Institute of Systems Science, National University of Singapore

MASTER OF TECHNOLOGY USER GUIDE

Mini Museum Chatbot System

TEAMMEMBERS

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MASTER OF TECHNOLOGY

Contents

1.0 System Overview

Mini Museum Chatbot system is our team project of the Cognitive System Course, which is a chatbot system based on the Action on Google(Google Assistant), Google's DialogFlow and Python to provide the fundamental information and recommendation information of the National Museum of Singapore to its tourists. Our goal is to create an intelligent National Museum of Singapore chatbot System that will be better serve the tourists with Google Assistant and offer Information and services for visitors who come to visit the National Museum of Singapore through natural language or who want to visit the National Museum of Singapore.

2.0 Requirements

The project uses the Google Assistant as the frontend interface, DialogFlow as the NLU Engine and middleware and the Flask as the backend and the fulfilment of the DialogFlow.

Data Structure

- Requests and responses between the Google Assistant and DialogFlow follow the Action on Google Conversation Protocol
- Requests and responses between the DialoFlow follow the DialogFlow Conversation Protocol.
- Flask backend server provides the JSON format response follow the DialogFlow Conversation Protocol and Action on Google Visual Components Documentation

2.1 Recommended Test Devices

Mini Museum chatbot demonstration supports the following test devices:

- Android Phone with GApps and has installed the Google Assistant(Recommended)
- IOS phone has installed the Google Assistant(Recommended)
- Action on Google Simulator using the Google Chrome Brower (Can't get the full experience)

2.2 Dependencies

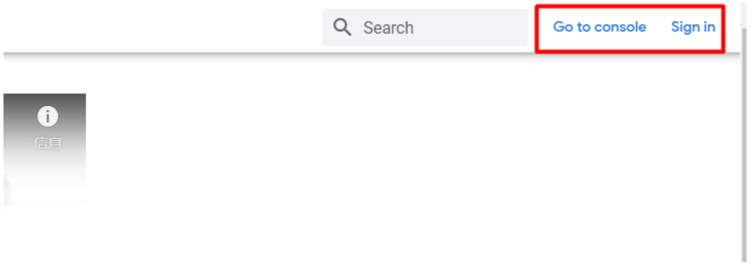
- Frontend
  - Google Assistant
  - Action on Google
- DialogFlow
- Backend
  - Python 3.7
  - Python Library
    - Flask
    - Flask-Assistant

        - Panadas
        - Selenium
        - xlrd
        - xlwt
        - …..(For the detail Please see the requirement.txt in the project package or the APPENDIX A)
- Util
    - Ngrok

3.0 Deployment

1. Prerequisites

   1.1. Use current Google Account or Register a new one to log in the DialogFlow https://dialogflow.com/ → Click the Sign In or Go to Console



   1.2. Download the source code package of the project from the GitHub repo:

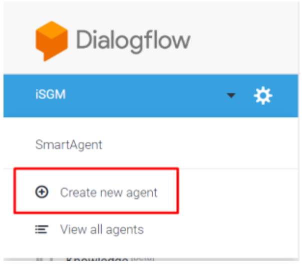
   1.3. Download and Install the work on your machine from the ngrok official website https://ngrok.com/

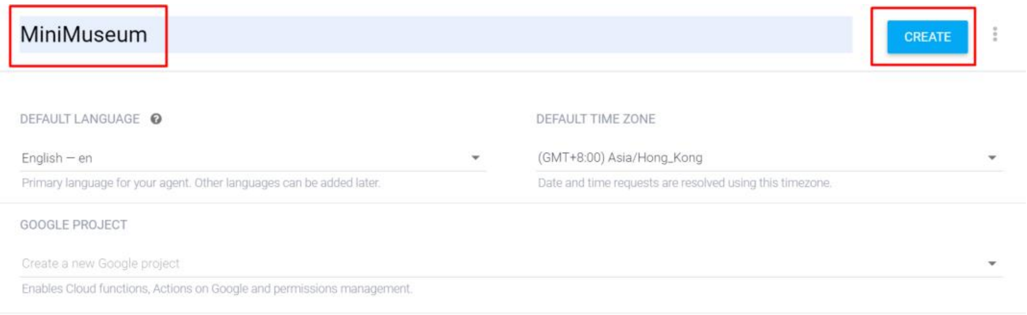
   1.4. Install python3.7 on your machine (and use pip to install pipenv) https://www.python.org/

   1.5. Prepare a smartphone installed the Google Assistant and login with the same account used for the DialogFlow login

2. Set up DialogFlow

   2.1. Create a new agent called "Mini Museum"





MiniMuseum

DEFAULT LANGUAGE

English — en

Primary language for your agent. Other languages can be added later.

DEFAULT TIME ZONE

(GMT+8:00) Asia/Hong_Kong

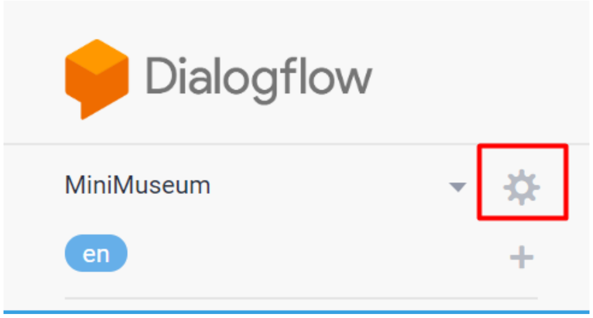
Date and time requests are resolved using this timezone.

