Covid-19 FAQ Bot using RASA (Procedure and Outcome)

Contents

1 Prerequisites of RASA: 6

2 Introduction to RASA 6

2.1 RASA Architecture: 6

3 The problem statement 7

3.1 Technical stack: 7

3.2 The application flow 7

4 Implementation: 8

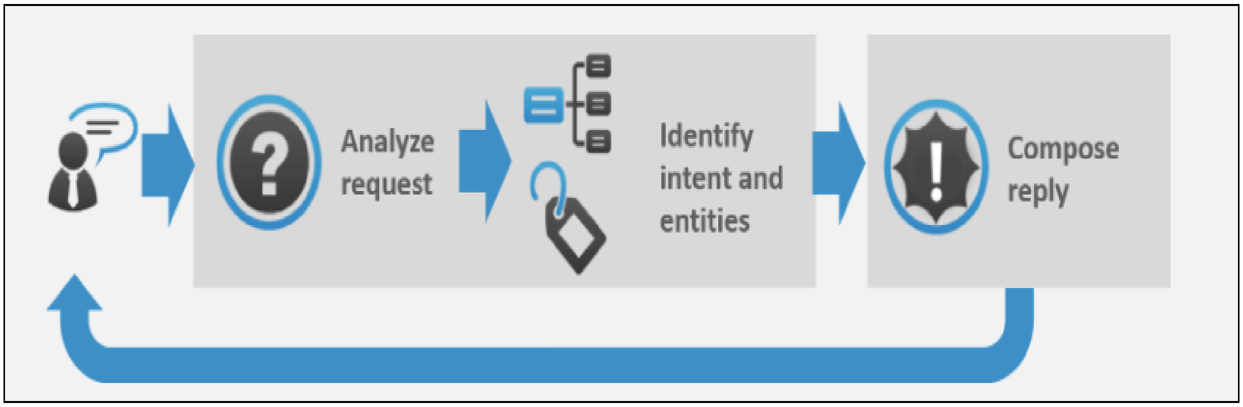
5 Deployment globally using Ngrok 15

6 Channel Integration 16

1. Chatbot Concept

What are chatbots?

A chatbot is an application that can initiate and continue a conversation using auditory and/or textual methods as a human would do. A chatbot can be either a simple rule-based engine or an intelligent application leveraging Natural Language Understanding. Many organizations today have started using chatbots extensively. Chatbots are becoming famous as they are available 24*7, provide a consistent customer experience, can handle several customers at a time, are cost-effective and hence, results in a better overall customer experience. A Chatbot has two different tasks at the core: user request analysis (identifying the intent of the user) and returning the response.



There are two types of chatbots: one functions on a set of rules and the other more advanced one uses artificial intelligence.

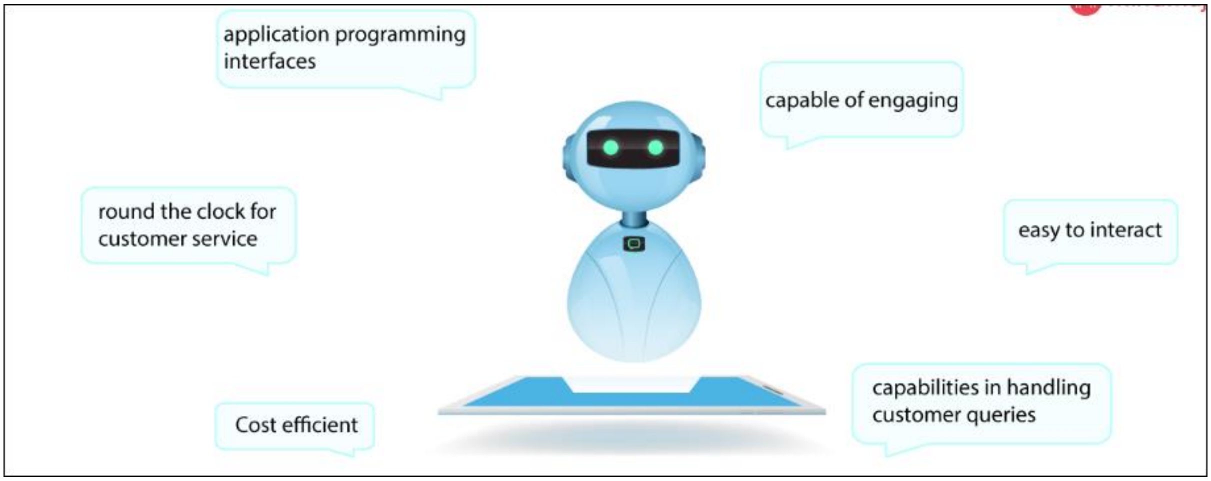
2. **Chatbots that function on rules**: It is easy to build. Though simplistic, it can get basics tasks done with limitations to specific commands. This bot is only as smart as it is programmed.
3. **Chatbots that function on machine learning**: It understands languages and not just commands and provides relevant responses. It communicates through speech or text relying on AI technologies like machine learning and NLP. It gets smarter as it learns from the conversations from users.

4. Use cases

A chatbot can be used in many different ways. Any business or industry having a website or an app can have a chatbot. Following are some of the chatbot applications, out of the infinite possibilities:

1. A takeaway restaurant that allows customers to order from their office or home.
2. A chatbot that answers customer service questions and provides help with different tasks.
3. A chatbot that allows the customer to book a flight and receive relevant information.
4. A chatbot that helps a customer with ecommerce purchases.
5. A marketing campaign chatbot that asks questions to the customer.
6. A health bot that provides services for booking a Doctor consultation.
7. A movie ticket booking bot.

5. Advantages of Chatbots


application programming interfaces
capable of engaging
round the clock for customer service
easy to interact
Cost efficient
capabilities in handling customer queries

The advantages of chatbots are as follows:

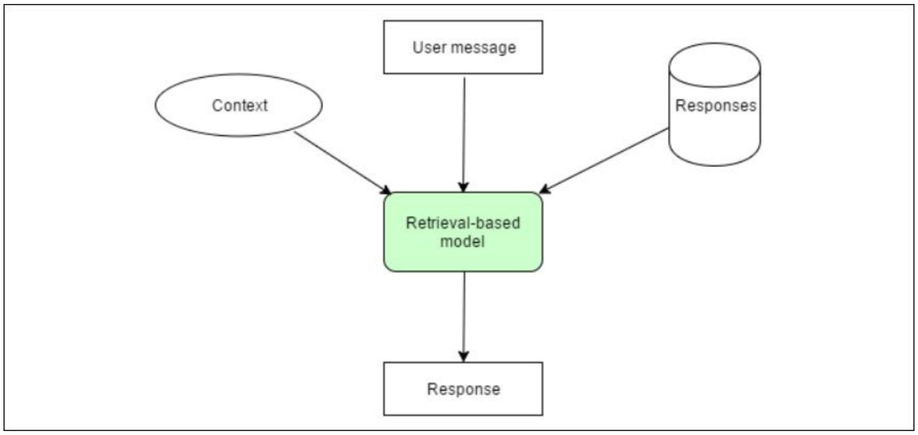
- They are capable of engaging customers in a friendly manner.
- A simple interface makes it easier to interact with.
- Interactions are made possible via social media platforms like Twitter, Facebook, etc. Chats are served through application programming interfaces (APIs).
- Chatbots have extraordinary capabilities in handling customer queries.
- Chatbots work efficiently round the clock for customer service.
- Cost-efficient and are easy to build.

