

Autobot Evaluation & Report

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Introduction

Our chatbot, better known as Autobot, is a simple question and reply program that provides its users with information about any vehicles that it can provide within the Cars API from API Ninjas. Before that, however, the chatbot gets to know the user by asking about their name, likes, and dislikes, and storing that information in its `user_data` pickle database.

Before running the chatbot, please ensure that you have NLTK installed by performing `pip install nltk` for Python 3.7 or greater. It would also be ideal if you performed `nltk.download('all')` in a Python terminal to avoid any potential hiccups with running the program. The other libraries used in the program are built-in and should not require any installation.

There are no command-line arguments for the bot, and it does not need to be compiled, so it can be run simply by calling the Python executable and specifying the name of the file like:

```
python chatbot.py
```

System Description

The chatbot begins by asking for the user's name. Due to concerns about not wanting to accidentally improperly parse a user's name or fail to do so due to some processing error (for example, a name being caught as a stopword), we decided to simply take the name and save it, asking for clarification to ensure that we only include the name and not any additional words.

Autobot then asks the user about themselves, starting with things they like, of which the user can input as many as they wish. When the user signifies that they are done talking about things they like, the bot switches to dislikes and records those in the same way. The likes and dislikes *are* processed to remove stopwords and lemmatized so that the data stored in the pickle file is more explicit. We also included custom stopwords because we know some context for the question, such as words like “like”, “love”, and “dislike”, which could be included as part of the user's statement. So, for

example, a phrase “I love eating pizza” may just be cut down to “eating pizza” and stored as one of the user’s likes.

Once the user is done with their dislikes, Autobot asks them if they would like to talk about the headliner of cars based on their features. If the user doesn’t say no, the bot continues with the main loop of conversation, in which the user can ask about a specific category and input a value which is passed to the API we’re using, the Cars API from API Ninjas. The API is used according to API Ninjas’ terms of service to search up cars that are stored in their cars knowledge base.

The following are some of the API’s features which we chose to use as categories for search for Autobot:

- make
- model
- fuel type
- drivetrain
- number of cylinders
- transmission type
- year

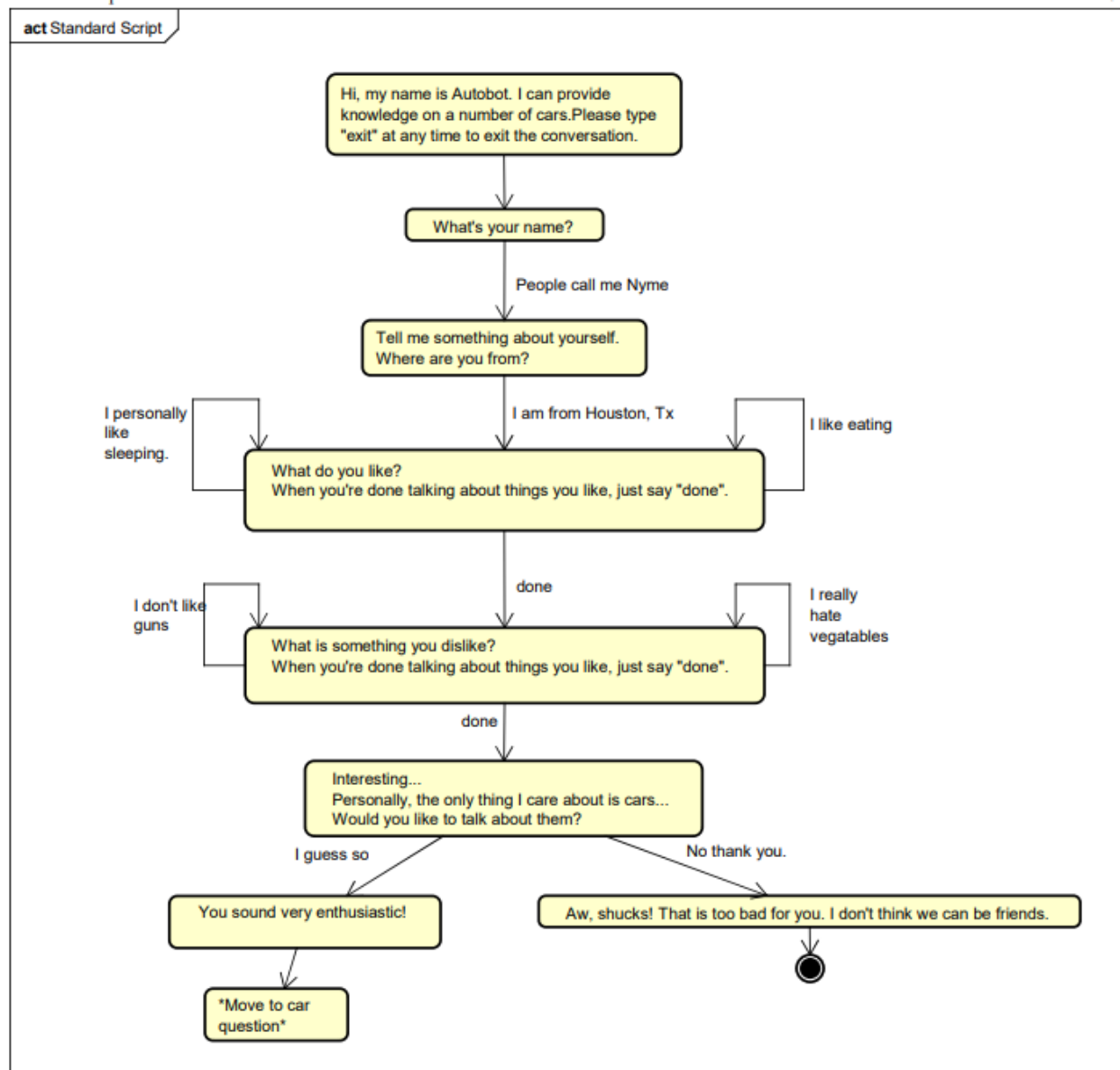
Once the user selects one of these features (or categories), the bot asks them for the value they would like to search for and offers some examples. For example, if the user asks to search by car models, the bot may say, “What model of car would you like to search for? Don’t include the name. Some examples are: camry, accord”. The user would then input a model and it would be passed to the API, after which the bot will parse the result and either tell the user that it got no results or list out the results it got, including specific features of the cars. We chose to include the make, model, year, class, city mpg, highway mpg, transmission, and drivetrain of the cars we listed (if they were available) in order to give a good description of each car that is returned as a result.