GOOGLE PROJECT

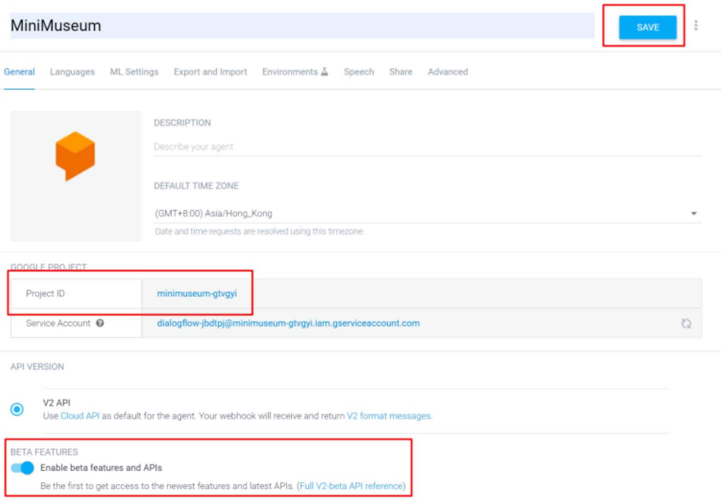
Create a new Google project

Enables Cloud functions, Actions on Google and permissions management.

2.2. Click the setting button



2.3. Record the project-id of the agent and open the Enable Beta Feature and APIs Switch, then remember Click Save Button



MiniMuseum

DESCRIPTION

Describe your agent

DEFAULT TIME ZONE

(GMT+8:00) Asia/Hong_Kong

Date and time requests are resolved using this timezone.

GOOGLE PROJECT

Project ID	minimuseum-gtvgyi
Service Account	dialogflow-jbdtpj@minimuseum-gtvgyi.iam.gserviceaccount.com

API VERSION

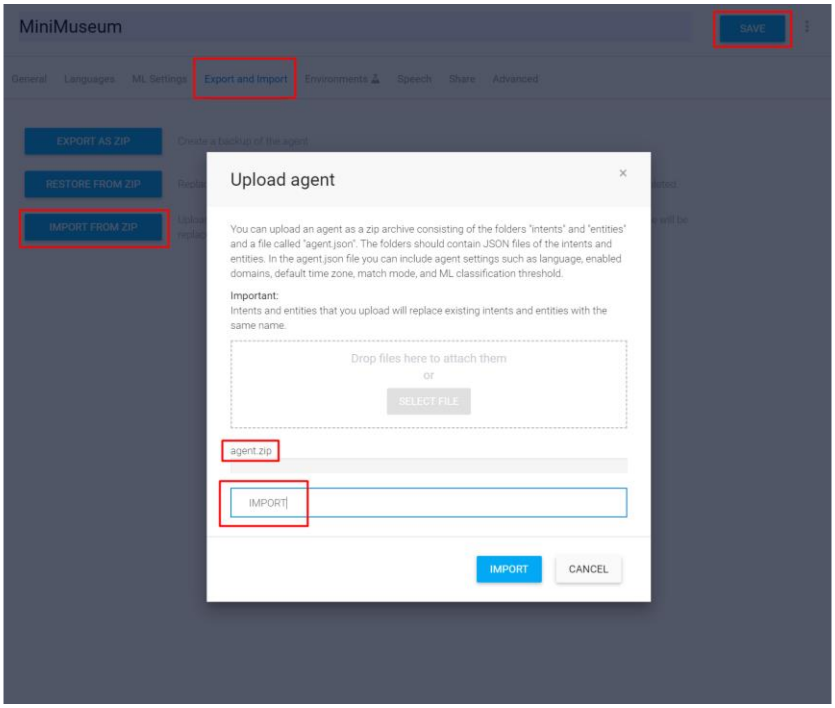
● V2 API
Use Cloud API as default for the agent. Your webhook will receive and return V2 format messages.

BETA FEATURES

Enable beta features and APIs

Be the first to get access to the newest features and latest APIs. (Full V2-beta API reference)

2.4. Import the zip file “MiniMuseumAgent.zip” downloaded



Upload agent

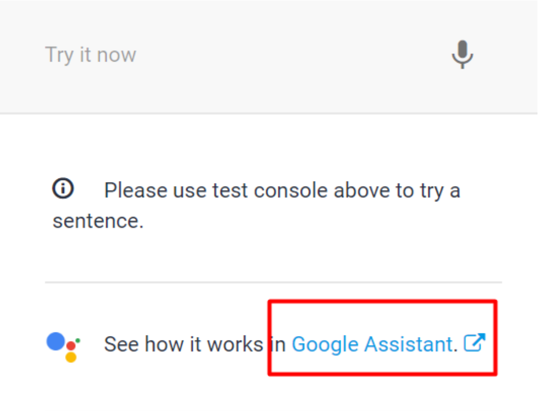
You can upload an agent as a zip archive consisting of the folders "intents" and "entities" and a file called "agent.json". The folders should contain JSON files of the intents and entities. In the agent.json file you can include agent settings such as language, enabled domains, default time zone, match mode, and ML classification threshold.