6. Models for a Chatbot

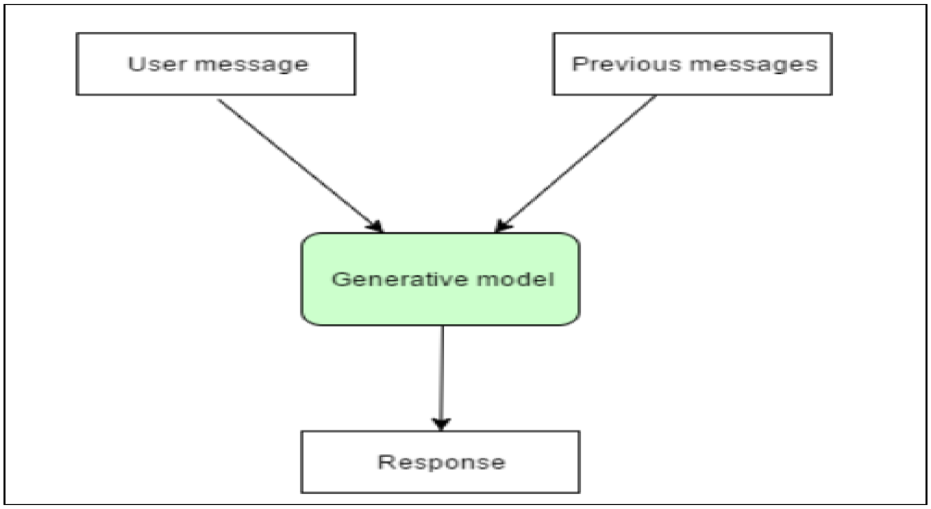
When creating a chatbot, the goal is to automate the process altogether and to reduce human intervention. The first step in creating a chatbot involves inputting thousands of existing interactions between customers and customer service representatives to teach the machine which words/phrases are sensitive to the business. The next step is preprocessing which involves incorporating grammar to identify any misspellings.

Then the next step is to identify the kind of chatbot we would like to implement. There mainly are two models:

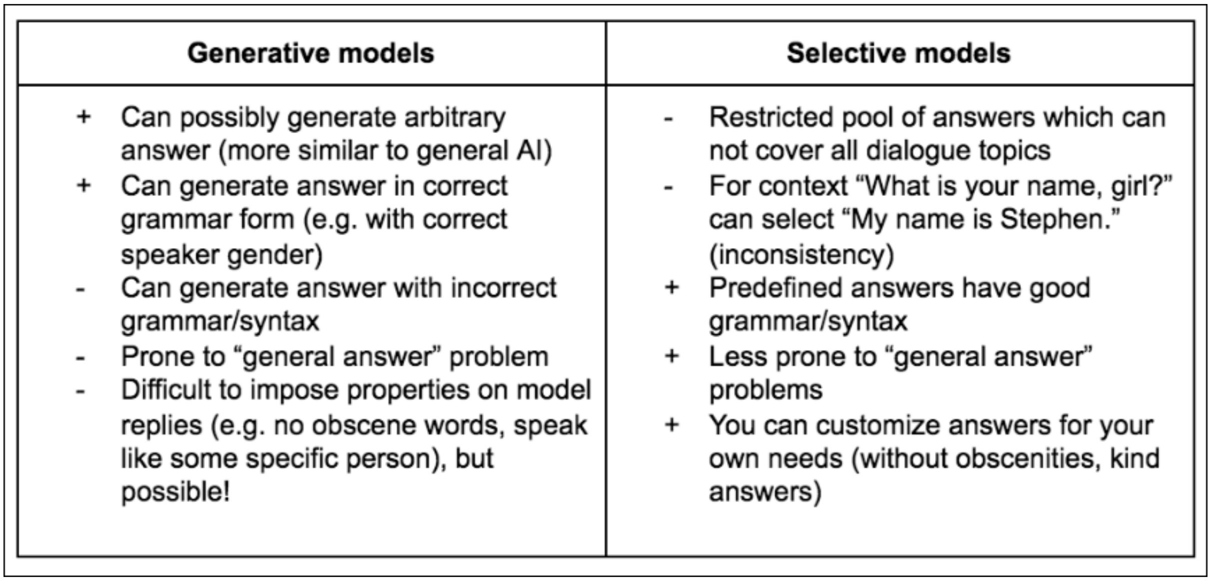
1. **Retrieval-based model**- These models are much easy to build and give more predictable responses. They make use of context in the conversation for selecting the best response from a predefined list of messages that they got trained from. The context includes all the previous conversations, and the saved variables.



2. **Generative based model**: A generative model chatbot doesn't use any predefined repository. This kind of chatbot is more advanced because it learns from scratch using "Deep Learning."

