based Bot

- I want to order a spinach and feta pizza.
- What size would you like?
- I would like a medium pizza.
- Do you want any sides with it?
- No.
- How would you like to pay?
- I will pay with cash.
- Where will you like it delivered?
- O'Reilly Media, 2 Avenue de Lafayette 6th floor Boston, MA 02111 USA
- We will get it delivered. Bon Appetit!

Open-Ended Bot

- Hello, how are you?
- I am fine. What did you do in the last weekend?
- I went to a beach.
- Great! I really like going to the beach, but I recently read news about how plastics are affecting sea animals. What do you think about plastic overuse?
- I think we should control the use of plastic.
- I agree with you. Speaking about it, did watch the movie The Revenant?
- Yes, it was great.
- Leonardo DiCaprio's performance in it was well deserved for an Oscar.

Source: *Practical Natural Language Processing*. S. Vajjala, B. Majumder, A. Gupta, H. Surana. 2020. O'Reilly

Example of a flow-based process of a chatbot
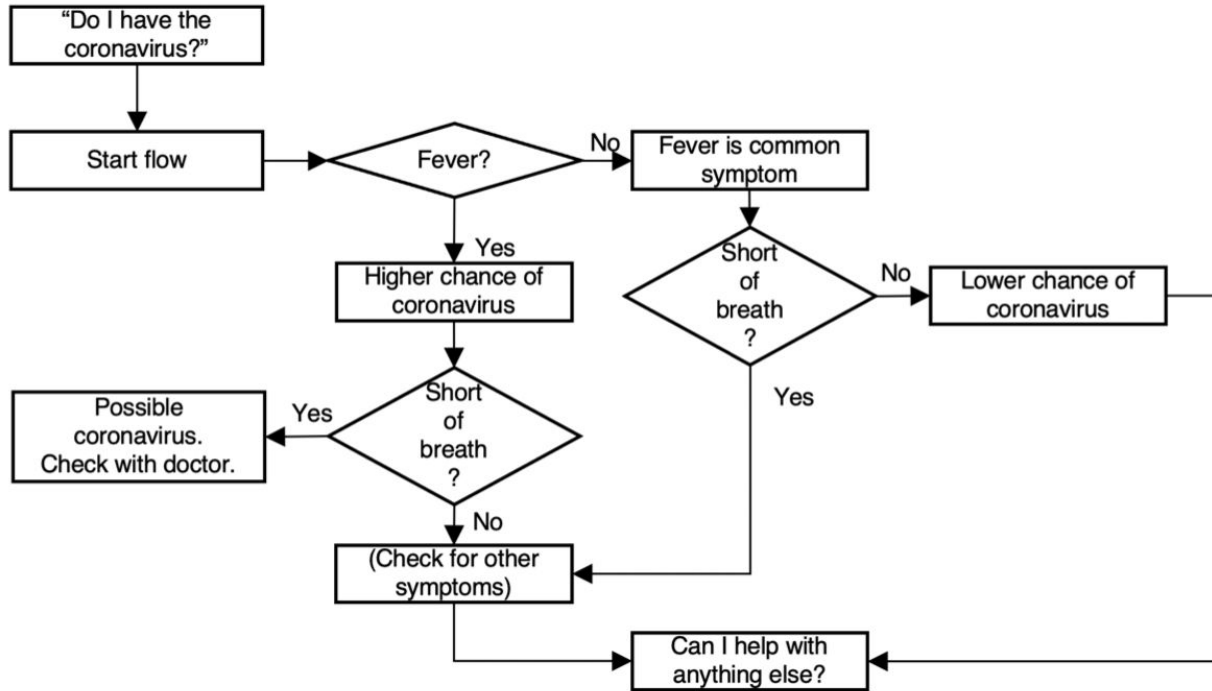
Source: *Creating Virtual Assistants. Chatbot that work*. A. Freed. 2021. Manning