Important:
Intents and entities that you upload will replace existing intents and entities with the same name.

agent.zip

IMPORT

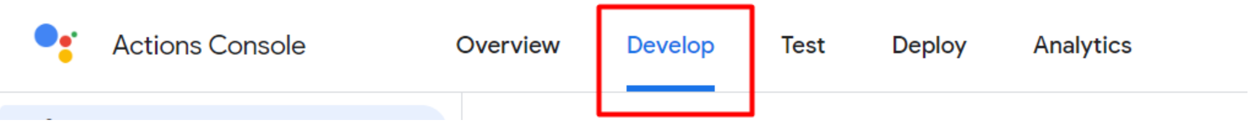
2.5. Click the Google Assistant on the right panel of the page



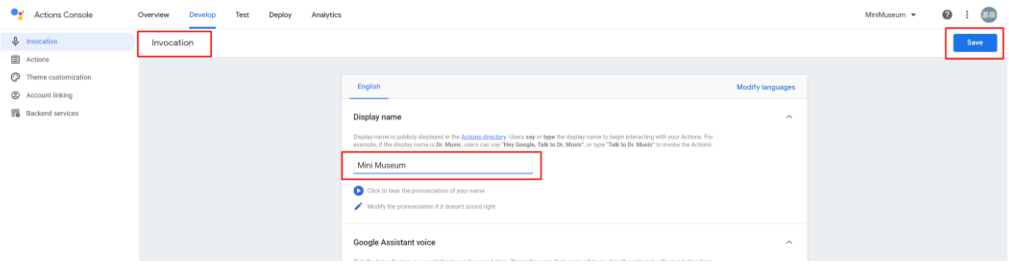
Please use test console above to try a sentence.

See how it works in Google Assistant.

2.6. Click the Develop Button on the Top Menu Bar of the page



2.7. In the Invocation Page, input the Agent's Display Name as “Mini Museum”, Then Click Save Button

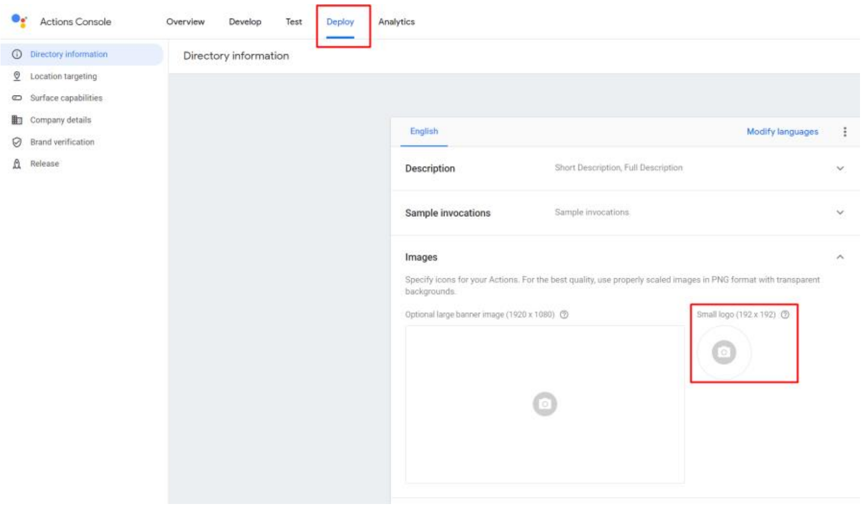


Display name is publicly displayed in the Actions directory. Users say or type the display name to begin interacting with your Actions. For example, if the display name is Dr. Music, users can say "Hey Google, Talk to Dr. Music", or type "Talk to Dr. Music" to invoke the Actions.

Mini Museum

Click to hear the pronunciation of your name

Modify the pronunciation if it doesn't sound right

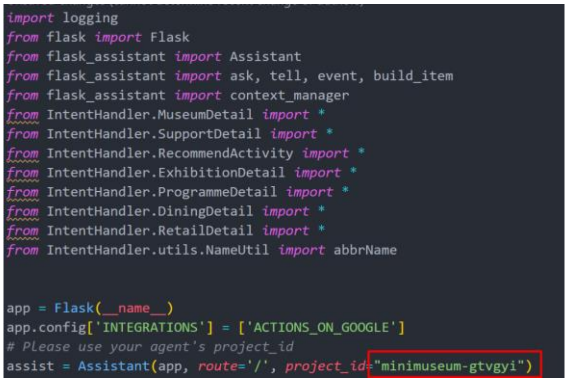


Specify icons for your Actions. For the best quality, use properly scaled images in PNG format with transparent backgrounds.

3. Start backend server

The backend server code is in the MiniMuseumCharbot.zip file

3.1. Unzip the file
3.2. Use the pip or pipenv to install the requirements of the backend
   a. If your use pipenv, please use commend `pipenv install` in the root folder
   b. If your use pip and your want to install requirements into your original python environment, please use commend “pip install -r requirements.txt”
3.3. After the installation
   a. Before starting the backend application, please modify the code in the app.py with the Agent project-id recorded before. (This is a very important part to give the capability to the backend for controlling the context in DialogFlow Conversation)



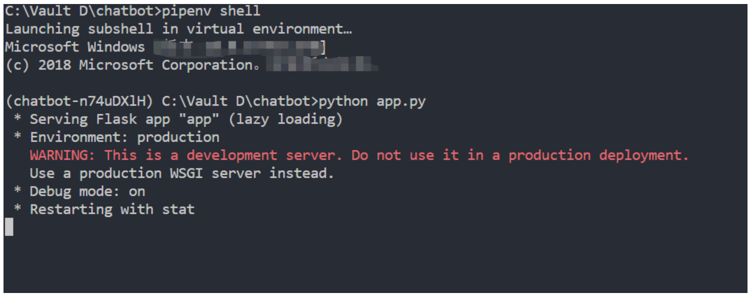
```
import logging
from flask import Flask
from flask_assistant import Assistant
from flask_assistant import ask, tell, event, build_item
from flask_assistant import context_manager
from IntentHandler.MuseumDetail import *
from IntentHandler.SupportDetail import *
from IntentHandler.RecommendActivity import *
from IntentHandler.ExhibitionDetail import *
from IntentHandler.ProgrammeDetail import *
from IntentHandler.DiningDetail import *
from IntentHandler.RetailDetail import *
from IntentHandler.utils.NameUtil import abbrName


app = Flask(__name__)
app.config['INTEGRATIONS'] = ['ACTIONS_ON_GOOGLE']
# Please use your agent's project_id
assist = Assistant(app, route='/', project_id="minimuseum-gtvgyi")
```

b. If you use pipenv to install, please use commend `pipenv shell` to activate the virtual environment has been installed. Then use the commend `python app.py` in the root folder to start the Flask server.

c. If you use pip to install, please use the commend `python app.py` in the root folder to start the Flask server.