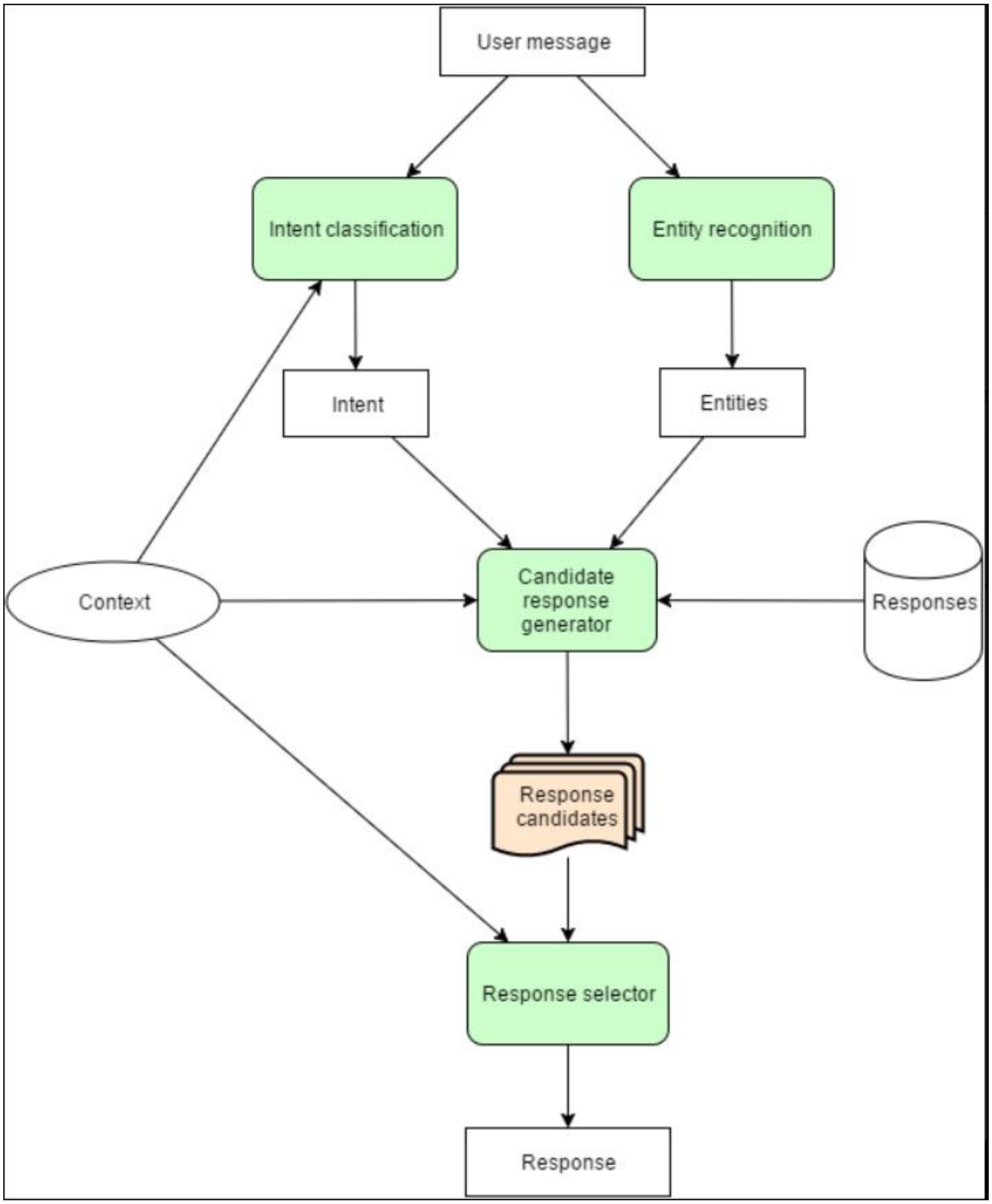


Pros and Cons:



Generative models	Selective models
+ Can possibly generate arbitrary answer (more similar to general AI) + Can generate answer in correct grammar form (e.g. with correct speaker gender) - Can generate answer with incorrect grammar/syntax - Prone to "general answer" problem - Difficult to impose properties on model replies (e.g. no obscene words, speak like some specific person), but possible!	- Restricted pool of answers which can not cover all dialogue topics - For context "What is your name, girl?" can select "My name is Stephen." (inconsistency) + Predefined answers have good grammar/syntax + Less prone to "general answer" problems + You can customize answers for your own needs (without obscenities, kind answers)

7. Architecture of AI chatbot



Message processing begins with understanding what the user is talking about.

1. An intent classification module identifies the intent of the user messages. Typically, it is a selection of one out of many predefined intents, though more sophisticated bots can identify multiple intents from one message.

2. An entity recognition module extracts structured bits of information from the message. The weather bot can extract the location and date.

3. The candidate response generator is doing all the domain-specific calculations to process the user request. It can use different algorithms, call a few external APIs, or

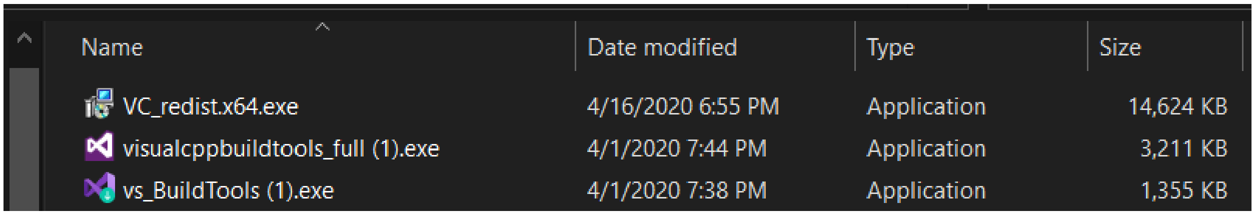
even ask a human to help with response generation. The result of these calculations is a list of response candidates. All these responses should be correct according to the domain-specific logic. They can't be just tons of random responses. The response generator must use the context of the conversation as well as intent and entities extracted from the last user message. Otherwise, it can't support multi-message conversations.

4. The response selector just scores all the response candidate and selects a response which should work better for the user.

1 Prerequisites of RASA:

The prerequisites for developing and understanding a chatbot using Microsoft Azure are:

- Python installed
- Microsoft Build tools with visual c++ 14.0 installed. Link: https://visualstudio.microsoft.com/downloads/



Name	Date modified	Type	Size
VC_redist.x64.exe	4/16/2020 6:55 PM	Application	14,624 KB
visualcppbuildtools_full (1).exe	4/1/2020 7:44 PM	Application	3,211 KB
vs_BuildTools (1).exe	4/1/2020 7:38 PM	Application	1,355 KB

Figure 1: Required Files

2 Introduction to RASA

Rasa is an open source machine learning framework for building contextual AI assistants and chatbots.

Rasa has two main modules:

- **NLU** for understanding user messages
- **Core** for holding conversations and deciding what to do next

2.1 RASA Architecture:

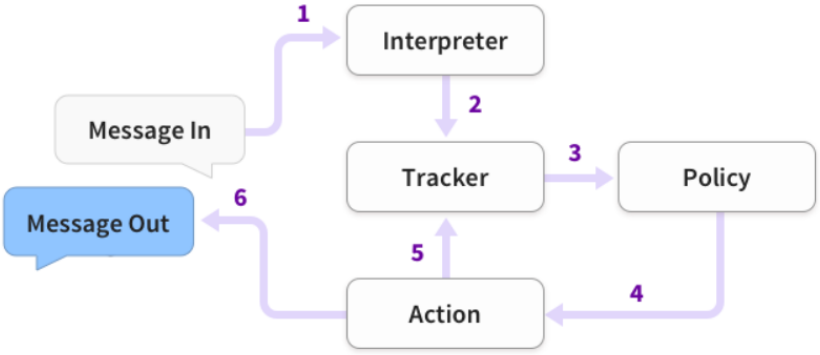


Figure 2: RASA architecture

3 The problem statement

The goal here is to build a chatbot which can answer queries related to the COVID-19 disease.

3.1 Technical stack:

- Python
- Rasa X

3.2 The application flow

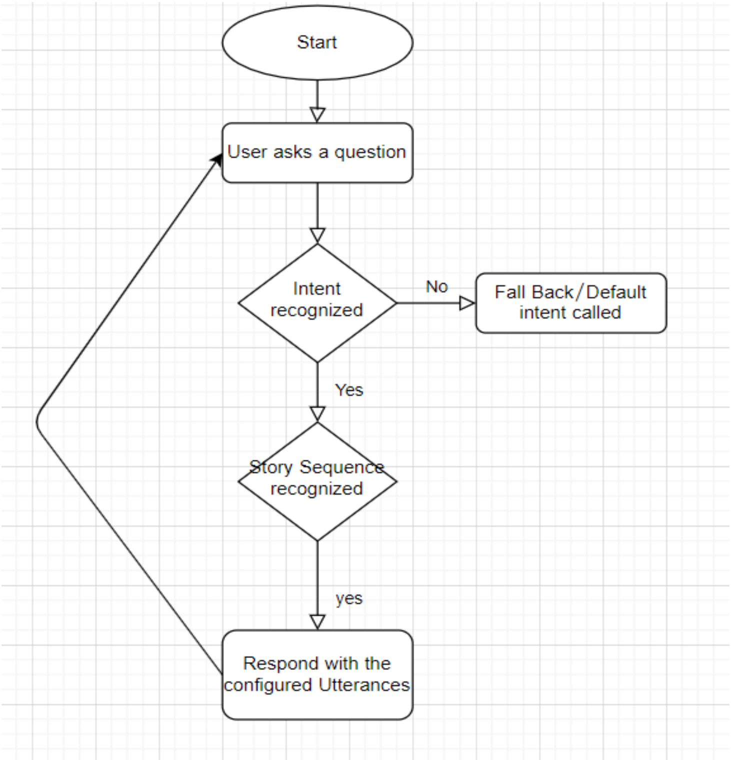
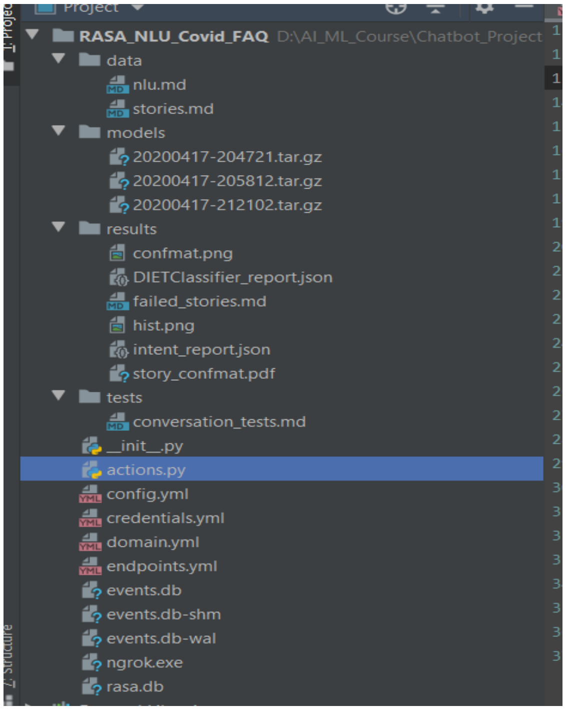

