AI With Python Workshop

Welcome to the AI with Python Workshop by CUHK-Jockey Club AI for the Future Project

This notebook complements the powerpoint slides during the workshop and will be used to do the coding exercises

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AI Project using Python

In this project we will create a virtual assistant that understands natural language. We will be able to interact with it in English to perform the following tasks:

- **Chit-chat**
  - Tell jokes
- **Weather**
  - Get current weather for any city
- **Movies**
  - Get rating for a movie
  - Find the director(s) of a movie
  - Find the actor(s) in a movie

Learning outcomes

In this tutorial you will learn:

- The basic terminologies required in virtual assistant systems
  - Intents
  - Slots
  - Entities
  - Utterances
- How to use SNIPS-NLU to understand natural language and detect intents, slots, and entities from utterances.
- How to use the detected intents, slots and entities to get information from APIs

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Let's Begin

We will use the following libraries in this tutorial

- **snips-nlu**
  - This library deals with the Natural Language Understanding to detect intents, slots, and entities.
- **pyjokes**
  - This library provides jokes based on Python.
- **pyowm**
  - This library provides the weather API to get weather information.
- **imdbpy**
  - This library provides the IMDB movie APU to get movie information.

Prepare the training dataset

Prepare the training dataset to train your Natural Language Understanding (NLU) Engine.

In our training dataset, we will have the following **intents**:

1. **tell_joke** : To detect that the user is asking the virtual assistant for a joke. There are no slots required for this intent.
   - **Example utterances:** "Hi, tell me a joke.", "I'm bored. Entertain me with a funny joke."

1. **get_weather** : To detect that the user is asking for current weather of a city. For this intent we need to fill a slot for `city`.
   - **Example utterances:** "How is the weather in New York?", "I wonder how the weather conditions are like in Hong Kong right now?"

1. **get_rating** : To detect that the user is asking the rating for a movie. For this intent we need to fill a slot for `movie_name`.
   - **Example utterances:** "How good is the movie Batman?", "I want to know the movie ratings for Fast and Furious"

1. **get_director** : To detect that the user is asking for who is the director of a movie. For this intent we need to fill a slot for `movie_name`.
   - **Example utterances:** "Who directed Tenet?", "I want to know the director of the movie Ip Man"

1. **get_cast** : To detect that the user is asking for who acted in a movie. For this intent we need to fill a slot for `movie_name`.
   - **Example utterances:** "Who acted in the movie Joker?", "What is the cast for the movie The Boat People?"

We will have the following **entities**:

1. **city**
   - **Examples**: Hong Kong, New York, Dublin, London

1. **movie_name**
   - **Examples**: Star Wars, Ip Man, The Dark Knight, La la land

We have created a starter dataset for you with 1 example intent and 1 example entity in the file `dataset.yaml`

Install and Import libraries

Run the cell below to install and import the required libraries and functions.

Note: *We have pre-written some code to simplify the weather and movie rating APIs in the file `utils.py`. You can view the file later to understand the inner working in more detail.*

In [1]:

```
# Run this cell
!pip install pyjokes
!pip install snips-nlu
!pip install pyowm
!pip install imdbpy
!python -m snips_nlu download en
!git clone https://github.com/muditchaudhary/workshop_utils
from workshop_utils.utils import *
import pyjokes
import json
from snips_nlu import SnipsNLUEngine
from snips_nlu.default_configs import CONFIG_EN
```

```
Collecting snips_nlu_en==0.2.3
  Downloading https://github.com/snipsco/snips-nlu-language-resources/releases/download/snips_nlu_en-0.2.3/snips_nlu_en-0.2.3.tar.gz (1.3 MB)
     |████████████████████████████████| 1.3 MB 5.3 MB/s
Building wheels for collected packages: snips-nlu-en
  Building wheel for snips-nlu-en (setup.py) ... - \ | done
  Created wheel for snips-nlu-en: filename=snips_nlu_en-0.2.3-py3-none-any.whl size=1297478 sha256=c6379d363907b73969784e935fb83c791655e7156cfd70976ce2c2acd3aa7e2d
  Stored in directory: /tmp/pip-ephem-wheel-cache-w3mq727z/wheels/77/e5/27/a2c7ae7b04c836360914a1ac909339da898cb66444e709f650
Successfully built snips-nlu-en
Installing collected packages: snips-nlu-en
Successfully installed snips-nlu-en-0.2.3
WARNING: You are using pip version 21.1; however, version 21.1.2 is available.
You should consider upgrading via the '/opt/python/envs/default/bin/python -m pip install --upgrade pip' command.

Linking successful
/opt/python/envs/default/lib/python3.8/site-packages/snips_nlu_en/snips_nlu_en-0.2.3 --> /opt/python/envs/default/lib/python3.8/site-packages/snips_nlu/data/en

Cloning into 'workshop_utils'...
remote: Enumerating objects: 17, done.
remote: Counting objects: 100% (17/17), done.
remote: Compressing objects: 100% (13/13), done.
remote: Total 17 (delta 5), reused 15 (delta 3), pack-reused 0
Unpacking objects: 100% (17/17), done.
Requirement already satisfied: pyjokes in /opt/python/envs/default/lib/python3.8/site-packages (0.6.0)
WARNING: You are using pip version 21.1; however, version 21.1.2 is available.
You should consider upgrading via the '/opt/python/envs/default/bin/python -m pip install --upgrade pip' command.
```

