

Topic 7

Building Chatbots in Dialogflow

AI HUMAN INTERFACE

A solid blue horizontal bar spanning the width of the slide at the bottom.

Learning Outcomes

- ☐ Dialogflow Console Overview
- ☐ Learn how to build agents
- ☐ Learn how to use intents to map user input to response
- ☐ Learn how to use entities to extract useful information

Dialogflow Console Overview

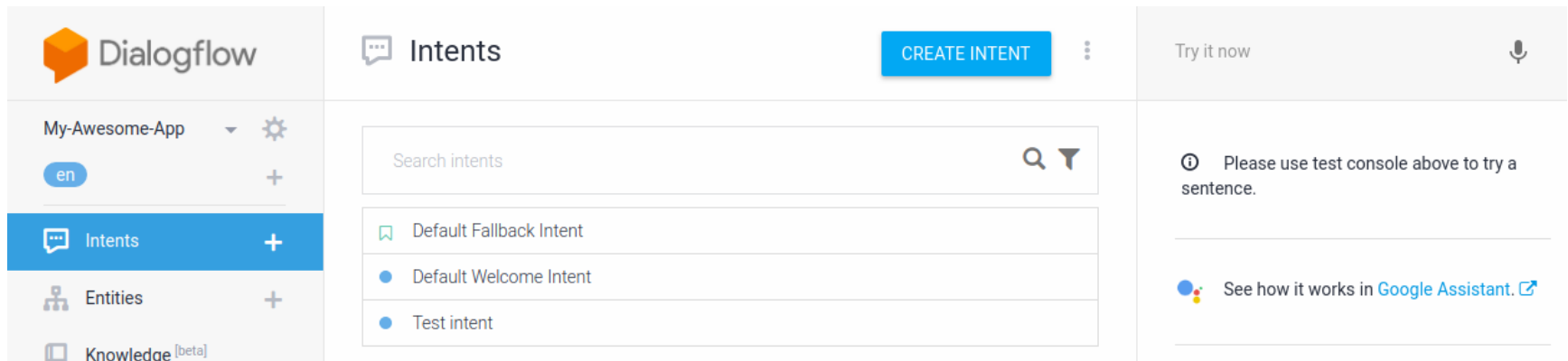
- Dialogflow provides a **web user interface** called the Dialogflow Console. You use this console to create, build, and test agents.
- Although Dialogflow is under Google platform, it is different from Google Cloud Platform console. The Dialogflow Console is used to manage Dialogflow agents (chatbot), while the GCP Console is used to manage other GCP resources (such as AI and ML).

Dialogflow Console Overview

The console is used to create, build, manage, fine-tune, and test your agents. With it, you can:

- Create **agents** that define the conversational experience
- Create **intents** that map user input to responses
- Create **entities** to extract useful data from user input
- Control conversation paths with **contexts**
- Add **events** that are triggered by occurrences outside of the conversation
- **Integrate** with other conversational platforms
- Implement **fulfilment** to connect your service when using integrations
- Test your agent via the **simulator**

Dialogflow Console Layout



The console is arranged in three main panels:

- **Sidebar menu** (left): Once we select the agent, we use these menu options to build and manage various elements of the agent.
- **Main content** (middle): This panel shows data and editing control for the option selected in the sidebar menu.
- **Dialogflow simulator** (right): you can have conversation with the agent by speaking or typing message in the simulator. This is useful tool to test your agent.

Dialogflow Agent

- A Dialogflow agent is a virtual agent that handles concurrent conversations with your end-users. It is a natural language understanding module that understands the nuances of human language. Dialogflow translates end-user text or audio during a conversation to structured data that your apps and services can understand. You design and build a Dialogflow agent to handle the types of conversations required for your system.
- A Dialogflow agent is similar to a human call centre agent. You train them both to handle expected conversation scenarios, and your training does not need to be overly explicit.

Understand Intent in Chatbot

AI HUMAN INTERFACE

A solid blue horizontal bar at the bottom of the slide.