Start
User asks a question
Intent recognized
No
Fall Back/Default intent called
Yes
Story Sequence recognized
yes
Respond with the configured Utterances

Figure 3 Flowchart of RASA Application

4 Implementation:

- Create a new folder for your chatbot project.
- Open that folder using Pycharm
- Create a new environment for your chatbot project from pycharm or from anaconda prompt.
- **Use this > pip install rasa-x --extra-index-url https://pypi.rasa.com/simple**
- Run the command **pip install spacy** for installing spacy library.
- Then enter the following commands:
  - **python -m spacy download en**
  - **python -m spacy download en_core_web_md**
  - **python -m spacy link en_core_web_md en**

- After all this command run successfully, enter the command **rasa init** and for all the subsequent actions choose Y (for training the model etc).
- You'll then end up with all the predefined structures which RASA would have built, as shown below:



```
RASA_NLU_Covid_FAQ D:\AI_ML_Course\Chatbot_Project
    data
        nlu.md
        stories.md
    models
        20200417-204721.tar.gz
        20200417-205812.tar.gz
        20200417-212102.tar.gz
    results
        confmat.png
        DIETClassifier_report.json
        failed_stories.md
        hist.png
        intent_report.json
        story_confmat.pdf
    tests
        conversation_tests.md
    __init__.py
    actions.py
    config.yml
    credentials.yml
    domain.yml
    endpoints.yml
    events.db
    events.db-shm
    events.db-wal
    ngrok.exe
    rasa.db
```

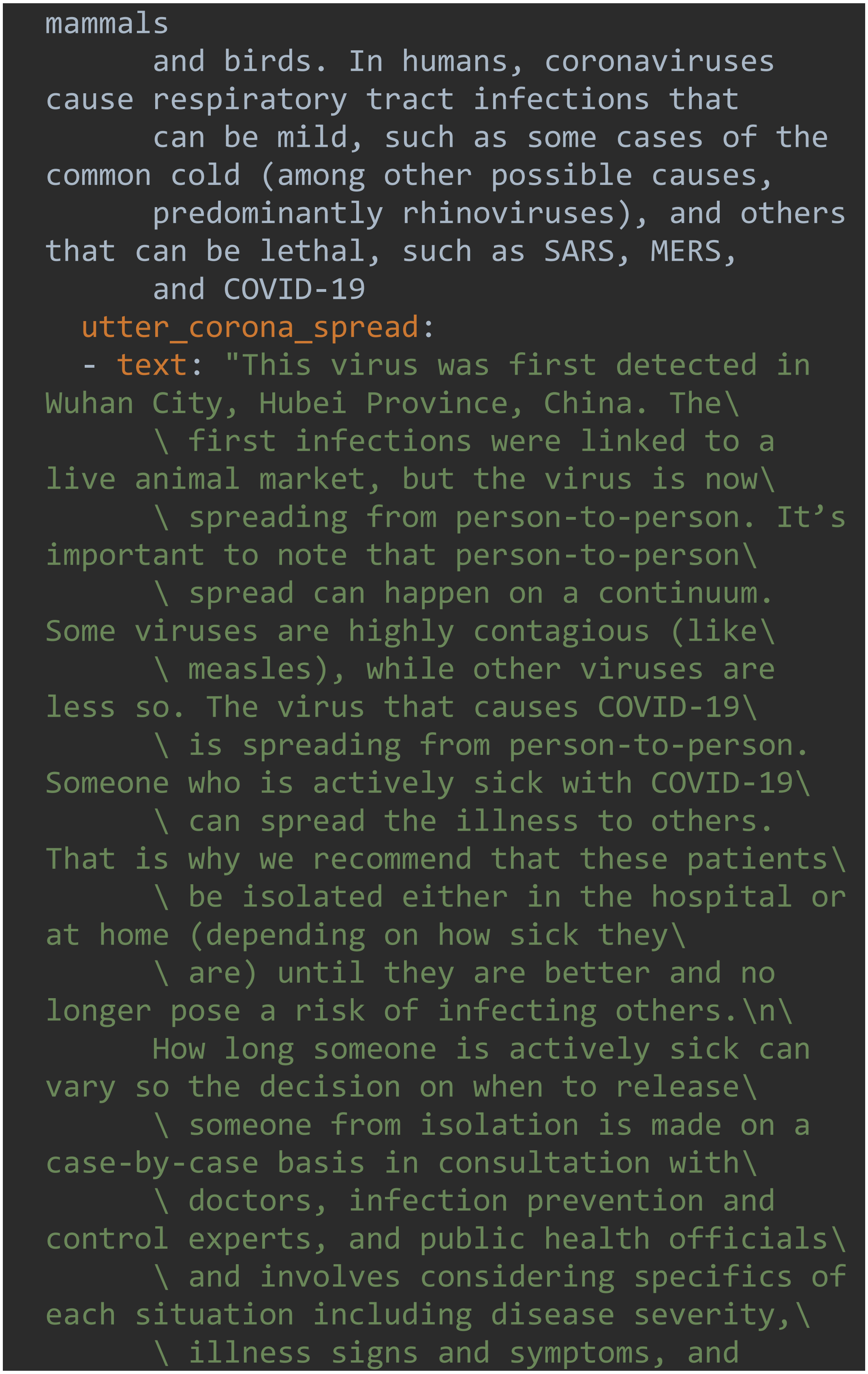
Figure 4 Structure of RASA Folder

- ‘nlu.md’ file from the data folder have the following content:

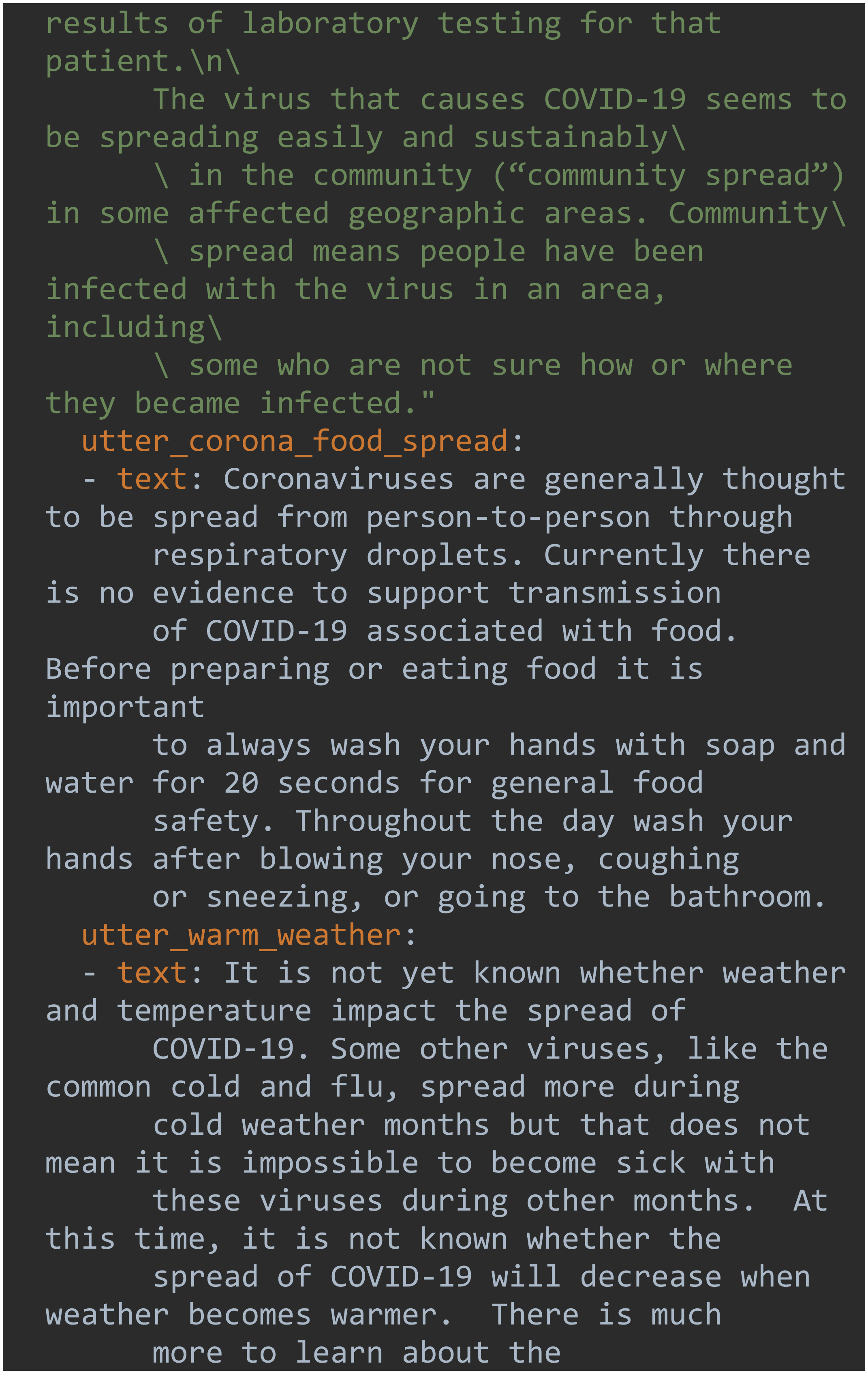
```
## intent:greet
- hey
- hello
- hi
- good morning
- good evening
- hey there

## intent:goodbye
- bye
- goodbye
- see you around
- see you later

## intent:bot_challenge
- are you a bot?
- are you a human?
- am I talking to a bot?
- am I talking to a human?

## intent:corona_intro
- What is corona virus
- what is covid
- what is a novel corona virus
- what is covid-19
- tell me about corona
- can you tell me about covid

## intent:corona_spread
- how does corona virus spread
- how does the virus spread

## intent:corona_food_spread
- Does corona spread from food
- how will corona spread from food

## intent:warm_weather
- will warm weather stop the spread
- will it stop with warm weather

## intent: high_risk
- who is at a higher risk of infection
```

- This file is used to create all the intents and their sample utterances for conversation.
- Open the ‘domain.yml’ file and put the following content:

```
• session_config:
    session_expiration_time: 60
    carry_over_slots_to_new_session: true
  intents:
  - greet
  - goodbye
  - bot_challenge
  - corona_intro
  - corona_spread
  - corona_food_spread
  - warm_weather
  - high_risk
  responses:
    utter_greet:
    - text: Hey! How are you?
    utter_did_that_help:
    - text: Did that help you?
    utter_goodbye:
    - text: Bye
    utter_iamabot:
    - text: I am a bot, powered by Rasa.
    utter_corona_intro:
    - text: Coronaviruses are a group of
  related viruses that cause diseases in
```



```
mammals
      and birds. In humans, coronaviruses
cause respiratory tract infections that
      can be mild, such as some cases of the
common cold (among other possible causes,
      predominantly rhinoviruses), and others
that can be lethal, such as SARS, MERS,
      and COVID-19
  utter_corona_spread:
  - text: "This virus was first detected in
Wuhan City, Hubei Province, China. The\
      \ first infections were linked to a
live animal market, but the virus is now\
      \ spreading from person-to-person. It’s
important to note that person-to-person\
      \ spread can happen on a continuum.
Some viruses are highly contagious (like\
      \ measles), while other viruses are
less so. The virus that causes COVID-19\
      \ is spreading from person-to-person.
Someone who is actively sick with COVID-19\
      \ can spread the illness to others.
That is why we recommend that these patients\
      \ be isolated either in the hospital or
at home (depending on how sick they\
      \ are) until they are better and no
longer pose a risk of infecting others.\n\
      How long someone is actively sick can
vary so the decision on when to release\
      \ someone from isolation is made on a
case-by-case basis in consultation with\
      \ doctors, infection prevention and
control experts, and public health officials\
      \ and involves considering specifics of
each situation including disease severity,\
      \ illness signs and symptoms, and
```