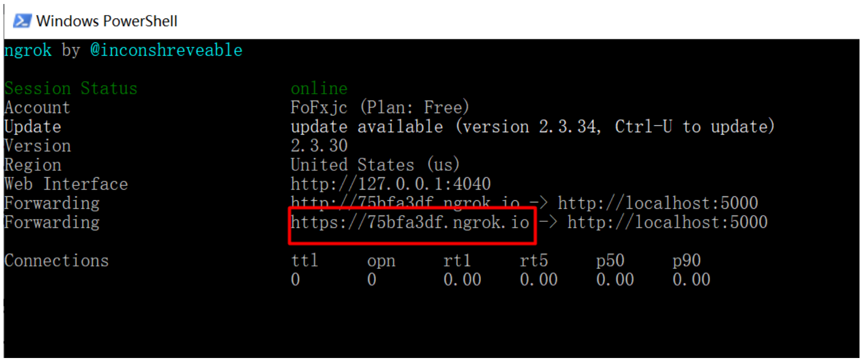
d. Our project’s default port is 5000



```
C:\Vault D\chatbot>pipenv shell
Launching subshell in virtual environment…
Microsoft Windows [redacted]
(c) 2018 Microsoft Corporation。[redacted]

(chatbot-n74uDXlH) C:\Vault D\chatbot>python app.py
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Restarting with stat
```

3.4. Start the ngrok to explore the local IP and port



```
ngrok by @inconshreveable

Session Status                online
Account                       FoFxjc (Plan: Free)
Update                        update available (version 2.3.34, Ctrl-U to update)
Version                       2.3.30
Region                        United States (us)
Web Interface                 http://127.0.0.1:4040
Forwarding                    http://75bfa3df.ngrok.io -> http://localhost:5000
Forwarding                    https://75bfa3df.ngrok.io -> http://localhost:5000

Connections                   ttl     opn     rt1     rt5     p50     p90
                              0       0       0.00    0.00    0.00    0.00
```

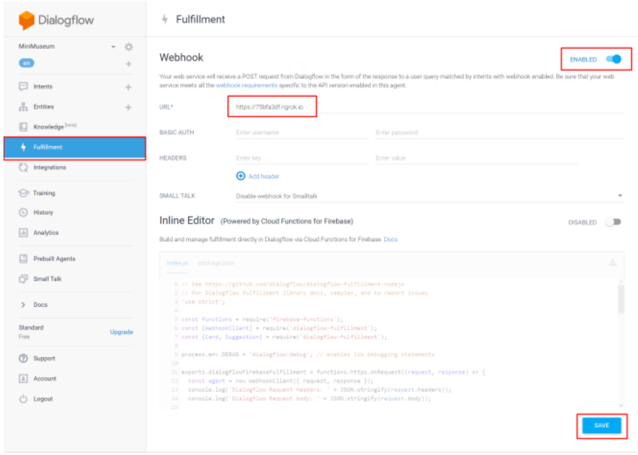
a. Run the ngrok

b. For Mac/Linux: ngork http 5000

c. For Windows: ngork.exe http 5000

d. Please copy the https URL in the command window

e. Paste this URL into the DialogFlow Fulfillment



Webhook ENABLED

Your web service will receive a POST request from Dialogflow in the form of the response to a user query matched by intents with webhook enabled. Be sure that your web service meets all the webhook requirements specific to the API version enabled in this agent.

URL*: https://75bfa3df.ngrok.io

BASIC AUTH: Enter username | Enter password

HEADERS: Enter key | Enter value

Add header

SMALL TALK: Disable webhook for Smalltalk

Inline Editor (Powered by Cloud Functions for Firebase) DISABLED

Build and manage fulfillment directly in Dialogflow via Cloud Functions for Firebase. Docs

index.js package.json

```
// See https://github.com/dialogflow/dialogflow-fulfillment-nodejs
// for Dialogflow fulfillment library docs, samples, and to report issues
'use strict';

const functions = require('firebase-functions');
const {WebhookClient} = require('dialogflow-fulfillment');
const {Card, Suggestion} = require('dialogflow-fulfillment');

process.env.DEBUG = 'dialogflow:debug'; // enables lib debugging statements

exports.dialogflowFirebaseFulfillment = functions.https.onRequest((request, response) => {
  const agent = new WebhookClient({ request, response });
  console.log('Dialogflow Request headers: ' + JSON.stringify(request.headers));
  console.log('Dialogflow Request body: ' + JSON.stringify(request.body));
```

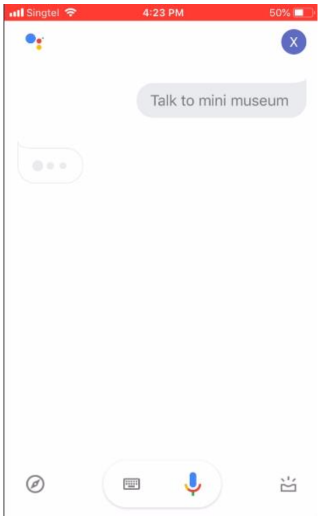
1) Click the Fulfillment Button
2) Paste the URL to the Webhook URL and Click the Save at the bottom of the Page
3) Make sure your have already Clicked the Save Button

4.0 Walkthrough

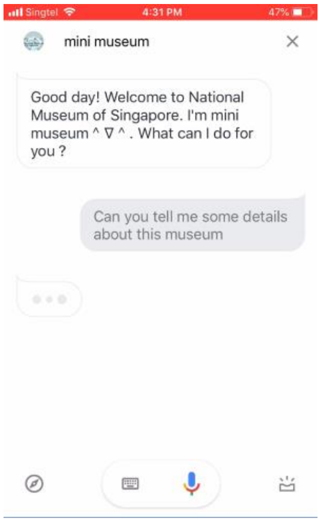
For the demonstration, we use the IOS phone installed the Google Assistant and log in the same account for logging in the DialogFlow

We recommend the Smart Device, like Android, IOS phone or tablet to do the test, because the Action on Google Simulator cannot provide the best test or user experience.