Three Questions to Answer

- What makes a good Chatbots?
- What are intents in Chatbots?
- Why intent classification is important for a good Chatbot?

A Good Chatbot

➤ **Being good at the basics**

- Ability to understand human conversations
- Predict what users want

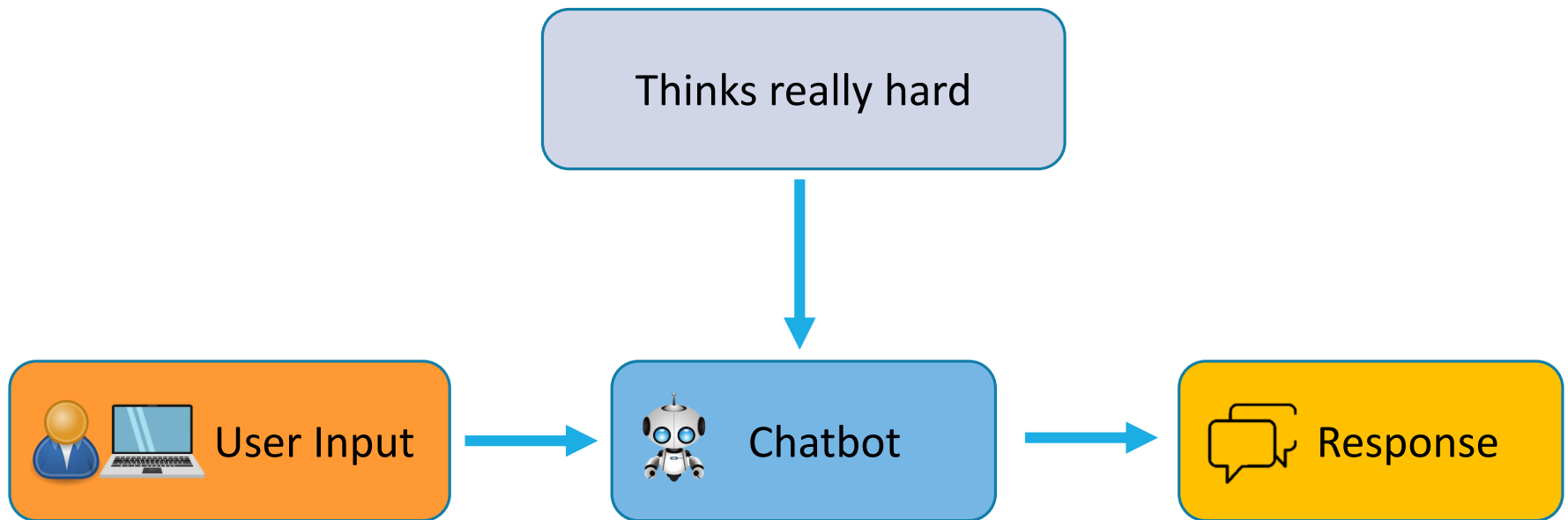
➤ **What do we need?**

- Accurate Natural Language Processing engine

➤ **How can we achieve that?**

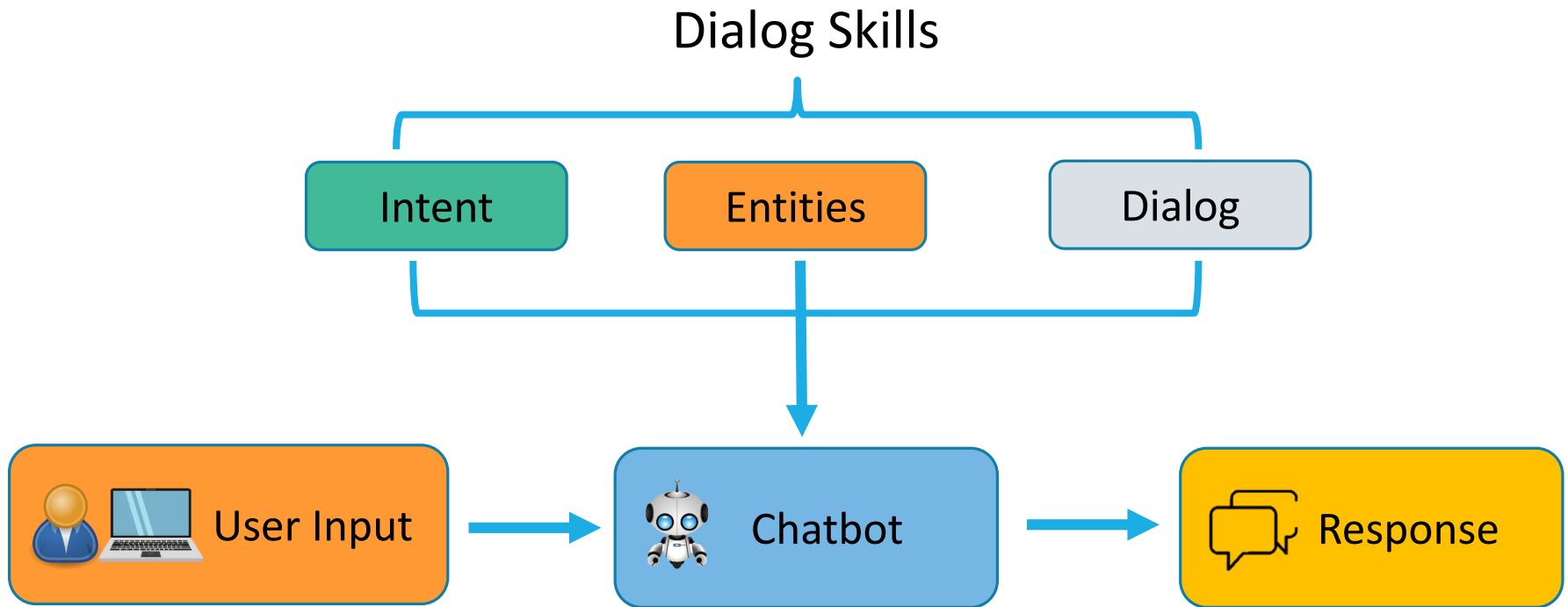
- Training set (bot dialog)
- Correct classification of user goals
- Train the NLP

Chatbot Process Flow



But, this is very high level process flow, and it did not tell us much

Chatbot Process Flow



Chatbots use 3 main components to determine how to interpret user inputs and how to respond to them

Intents capture the user goal

- Intents are the most important component
- Try to determine what the users want
- What are the users asking for

Intents Examples

Hello

Hi

Hey

Good morning

Ni Hao

Bonjour



#greetings

Chatbot Tries To Detect Intents From User Question



Does the user question express an intent similar to the ones that I've been trained for?

Chatbot Tries To Detect Intents From Users



Say “Hello”



Detects #greetings

Interaction Example

Customer: “Good morning.”

Bot: “Hello, how can I help you”

Customer: “May I know **where is your shop?**”

Bot: “Our location is at Dover MRT”

Customer: “What is the **opening hour?**”

Bot: “It is 9am-6pm, Monday to Friday”

Customer: “Thanks! Bye!”

Bot: “Goodbye!”

Intent?

How Artificial Intelligence works here

- Detection Human Intents is where artificial intelligence kicks in!
- The chatbots will be trained with pre-defined examples.
- When put into production, even when users rephrase their input, the chatbots should still be able to detect the user intents.

Intent Classification

- Rule based pattern matching
- Machine learning classification algorithms such as decision trees, naïve Bayes, and logistic regression
- Deep learning such as neural networks

For example, when the user tells the chatbot: “I want to book a flight from Houston to LA”, the intent classifier will classify the context and sequence of words under the label “**book flight**”.