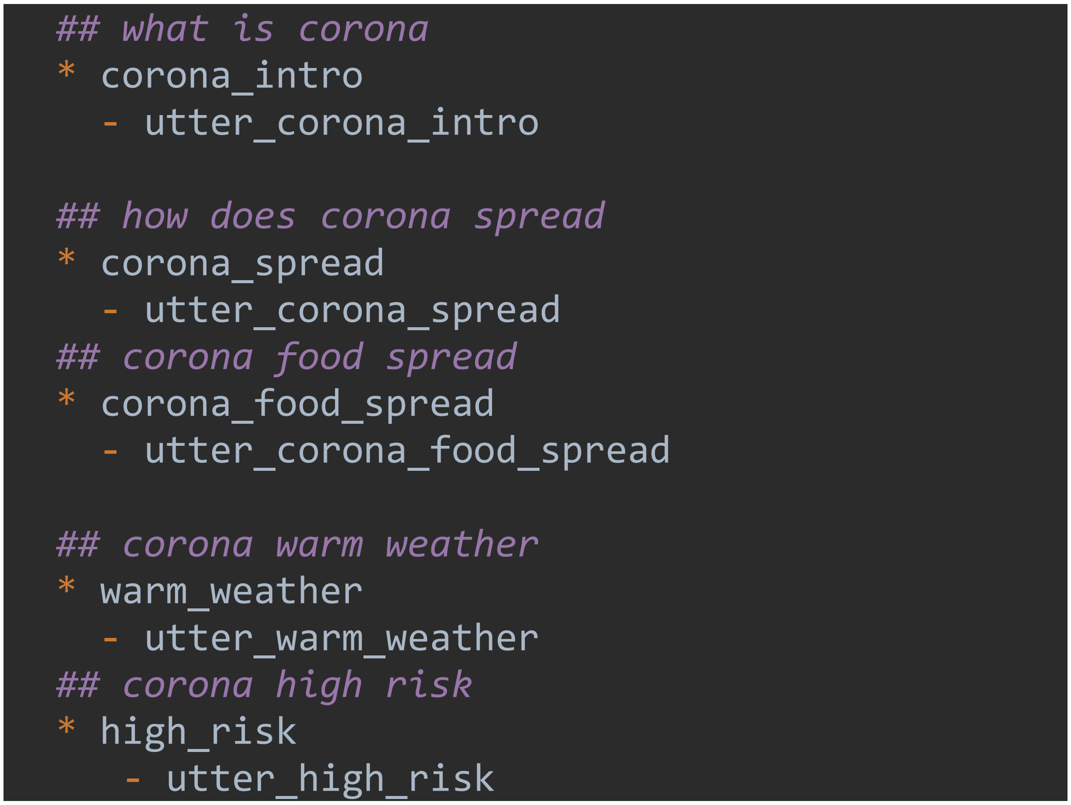
```
results of laboratory testing for that
patient.\n\
      The virus that causes COVID-19 seems to
be spreading easily and sustainably\
      \ in the community (“community spread”)
in some affected geographic areas. Community\
      \ spread means people have been
infected with the virus in an area,
including\
      \ some who are not sure how or where
they became infected."
  utter_corona_food_spread:
  - text: Coronaviruses are generally thought
to be spread from person-to-person through
      respiratory droplets. Currently there
is no evidence to support transmission
      of COVID-19 associated with food.
Before preparing or eating food it is
important
      to always wash your hands with soap and
water for 20 seconds for general food
      safety. Throughout the day wash your
hands after blowing your nose, coughing
      or sneezing, or going to the bathroom.
  utter_warm_weather:
  - text: It is not yet known whether weather
and temperature impact the spread of
      COVID-19. Some other viruses, like the
common cold and flu, spread more during
      cold weather months but that does not
mean it is impossible to become sick with
      these viruses during other months.  At
this time, it is not known whether the
      spread of COVID-19 will decrease when
weather becomes warmer.  There is much
      more to learn about the
```

```
transmissibility, severity, and other
features associated
      with COVID-19 and investigations are
ongoing.
  utter_high_risk:
  - text: Older adults and people of any age
who have serious underlying medical
conditions
      may be at higher risk for more serious
complications from COVID-19. These people
      who may be at higher risk of getting
very sick from this illness, includes;
      Older adults, People who have serious
underlying medical conditions like...
      Heart disease, Diabetes, Lung disease,
actions:
- utter_greet
- utter_did_that_help
- utter_goodbye
- utter_iamabot
- utter_corona_intro
- utter_corona_spread
- utter_corona_food_spread
- utter_warm_weather
- utter_high_risk
```

This file is used to configure the bot responses.

- Open the ‘stories.md’ file from the data folder and put the following content:

```
## say goodbye
* goodbye
  - utter_goodbye

## bot challenge
* bot_challenge
  - utter_iamabot
```



```
## what is corona
* corona_intro
  - utter_corona_intro

## how does corona spread
* corona_spread
  - utter_corona_spread
## corona food spread
* corona_food_spread
  - utter_corona_food_spread

## corona warm weather
* warm_weather
  - utter_warm_weather
## corona high risk
* high_risk
   - utter_high_risk
```

This file is used to create the conversation flows.

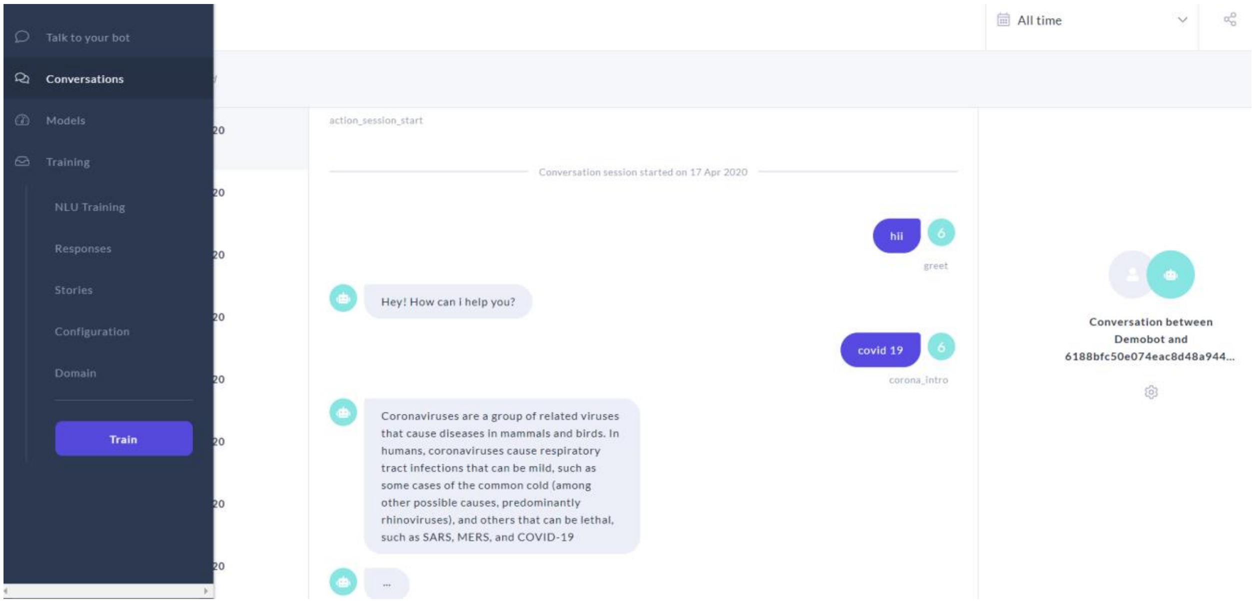
- After all this, you can just enter the command ‘**rasa train’** to train the model with new conversation elements.
- After the training is completed, enter the command ‘**rasa x’** to test your chatbot in the web UI. You’ll see :

The server is running at http://localhost:5002/login?username=me&password=X7HoxMXV83Ar

- Copy this URL in your web browser and you’ll see the web UI for your chatbot:

Note:- In my case it directly opened in a browser

- Here I am attaching some of the screenshot of chat



action_session_start

Conversation session started on 17 Apr 2020

hii
greet

Hey! How can i help you?