Please type "Talk to mini museum" in the Google Assistant or speak to the Google Assistant use the same sentence.

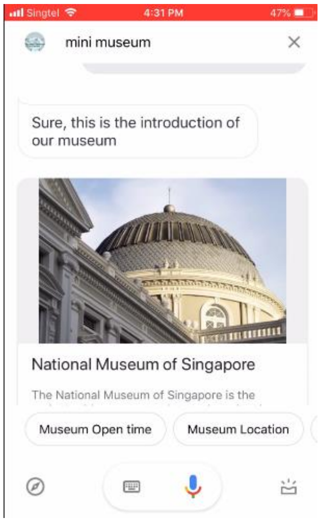


Talk to mini museum



Good day! Welcome to National Museum of Singapore. I'm mini museum ^ ∇ ^ . What can I do for you ?

Can you tell me some details about this museum



Sure, this is the introduction of our museum

National Museum of Singapore

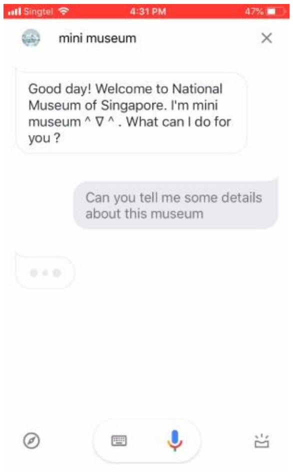
The National Museum of Singapore is the

5.0 Business Scenarios – Sample Input and System Output

5.1 Scenario 1 Museum Info

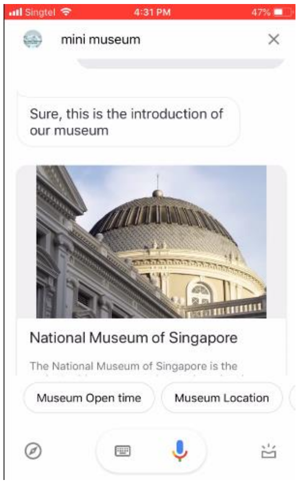
Scenario	Intents
For a tourist who is interested in the fundamental information of the National Museum of Singapore **Sample Input** 1. Can you tell me some details about this museum? 2. Give me the location of this museum? 3. When does this museum open? 4. Tell me something about Group Visits 5. How much are the tickets of this Museum? 6. Can I take a vlog in the museum? 7. Call tell me something about the Amenities of this museum?	Mini Museum can provide the information on introduction, open time, location, ticket price, guided tours, group visits, accessibility, photography and Filming rules and venue rental Intents: MiniMuseum – MuseumInfo Group • getMuseumDetail ○ inputContext: ○ outputContext: museumdetail • getMuseumOpenTime ○ inputContext: museumdetail ○ outputContext: museumdetail • getMuseumOpenTimeNC • getMuseumLocation ○ inputContext: museumdetail ○ outputContext: museumdetail • getMuseumLocationNC • getMuseumTicketInfo ○ inputContext: museumdetail ○ outputContext: museumdetail • getMuseumTicketInfoNC • getMuseumGuidedTourInfo • getMuseumGroupVisits • getMuseumAmenitiesandEtiquetteInfo • getMuseumVenueRentalInfo • getMuseumAccessibilityInfo • getMuseumPhotographyAndFilmingInfo **# every Intent named end with NC is to make sure the system can answer the same question as the non-NC one when the conversation is not in certain content**

Sample Screenshot:



Good day! Welcome to National Museum of Singapore. I'm mini museum ^ ∇ ^ . What can I do for you ?

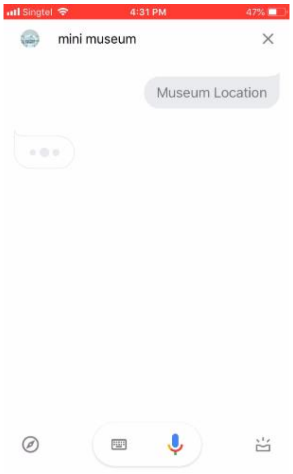
Can you tell me some details about this museum



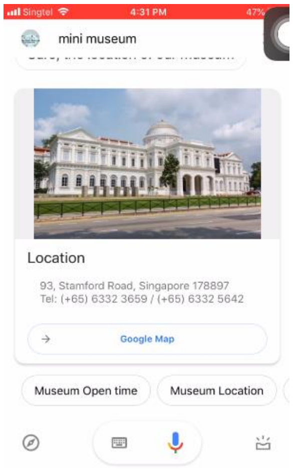
Sure, this is the introduction of our museum