Intents for Business

#hours_info

Intents for Business

What time are you open

What are your hours of operation

Are you open on Saturdays

When do you close

What days are you closed on

Are you open on Christmas



#hours_info

Intents for Business



When is your Orchard store open?



Detects `#hours_info`

In Class Discussion

What other business-related intents
that you can think of?

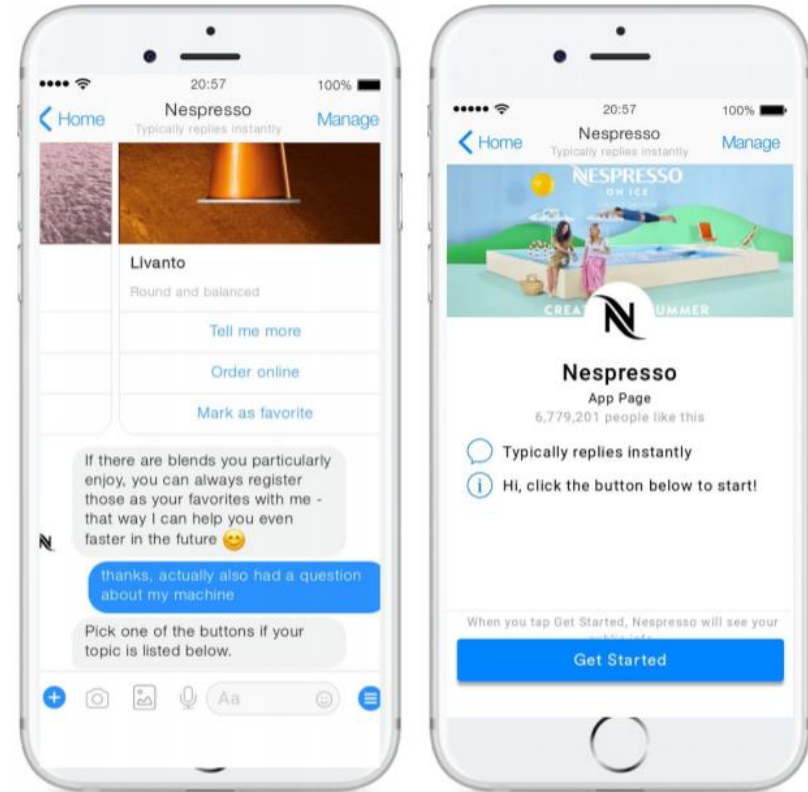
Most technologies are able to classify user intents...



Is this enough to analyze the bot performance? How do we know the classifications are correct or not?

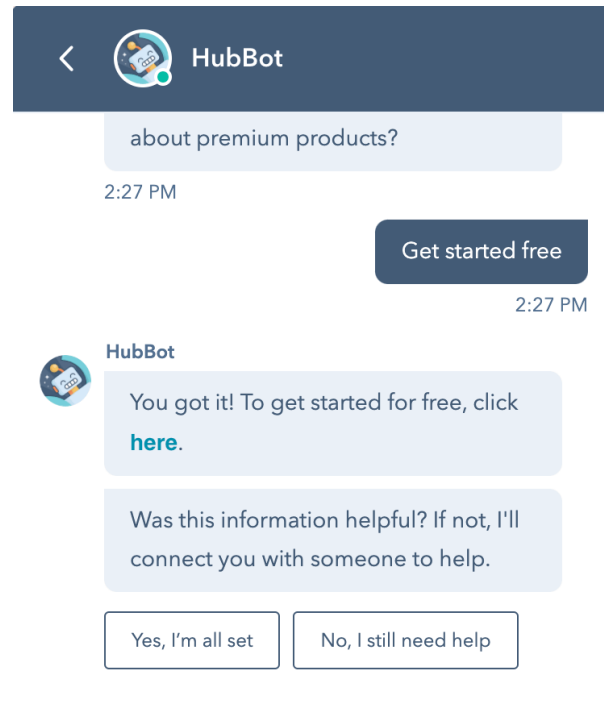
Good to have feature: A/B Testing

- Train Natural Language Processing
- Present two models to consumers
- See which one is performing better
- Outcome: Better trained Chatbot