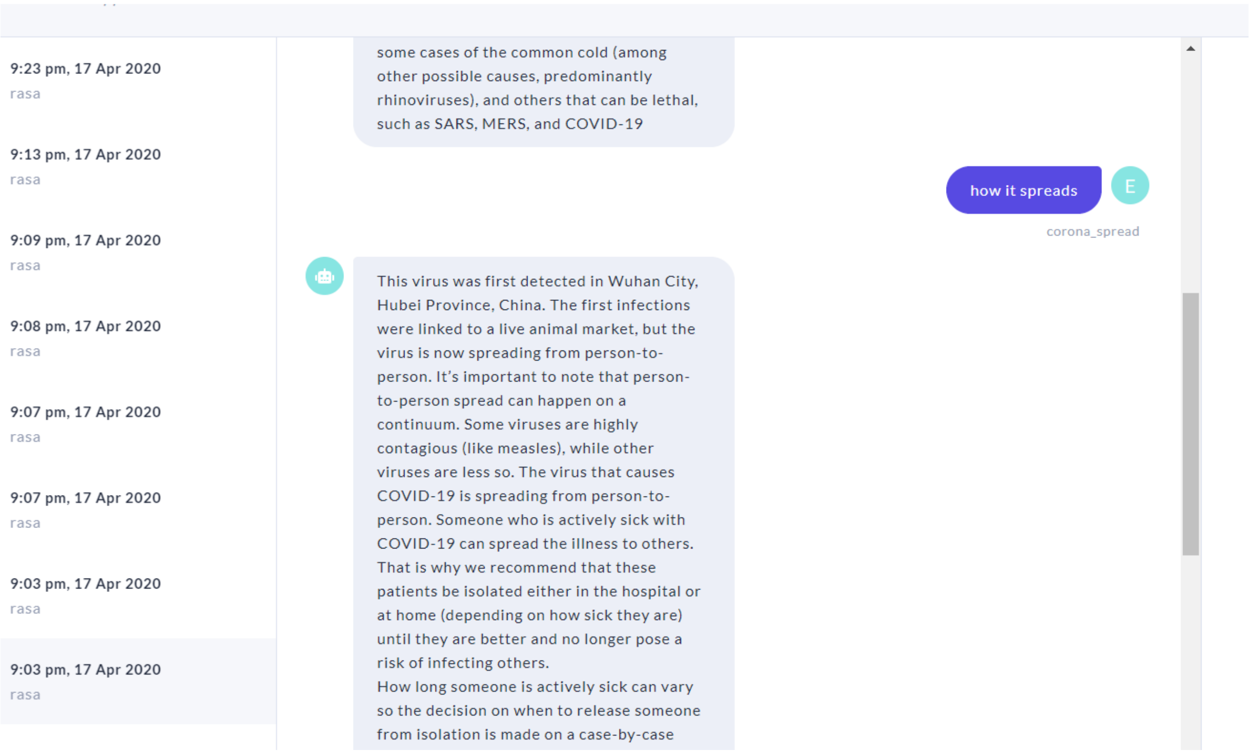
covid 19
corona_intro

Coronaviruses are a group of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold (among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19

...

Conversation between Demobot and 6188bfc50e074eac8d48a944...

Figure 5: These are some chat bot responses


9:23 pm, 17 Apr 2020
rasa

9:13 pm, 17 Apr 2020
rasa

9:09 pm, 17 Apr 2020
rasa

9:08 pm, 17 Apr 2020
rasa

9:07 pm, 17 Apr 2020
rasa

9:07 pm, 17 Apr 2020
rasa

9:03 pm, 17 Apr 2020
rasa

9:03 pm, 17 Apr 2020
rasa

some cases of the common cold (among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19

how it spreads
corona_spread

This virus was first detected in Wuhan City, Hubei Province, China. The first infections were linked to a live animal market, but the virus is now spreading from person-to-person. It's important to note that person-to-person spread can happen on a continuum. Some viruses are highly contagious (like measles), while other viruses are less so. The virus that causes COVID-19 is spreading from person-to-person. Someone who is actively sick with COVID-19 can spread the illness to others. That is why we recommend that these patients be isolated either in the hospital or at home (depending on how sick they are) until they are better and no longer pose a risk of infecting others.
How long someone is actively sick can vary so the decision on when to release someone from isolation is made on a case-by-case

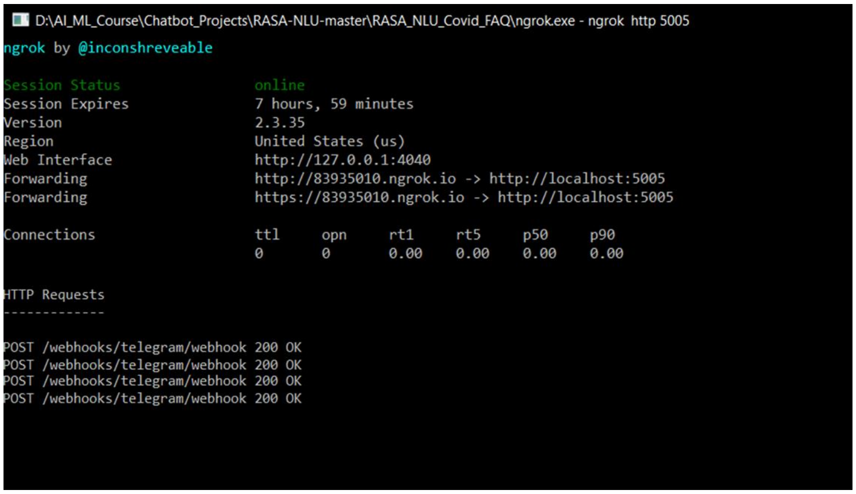
Figure 6 Some other chat bot responses

Here is deployment part,

5 Deployment globally using Ngrok

- Download ngrok from https://ngrok.com/download
- After extracting the zip file, open the ngrok file and run it.

- In ngrok, enter the command ‘ngrok http 5005 ’:



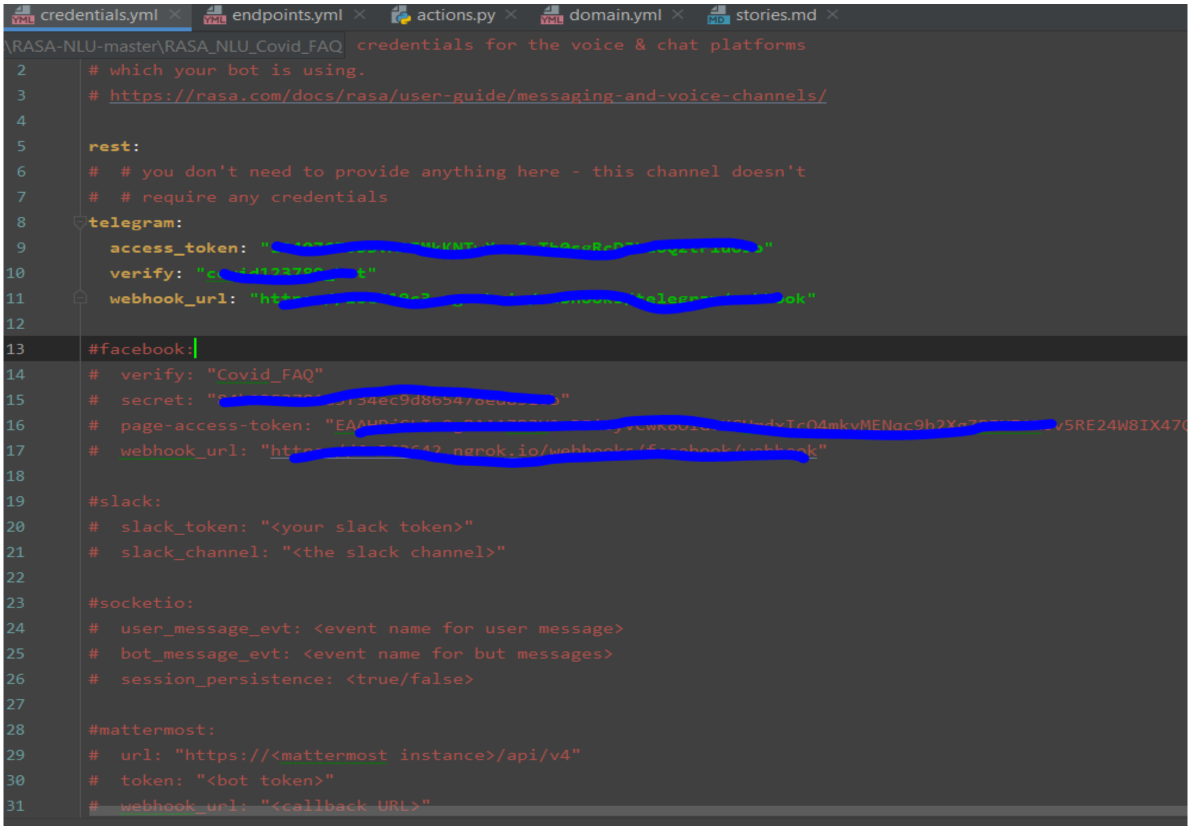
```
D:\AI_ML_Course\Chatbot_Projects\RASA-NLU-master\RASA_NLU_Covid_FAQ\ngrok.exe - ngrok  http 5005
ngrok by @inconshreveable

Session Status                online
Session Expires               7 hours, 59 minutes
Version                       2.3.35
Region                        United States (us)
Web Interface                 http://127.0.0.1:4040
Forwarding                    http://83935010.ngrok.io -> http://localhost:5005
Forwarding                    https://83935010.ngrok.io -> http://localhost:5005

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

HTTP Requests
-------------

POST /webhooks/telegram/webhook 200 OK
POST /webhooks/telegram/webhook 200 OK
POST /webhooks/telegram/webhook 200 OK
POST /webhooks/telegram/webhook 200 OK
```