National Museum of Singapore

The National Museum of Singapore is the



Museum Location



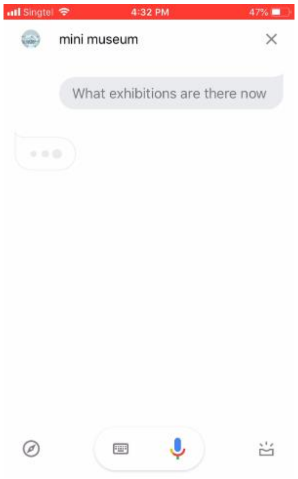
Location

93, Stamford Road, Singapore 178897
Tel: (+65) 6332 3659 / (+65) 6332 5642

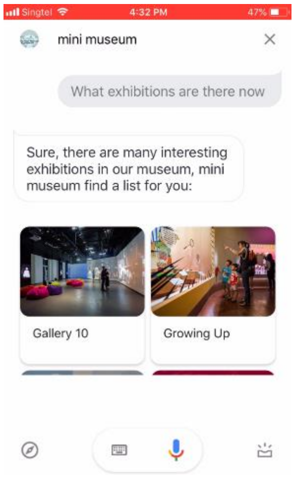
5.2 Scenario 2 Exhibition Info

Scenario	Intents
For a tourist who is interested in the exhibition's information of the National Museum of Singapore **Sample Input** 1. What exhibitions do you have now? 2. Gallery 10 details 3. Can you tell the location of Gallery 10 4. Does Gallery 10 require tickets?	Mini Museum can provide the information on exhibitions which are available about the location, open date, price and brief introduce **Intents** • getExhibitionIntro • getExhibitionContent ○ inputContext: ○ outputContext: exhibitiondetail ○ event: exhibition_tap • getExhibitionTime ○ inputContext: exhibitiondetail ○ outputContext: exhibitiondetail • getExhibitionTimeNC ○ inputContext: ○ outputContext: exhibitiondetail • getExhibitionLocation ○ inputContext: exhibitiondetail ○ outputContext: exhibitiondetail • getExhibitionLocationNC ○ inputContext: ○ outputContext: exhibitiondetail • getExhibitionTicket ○ inputContext: exhibitiondetail ○ outputContext: exhibitiondetail • getExhibitionTicketNC ○ inputContext: ○ outputContext: exhibitiondetail **# every Intent named end with NC is to make sure the system can answer the same question as the non-NC one when the conversation is not in certain content**

Sample Screenshot:



What exhibitions are there now

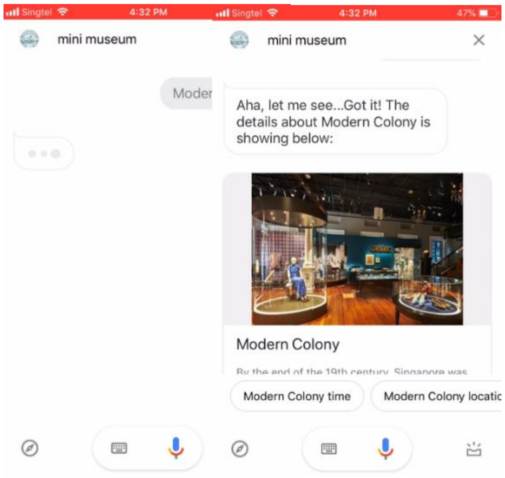


What exhibitions are there now

Sure, there are many interesting exhibitions in our museum, mini museum find a list for you:

Gallery 10

Growing Up



Aha, let me see...Got it! The details about Modern Colony is showing below:

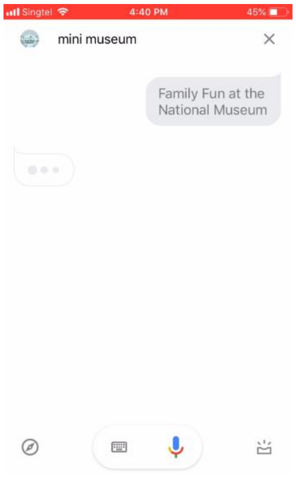
Modern Colony

By the end of the 19th century, Singapore was

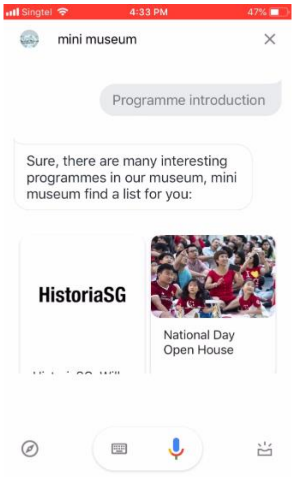
5.3 Scenario 3 Programme Info

Scenario	Intents
For a tourist who is interested in the programmes information of the National Museum of Singapore **Sample Input** 1. What programmes do you have now 2. I want to know more about school programmes. 3. What is the price for school programme 4. How much is the ticket for school programme	Mini Museum can provide the information on programmes which are available about the location, open date, price and brief introduce **Intents** • getProgrammeIntro • getProgrammeContent ○ inputContext: ○ outputContext: programmedetail ○ event: programme_tap • getProgrammeTime ○ inputContext: programmedetail ○ outputContext: programmedetail • getProgrammeTimeNC ○ inputContext: ○ outputContext: programmedetail • getProgrammeLocation ○ inputContext: programmedetail ○ outputContext: programmedetail • getProgrammeLocationNC ○ inputContext: ○ outputContext: programmedetail • getProgrammeTicket ○ inputContext: programmedetail ○ outputContext: programmedetail • getProgrammeTicketNC ○ inputContext: ○ outputContext: programmedetail **# every Intent named end with NC is to make sure the system can answer the same question as the non-NC one when the conversation is not in certain content**

Sample Screenshot:



Family Fun at the National Museum

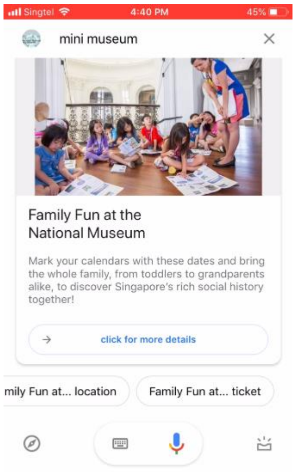


Programme introduction

Sure, there are many interesting programmes in our museum, mini museum find a list for you:

HistoriaSG

National Day Open House



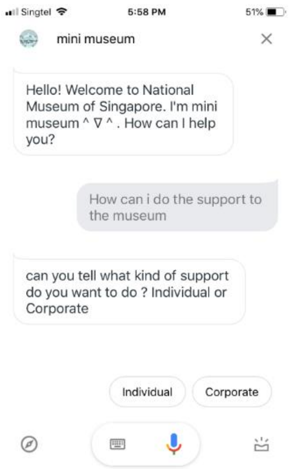
Family Fun at the National Museum

Mark your calendars with these dates and bring the whole family, from toddlers to grandparents alike, to discover Singapore's rich social history together!

5.4 Scenario 4 Support Info

Scenario	Intents
For a tourist who is interested in the support information of the National Museum of Singapore **Sample Input** **1.** How can I do the individual support to the museum **2.** Can you give me some information about the volunteer of this museum	Mini Museum can provide the information of support about how to be a volunteer or a docent, how to do individual or corporate support, and the Fellowship of the Museum **Intents** • getSupportDetail • getVolunteerInfo • getFellowshipInfo

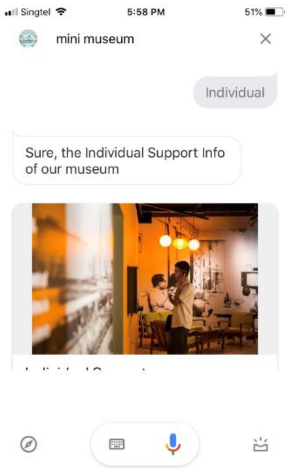
Sample Screenshot:



Hello! Welcome to National Museum of Singapore. I'm mini museum ^ ∇ ^ . How can I help you?

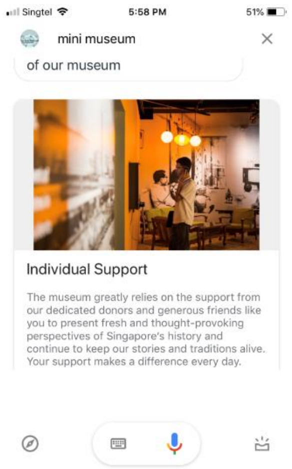
How can i do the support to the museum

can you tell what kind of support do you want to do ? Individual or Corporate



Individual

Sure, the Individual Support Info of our museum



of our museum

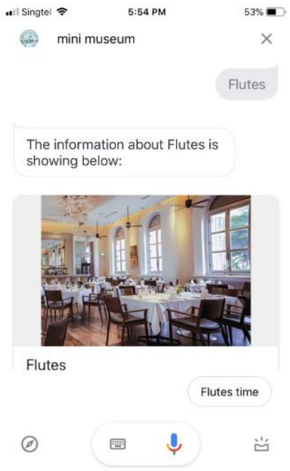
Individual Support

The museum greatly relies on the support from our dedicated donors and generous friends like you to present fresh and thought-provoking perspectives of Singapore's history and continue to keep our stories and traditions alive. Your support makes a difference every day.

5.5 Scenario 5 Dining Info

Scenario	Intents
For a tourist who is interested in the dining information of the National Museum of Singapore **Sample Input** 1. Where can I have my lunch? 2. When does Flutes open?	Mini Museum can provide the information on dining about the location, available time and brief introduce **Intents** • getDiningIntro • getDiningContent ○ inputContext: inputContext: ○ outputContext: diningdetail ○ event: dining_tap • getDiningTime ○ inputContext: diningdetail ○ outputContext: diningdetail • getDiningTimeNC ○ inputContext: ○ outputContext: diningdetail **# every Intent named end with NC is to make sure the system can answer the same question as the non-NC one when the conversation is not in certain content**

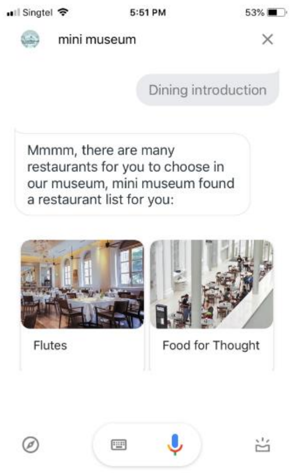
Sample Screenshot:



Flutes

The information about Flutes is showing below:

Flutes



Dining introduction

Mmmm, there are many restaurants for you to choose in our museum, mini museum found a restaurant list for you:

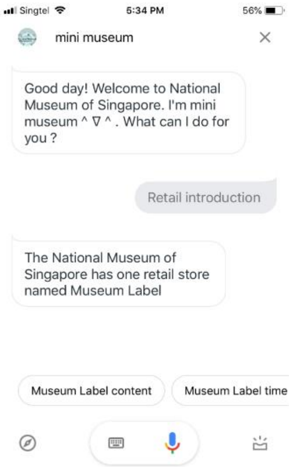
Flutes

Food for Thought

5.6 Scenario 6 Retail Info

Scenario	Intents
For a tourist who is interested in the retail information of the National Museum of Singapore **Sample Input** 1. where can I buy souvenirs 2. when does museum label open	Mini Museum can provide the information on retail about the location, available time and brief introduce **Intents** • getRetailIntro • getRetailContent ○ inputContext: ○ outputContext: retaildetail • getRetailTime ○ inputContext: retaildetail ○ outputContext: retaildetail • getRetailTimeNC ○ inputContext: ○ outputContext: retaildetail **# every Intent named end with NC is to make sure the system can answer the same question as the non-NC one when the conversation is not in certain content**

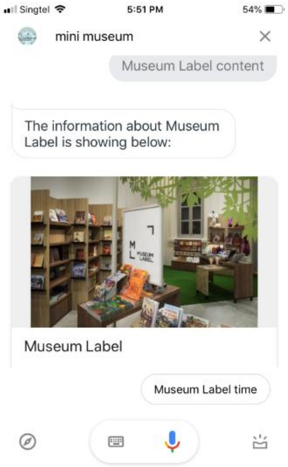
Sample Screenshot:



Good day! Welcome to National Museum of Singapore. I'm mini museum ^ ∇ ^ . What can I do for you ?