Good to have feature: User Feedback

Occasionally, include a feedback question to see if the bot is being **helpful**



Good-to-have feature: User Feedback

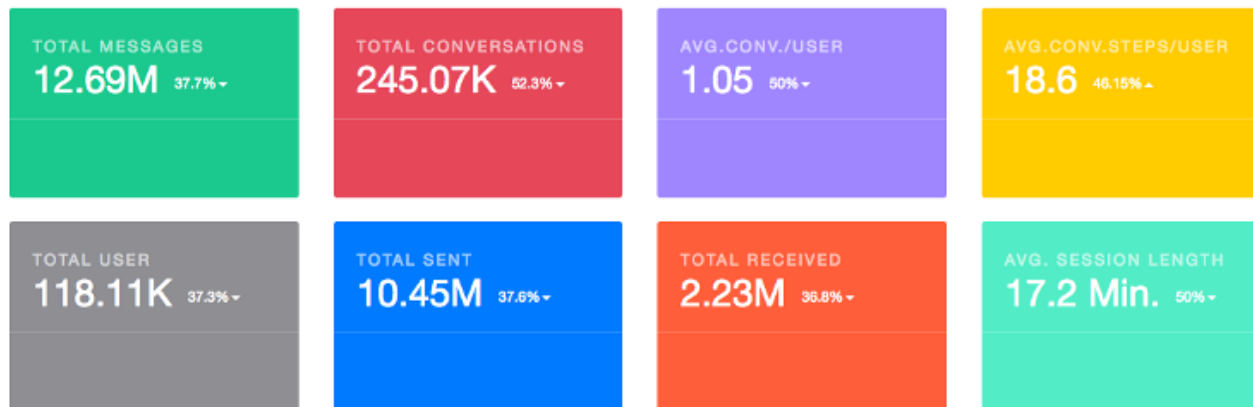
Add this to your **metrics dashboard**

- Add this to the existing bot performance metric
- Create a separate metric
- Track if the intents classification is working properly

DASHBOARD

Overview

QUICK STATS



How to improve: Artificial Utterances

Natural Language Generation services

- Create hundreds of relevant sentences and automatically tag these with the intents the chatbot must recognize

How can it help?

- Saving time on the pre-implementation
- Increasing effectiveness on the training and performance phase

how can I descale the machine?
how can I descale a machine?
how can I descale the nespresso?
how can I descale a nespresso?
how do I descale my machine?
how do I descale my nespresso?
how do I descale the machine?
how do I descale a machine?
how do I descale the nespresso?
how do I descale a nespresso?
how to descale my machine
how to descale my nespresso
how to descale the machine
how to descale a machine
how to descale the nespresso
how to descale a nespresso
I need to know how to descale my machine
I need to know how to descale my nespresso
I need to know how to descale the machine
I need to know how to descale a machine
I need to know how to descale the nespresso
I need to know how to descale a nespresso
I want to know how to descale my machine
I want to know how to descale my nespresso
I want to know how to descale the machine
I want to know how to descale a machine
I want to know how to descale the nespresso
I want to know how to descale a nespresso
I need to know how I can descale my machine
I need to know how I can descale my nespresso
I need to know how I can descale the machine
I need to know how I can descale a machine
I need to know how I can descale the nespresso
I need to know how I can descale a nespresso
I need to know how can I descale my machine
I need to know how can I descale my nespresso
I need to know how can I descale the machine
I need to know how can I descale a machine
I need to know how can I descale the nespresso

I need coffee
I need capsules
I need coffee capsules
I need more capsules
I need more coffee
I need more coffee capsules
I need some capsules
I need some coffee
I need some coffee capsules
I want coffee
I want capsules
I want coffee capsules
I want more capsules
I want more coffee
I want more coffee capsules
I want some capsules
I want some coffee
I want some coffee capsules
give me coffee
give me capsules
give me coffee capsules
give me more capsules
give me more coffee
give me more coffee capsules
give me some capsules
give me some coffee
give me some coffee capsules
send coffee
send capsules
send coffee capsules
send me coffee
send me capsules
send me coffee capsules
send me more capsules
send me more coffee
send me more coffee capsules
send me some capsules
send me some coffee

How can this help chatbot?