Convert the dataset to json format

Run the next cell to convert the dataset to json format to train the NLU Engine

In [3]:

```
# Run this cell

!snips-nlu generate-dataset en workshop_utils/dataset.yaml > dataset.json
```

Open the dataset

To open the dataset, we will follow the following steps:

1. Use `open` function to load the file into Python in a variable called `dataset_file`.
2. use `load` function from `json` as `json.load(dataset_file)` into a variable called `training_dataset`.

In [4]:

```
# Write the code below
dataset_file = open("dataset.json", "r")
training_dataset = json.load(dataset_file)
```

Initialize the Snips-NLU Engine with English Configuration

We will start our Snips-NLU engine using the `SnipsNLUEngine()`. We will pass a parameter in it as `config=CONFIG_EN`, which will load the English language configuration in our NLU engine.

We will store the Snips-NLU engine in a variable called `NLUengine`

In [5]:

```
# Write the code below

NLUengine = SnipsNLUEngine(config=CONFIG_EN)
```

Train the NLU Engine

We will now train the NLU engine using our training dataset. We will use `fit()` function to train the model

To train the model we have to run:

```
NLUengine.fit(training_dataset)
```

In [6]:

```
# Write the code below

NLUengine.fit(training_dataset)
```

```
<snips_nlu.nlu_engine.nlu_engine.SnipsNLUEngine at 0x7f17781a4610>
```

Let's try to predict again

Let's try to use our model on the sentence `"How's the weather in Hong Kong"`

Use the function `prediction = NLUengine.parse(your utterance)`

In [8]:

```
# Write the code below

prediction = NLUengine.parse("How's the weather in Hong Kong?")
```

Print the prediction

To print the prediction in a more readable format we will use `json.dumps()` function as:

`print(json.dumps(prediction, indent=2))`

In [9]:

```
# Write the code below

print(json.dumps(prediction, indent=2))
```

```
{
  "input": "How's the weather in Hong Kong?",
  "intent": {
    "intentName": "get_weather",
    "probability": 0.7324433420149711
  },
  "slots": [
    {
      "range": {
        "start": 21,
        "end": 30
      },
      "rawValue": "Hong Kong",
      "value": {
        "kind": "Custom",
        "value": "Hong Kong"
      },
      "entity": "city",
      "slotName": "city"
    }
  ]
}
```

Get the intent

To get the intent we access the intent name element from the resulted `prediction` dictionary.

We have made a function for you to get the intent easily. You can use `get_intent(prediction)` to get the intent.

In [10]:

```
# Write the code below

print(get_intent(prediction))
```

```
get_weather
```

Get the slot's entity type

There can be multiple slots mentioned in an utternace. But in our tutorial we only have 1 slot per utterance.

You can use our function `get_entity_type(prediction)` to get the slot's entity type.

In [11]:

```
# Write the code below

print(get_entity_type(prediction))
```

```
city
```

Get the entity's value

Similar to slots, there can be multiple entity values. But our tutorial will only have 1 value per slot.

You can use our function `get_entity_value(prediction)` to get the slot's value.

In [12]:

```
# Write the code below

print(get_entity_value(prediction))
```

```
Hong Kong
```

Integrate NLU Engine with API

We have provided you with the following pre-defined functions:

1. `get_current_weather(city)` : Given a city, it will print its current temperature and weather condition
2. `get_movie_rating(movie_name)` : Given a movie name, it will print its IMDB rating
3. `get_directors(movie_name)` : Given a movie name, it will print the name(s) of its director(s)
4. `get_cast(movie_name)` : Given a movie name, it will print the cast of the movie
5. `pyjokes.get_joke()` : This function from pyjokes library returns a joke (a nerdy programming based joke)

We will now use these functions to integrate our NLU with the APIs to get a working virtual assistant

Create a function

First we create a function called `assistant` that given an utterance, gives an appropriate response based on user's intent.

The function will have `utterance` as one of the parameter.

The function should work in the following manner:

1. Get the **intent** and **slot type** of the utterance using the NLU Engine
2. If the intent is `tell_joke`, print the output of `pyjokes.get_joke()` function.
3. Else if the intent is `get_weather`, get the value of slot `city` and use the `get_current_weather(city)` function.
4. Else if the intent is `get_rating`, get the value of slot `movie_name` and use the `get_movie_rating(movie_name)` function.
5. Else if the intent is `get_director`, get the value of slot `movie_name` and use the `get_movie_directors(movie_name)` function.
6. Else if the intent is `get_cast`, get the value of slot `movie_name` and use the `get_movie_cast(movie_name)` function.
7. Else `print("Unknown intent")`.