Figure 7 Ngrok running in current project folder

Now, we have our https address with us, so we can integrate to other communication channel such as telegram, Facebook messenger and etc.

6 Channel Integration

Telegram channel is selected to make bot communication



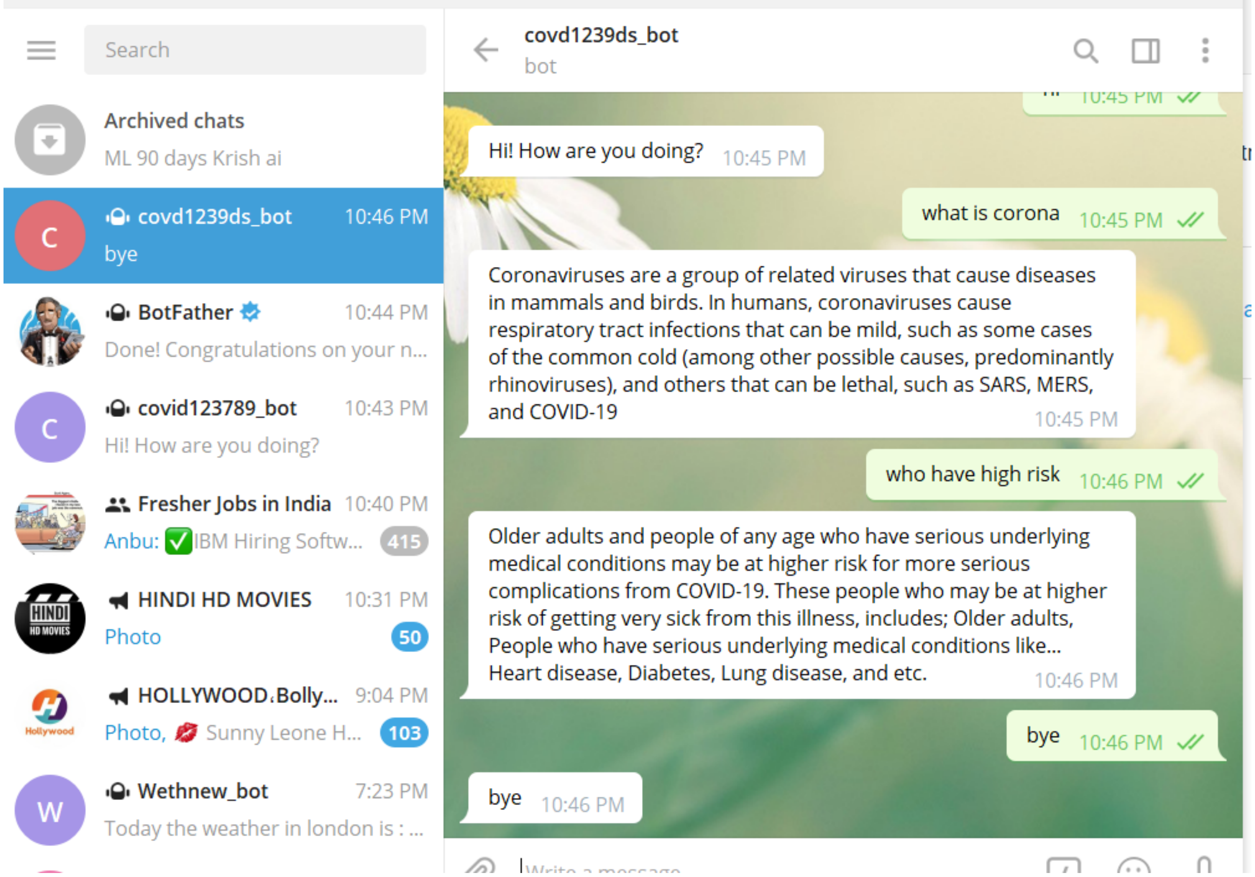
```
credentials for the voice & chat platforms
# which your bot is using.
# https://rasa.com/docs/rasa/user-guide/messaging-and-voice-channels/

rest:
#  # you don't need to provide anything here - this channel doesn't
#  # require any credentials
telegram:
  access_token: "[redacted]"
  verify: "[redacted]"
  webhook_url: "[redacted]"

#facebook:
#  verify: "Covid_FAQ"
#  secret: "[redacted]"
#  page-access-token: "[redacted]"
#  webhook_url: "[redacted]"

#slack:
#  slack_token: "<your slack token>"
#  slack_channel: "<the slack channel>"

#socketio:
#  user_message_evt: <event name for user message>
#  bot_message_evt: <event name for but messages>
#  session_persistence: <true/false>

#mattermost:
#  url: "https://<mattermost instance>/api/v4"
#  token: "<bot token>"
#  webhook_url: "<callback URL>"
```

Figure 8: credential.yml file

- **Open 'credentials.yml' and enter**:

```
telegram:
access_token: "obtained from telegram"
verify: "your bot username"
webhook_url: "https://<ngrokurl>/webhooks/telegram/webhook"
```

- Go to terminal and enter the command '**rasa run**'
- Open one more terminal and run the command '**rasa run actions**'
- Now, you can chat with your bot from Telegram.



Hi! How are you doing? 10:45 PM

what is corona 10:45 PM

Coronaviruses are a group of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold (among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19 10:45 PM

who have high risk 10:46 PM

Older adults and people of any age who have serious underlying medical conditions may be at higher risk for more serious complications from COVID-19. These people who may be at higher risk of getting very sick from this illness, includes; Older adults, People who have serious underlying medical conditions like... Heart disease, Diabetes, Lung disease, and etc. 10:46 PM

bye 10:46 PM

bye 10:46 PM

Figure 9: Telegram Screenshot of covid-19 FAQ Chat

Thanks for watch