- Discover new use cases
- Add new flows
- Add new features
- Redefine some intents
- ...

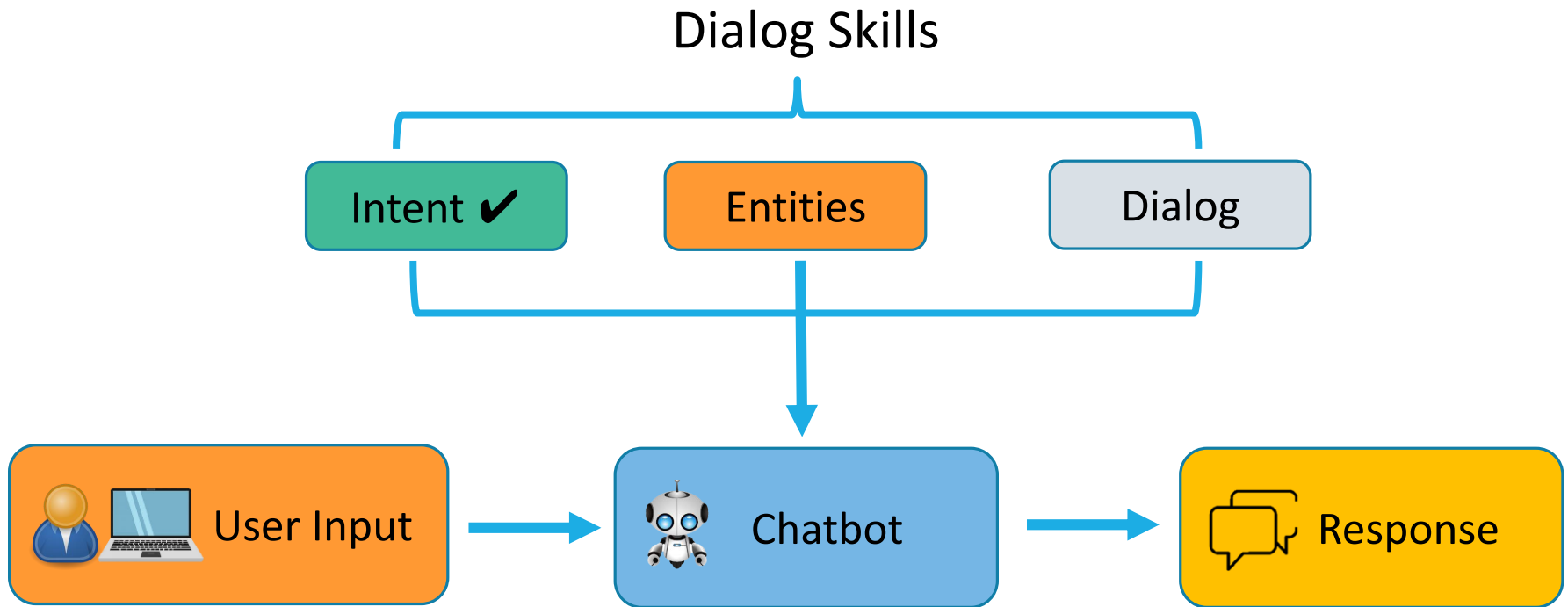
Exercise time

Lab 4, Exercise 1-1 to 1-5

Extract Entity in Chatbots

AI HUMAN INTERFACE

Chatbot Process Flow



Chatbots use 3 main components to determine how to interpret user inputs and how to respond to them

Intents Detection without specifics



When is your Orchard store open?



Detects #hours_info

Intents Detection without specifics



When is your Clementi store open?