Retail introduction

The National Museum of Singapore has one retail store named Museum Label



Museum Label content

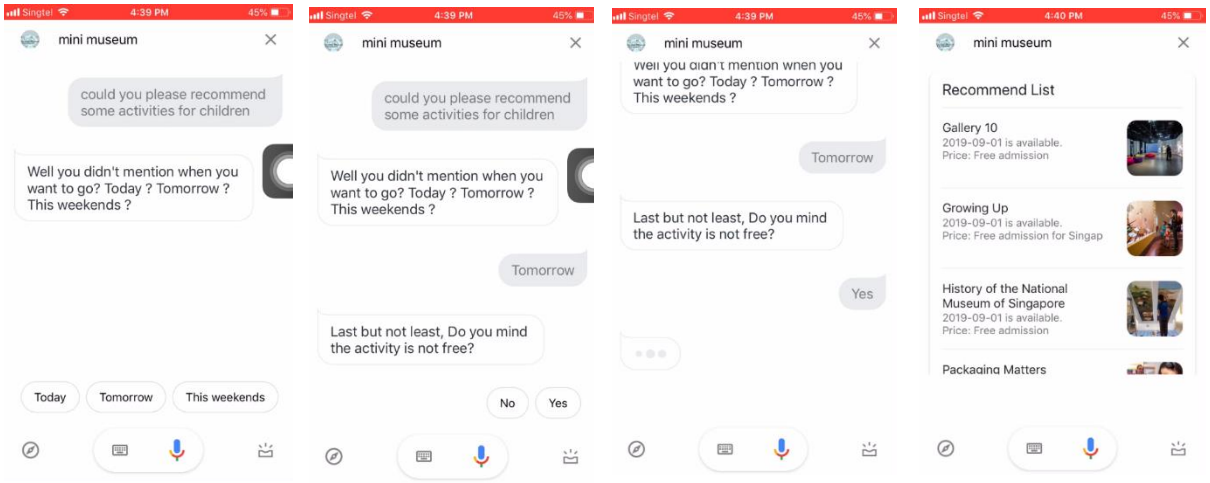
The information about Museum Label is showing below:

Museum Label

5.7 Scenario 7 Recommend Info

Scenario	Intents
For a tourist who wants to get some recommendation of his journey in the National Museum of Singapore **Sample Iuput** 1. Can you recommend some activities from August 6th to August 20th? 2. Our family will be playing in Singapore from August 6th to August 16th. Can you recommend some activities that can be visited in the National Museum during this period? 3. Can you recommend some free exhibitions that can be visited for tomorrow? 4. Can you recommend me some activities in August?	Mini Museum will ask several questions to confirm the demands of his journey and provide the recommendation of exhibitions and programmes by the information got from tourist, e.g. the group type（For Family, Students）, the activity type (Workshop, Lectures), price and availability date. **Intents** • getRecommendInfo ○ inputContext: ○ outputContext: recommenddetail • getRecommendInfo_GroupType ○ inputContext: recommenddetail ○ outputContext: recommenddetail • getRecommendInfo_ActivityType ○ inputContext: recommenddetail ○ outputContext: recommenddetail • getRecommendInfo_Date ○ inputContext: recommenddetail ○ outputContext: recommenddetail • getRecommendInfo_DatePeriod ○ inputContext: recommenddetail ○ outputContext: recommenddetail • getRecommendInfo_Price_No ○ inputContext: recommenddetail ○ outputContext: recommenddetail • getRecommendInfo_Price_Yes ○ inputContext: recommenddetail ○ outputContext: recommenddetail

Sample Screenshot:



could you please recommend some activities for children

Well you didn't mention when you want to go? Today ? Tomorrow ? This weekends ?

could you please recommend some activities for children

Well you didn't mention when you want to go? Today ? Tomorrow ? This weekends ?

Tomorrow

Last but not least, Do you mind the activity is not free?

Well you didn't mention when you want to go? Today ? Tomorrow ? This weekends ?

Tomorrow

Last but not least, Do you mind the activity is not free?

Yes

Recommend List

Gallery 10
2019-09-01 is available.
Price: Free admission

Growing Up
2019-09-01 is available.
Price: Free admission for Singap

History of the National Museum of Singapore
2019-09-01 is available.
Price: Free admission

Packaging Matters

6.0 Appendixes

Appendix A:

Backend Dependencies

- aniso8601==7.0.0
- certifi==2019.6.16
- chardet==3.0.4
- Click==7.0
- Flask==1.1.1
- Flask-Assistant==0.3.91
- idna==2.8
- itsdangerous==1.1.0
- Jinja2==2.10.1
- MarkupSafe==1.1.1
- requests==2.22.0
- ruamel.yaml==0.16.0
- ruamel.yaml.clib==0.1.0
- python-dateutil==2.8.0
- selenium==3.141.0
- urllib3==1.25.3
- Werkzeug==0.15.5
- xlwt==1.3.0
- xlrd==1.2.0
- pandas==0.25.0