Pipeline of a Conversational System
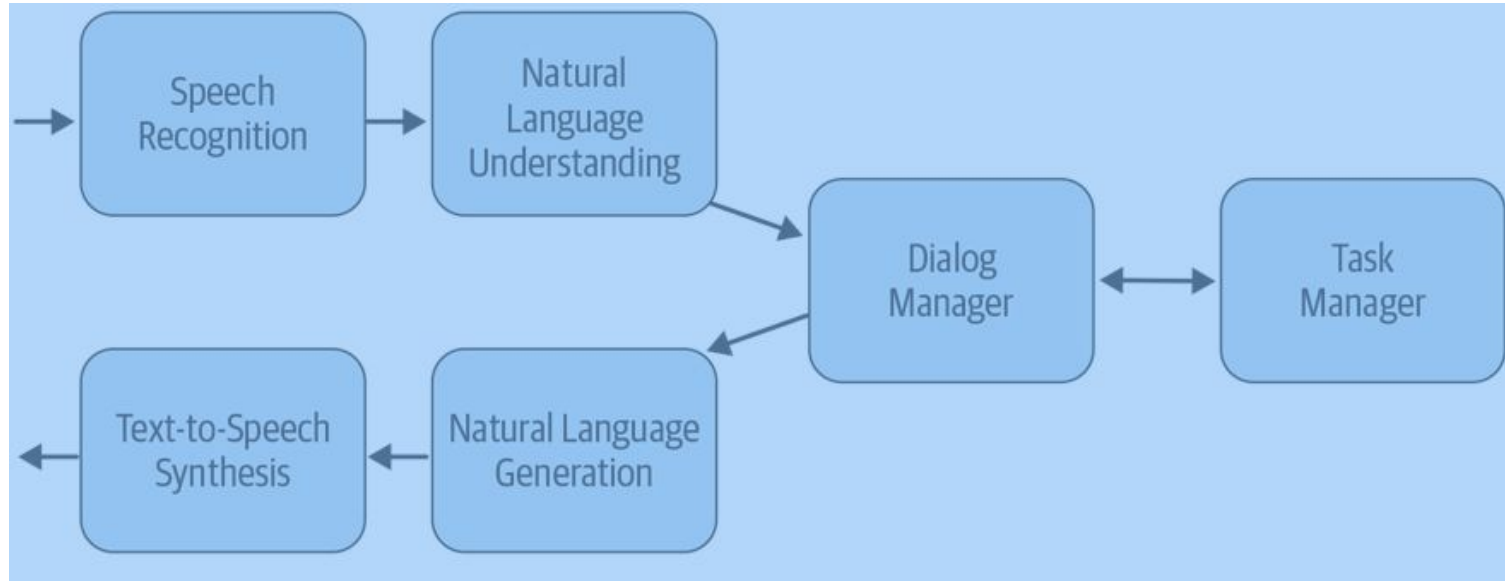
Source: *Practical Natural Language Processing*. S. Vajjala, B. Majumder, A. Gupta, H. Surana. 2020. O'Reilly

Some concepts

- **Dialog act or intent**

  The aim of the user utterance

- **slot or entity**

  Parts of the utterance that contain information which is relevant

NLU tasks

- **Dialog act or intent classification**

  Identify the aim of the utterance

- **Slot identification**

  Extract the meaningful entities from the utterance

Dialog manager

Controls and guides the flow of the conversation, It uses the information extracted by the NLU to this end.

- **Policies or strategies that determine how to use the information and what to do**
  - Rule-based approach
  - More advanced approaches
    - Reinforcement learning
    - ...
- **Response generation**
  - Fixed responses
  - Templates
  - Automatic generation
- **Tasks**
  - It can request the task manager to perform tasks

Building a conversational system (I)

- Identify the intents

  You can consult experts or the help center to identify the most common requests and identify the intents

- Identify the slots that are required
- Provide examples to train the NLU

Building a conversational system (II)

- Design the dialog flow
  - Rules
  - Machine Learning based policies
- Eventually, you may want the conversational to perform some task
  - Implement the tasks/actions

Frameworks for the development of Conversational Systems

- Watson assistant - http://www.ibm.com/cloud/watson-assistant/
- Microsoft Azure Bot Service - https://azure.microsoft.com/en-us/services/bot-service/
- DialogFlow - https://cloud.google.com/dialogflow/
- Rasa - https://rasa.com
- ...

Demo

Let's implement a Chatbot using Rasa

Scenario:

- Implement a chatbot that allows the client to ask for pizza, drinks,...
- Request restaurant recommendations
- Pizzas can be small, medium, large
- Drinks can be coffee, beer, wine, soda, ...