Detects #hours_info

Intents Detection without specifics

- In these previous examples, the chatbot correctly detects the intents.
- However, the chatbot completely ignore the specifics of the questions.
- Our current chatbot considers the two questions the same.

What Is Entity?

- Intents allow us to capture the user goals
- Entities allow us to capture specific values in the user input

What Is Entity?

- Entities can be fields, data, or text describing about anything – a time, place, person, item, number, etc.
- Knowing the difference between intents and entities are crucial for chatbots to take actions based on the user's intent.

Utterance

"Show me yesterday's financial news"

Entity

Entity

Intent: **showNews**

Verb

Noun

Entity Detection



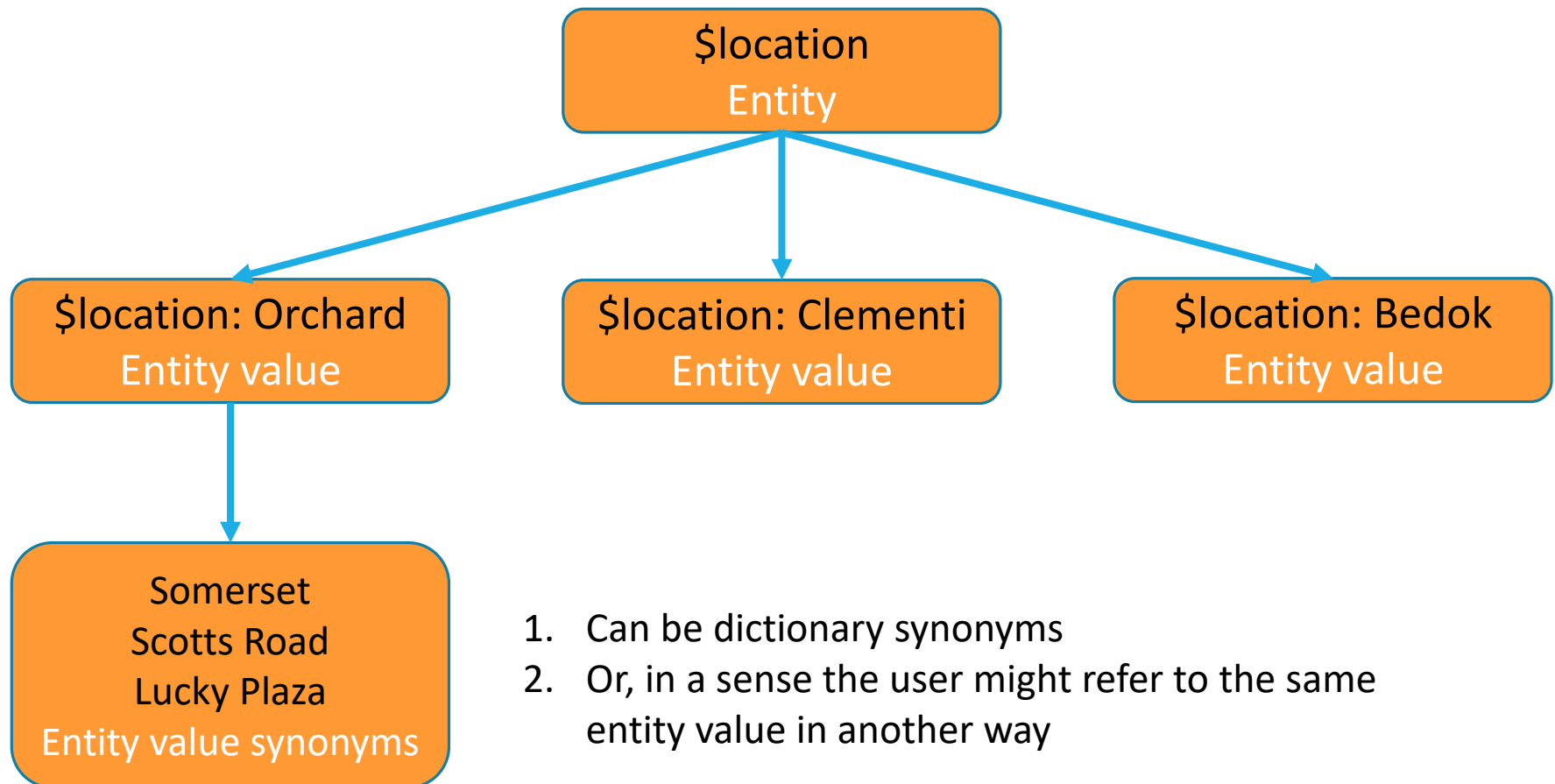
When is your **Orchard** store open?