Note: Inside the if-statements for `get_weather`, `get_rating`, `get_director`, and `get_cast`, you need to add another if-statement to check if the slot-type is correct. If it is not correct, you need to print "Sorry, please try again."

In [13]:

```
# Write the code below

def assistant(utterance):
    prediction = NLUengine.parse(utterance)
    intent = get_intent(prediction)
    slot_type = get_entity_type(prediction)



    if (intent == "tell_joke"):
        print(pyjokes.get_joke())

    elif (intent == "get_weather"):

        if (slot_type == "city"):
            city_name = get_entity_value(prediction)
            get_current_weather(city_name)
        else:
            print("Sorry, can you try again?")

    elif (intent == "get_rating"):

        if (slot_type == "movie_name"):
            movie_name = get_entity_value(prediction)
            get_movie_rating(movie_name)
        else:
            print("Sorry, can you try again?")

    elif (intent == "get_director"):

        if (slot_type == "movie_name"):
            movie_name = get_entity_value(prediction)
            get_movie_directors(movie_name)
        else:
            print("Sorry, can you try again?")

    elif (intent == "get_cast"):

        if (slot_type == "movie_name"):
            movie_name = get_entity_value(prediction)
            get_movie_cast(movie_name)
        else:
            print("Sorry, can you try again?")

    else:
        print("Unknown intent")
```

Create a conversation loop

We will create a loop that keeps on going until the user enters "Bye"

We will use a new kind of loop called `while-loop`

The loop has to accomplish the following things:

1. Keep asking for user input until the user enters "Bye"
2. Call the `assistant` function on the user's input

To break the loop, we will use a new keyword called `break`.

To get input from the user we will use a Python function called `input`.

We have partially written the code below to help you. Please fill the remaining code

In [0]:

```
# Complete the code belo
print("Welcome to the virtual assistant. How can I help you?")
while True:
    print("------------------------------------")
    user_input=str(input("Enter your input: "))

    # This if statement should break the loop if the user_input is "Bye"
    if (user_input == "Bye"):
        print("Have a good day!")
        break

    else:

        print("Assistant: ")
        assistant(user_input)
        """Enter the code here to call assistant function using user_input here"""
```

```
Welcome to the virtual assistant. How can I help you?
------------------------------------
Enter your input:  Tell me a joke
Assistant:
Child: Dad, why does the sun rise in the east and set in the west? Dad: Son, it's working, don't touch it.
------------------------------------
Enter your input:  How's the weather in Hong Kong?
Assistant:
The current temperature is 32.59 degrees Celsius.
The weather condition is overcast clouds.
------------------------------------
Enter your input:  Who directed the movie Deadpool?
Assistant:
The director(s) of the movie is/are:
Noriko Takao
------------------------------------
Enter your input:  Who directed Deadpool?\
Assistant:
The director(s) of Deadpool? is/are:
David Leitch
------------------------------------
Enter your input:  Who acted in Deadpool?
Assistant:
Sorry, can you try again?
------------------------------------
Enter your input:  Who acted in the movie Deadpool?
Assistant:
The actors(s) in Deadpool? is/are:
Ryan Reynolds played the role of Wade Wilson / Deadpool / Voice of Juggernaut
Josh Brolin played the role of Cable
Morena Baccarin played the role of Vanessa
Julian Dennison played the role of Firefist
Zazie Beetz played the role of Domino
------------------------------------
Enter your input:  What acted in the movie Fast and the Furious?
Assistant:
The actors(s) in Fast and the furious is/are:
Mathew Buck played the role of Film Brain
Christopher Barnard played the role of Professor Celluloid
------------------------------------
Enter your input:  Who acted in the movie tenet?
Assistant:
Sorry, can you try again?
------------------------------------
Enter your input:  Who acted in the movie Tenet?
Assistant:
The actors(s) in Tenet? is/are:
Juhan Ulfsak played the role of Passenger
Jefferson Hall played the role of Well-Dressed Man
Ivo Uukkivi played the role of Uniformed Official
Andrew Howard played the role of Driver
John David Washington played the role of Protagonist
------------------------------------
Enter your input:  Who directed Tenet?
Assistant:
The director(s) of Tenet is/are:
Christopher Nolan
------------------------------------
Enter your input:  How good is the movie Tenet?
Assistant:
Sorry, can you try again?
------------------------------------
Enter your input:  I want to know the movie rating for Tenet?
Assistant:
Tenet?
Tenet? got a rating of 7.4 out of 10
------------------------------------
Enter your input:  I want to know the movie rating for Shawshank Redemption
Assistant:
Shawshank Redemption
Movie rating couldn't be found in the database
------------------------------------
Enter your input:  I want to know the movie rating for The Dark Knight
Assistant:
The Dark Knight
The Dark Knight got a rating of 9.0 out of 10
------------------------------------
```

End of Part 2

Thank you for attending the workshop