When is your **Clementi** store open?

- We need to also identify the entities (specific values) in the user input. In this case, it is the location of the store.

Entity Detection



Entity Detection



When is your Lucky Plaza store open?



Detects **#hours_info** and **\$location:Orchard**

Entity Types

- Simple Entities
- Compound Entities
- System Entities

Simple Entities

If you have to extract a single job title, a city name, or quantity, these are called simple entities. Examples are as followed:

I want to book a flight to Singapore.

Are you hiring a data analyst?

I would like to order three tickets.

Compound Entities

Sometimes, users will express multiple entities within one utterance, referred to as compound entities. Example is as follows:

I want to travel by [airplane](travel_mode) from [Singapore] (city) to [Thailand] (city) on [Friday] (date_time)

System Entities

System entities are ready-to-use data buckets that help to extract valuable information from conversations. Example is as follows:

\$sys-time: system entity detects mentions of times in user input.

Recognized formats

- 2pm
- at 4
- 15:30

Entity Evaluation

Chatbot detects entities in the user input by using one of the following evaluation methods:

- Dictionary-based method
- Annotation-based method

Dictionary-based method

The chatbot will look for terms in the user input that match the values, synonyms, or patterns we define for the entity.

- **Synonym entity:** We define a category of terms as an entity (color), and then one or more values in that category (blue). For each value you specify a bunch of synonyms (aqua, navy).
- **Pattern entity:** We define a category of terms as an entity (contact_info), and then one or more values in that category (email). For an email entity value, you might want to specify a regular expression that defines a xxxxx@xxx.com pattern.
- **System entity:** System entities are prebuilt. They cover commonly used categories, such as numbers, dates, and times.

Annotation-based method

When you define an annotation-based entity, which is also referred to as a contextual entity, a model is trained on both the annotated term and the context in which the term is used in the sentence you annotate.

- Add [Coach bag] as a value of **@product** entity:

I want to buy a Coach bag

- At run time, the chatbot evaluates terms based on the context:

I want to buy a Gucci bag -> chatbot can automatically recognizes [Gucci bag] as a **@product** entity, due to the similarity of the structure of this sentence compared to the user example that we annotated (I want to buy a Coach bag)

Can you identify entities in the user inputs?

Customer: “May I know where is your shop?”

Bot: “Our location is at Dover MRT”

Customer: “Are you opening at 8pm Saturday?”

Bot: “Yes, we are open”

Entity?

Customer: “Is the golden bubble milk tea in stock?”

Bot: “Yes, there are ready stocks”

Customer: “I want to order five cups?”

Bot: “Sure, we will prepare them for you”

Intents vs. Entities

- Intents and Entities are equally important to chatbots. While intents are used to capture user goal, entities are used to capture specific values.
- Based on the correct intent and entity detection, chatbots will take actions and respond to user queries.

Exercise time

Lab 4, Exercise 2-1 to 2-4

Summary

In this chapter, we learn how to build a chatbot and define the followings:

- Intents
- Entities
- Responses

What are intents?

- Try to determine what the users want
- What are the users asking for

What Is Entity?

- Intents allow us to capture the user goals
- Entities allow us to capture specific values in the user input

What is a good Chatbot

- Understand the user's question
- Provide accurate answer