The loop continues until the user asks to “exit”, at which point the bot will say its goodbyes and the program will end.

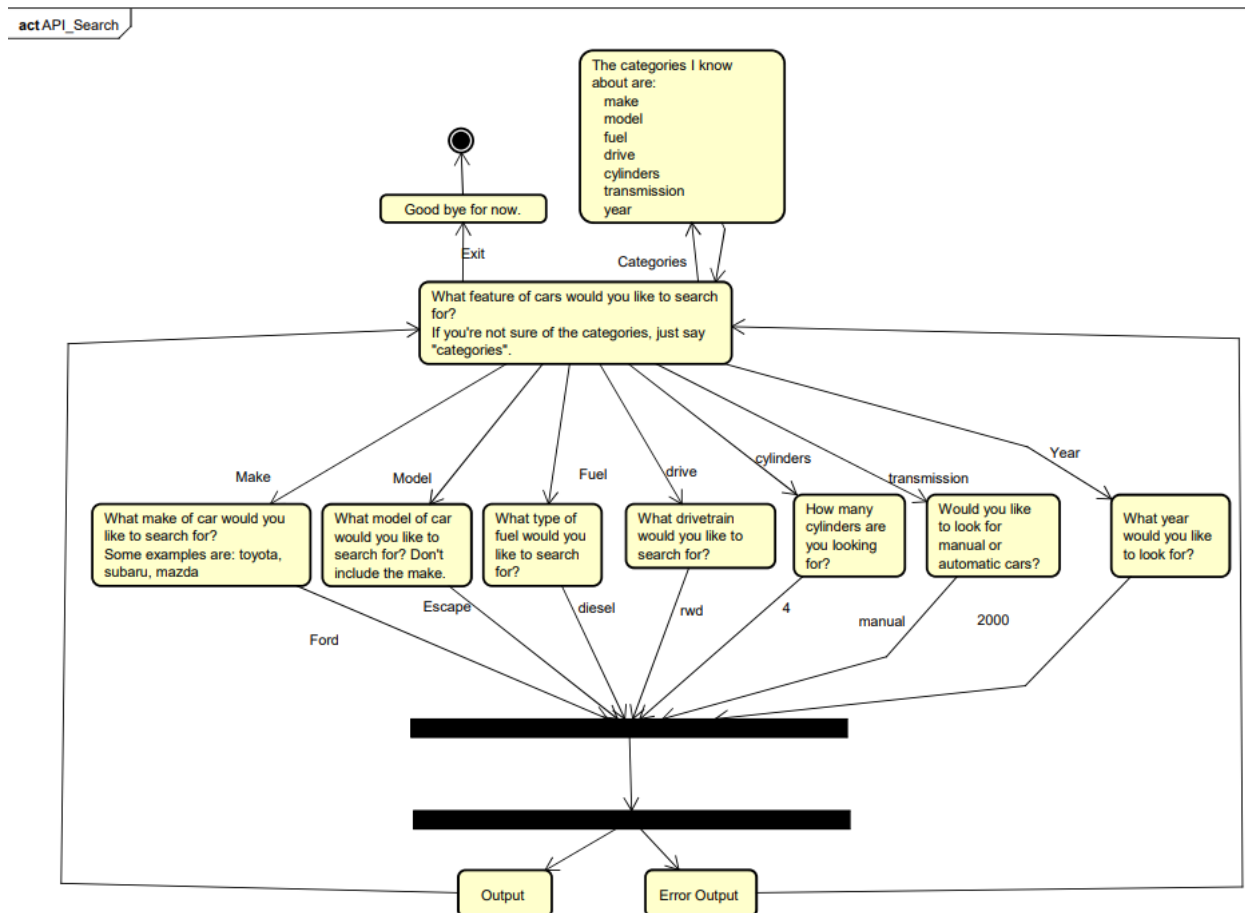
Dialog Logic Diagrams

By utilizing Astah diagram software, we laid out the desired interactions we wanted our users to experience when using Autobot. The diagrams also provide insight into how we expect our users would respond to Autobot's questions and provide inputs.

Our first dialog logic diagram maps out the first few lines Autobot will routinely ask any new user. This helps introduce the user to the chatbot's purpose and its way of interacting with people.



Our second dialog maps out the looping questions that Autobot continually asks the user in order to provide them with information about cars. This conversation loop is available only when the user does not respond negatively to Autobot's final scripted question, that being: 'Personally, the only thing I care about is cars... Would you like to talk about them?'. That way, our chatbot will be utilized by users that are interested in searching for and discovering cars. This diagram also has example values for each of the categories, such as 2000 for year.



Sample Chatbot Interactions

Example: user decides not to talk about cars with the chatbot.

Hi, my name is Autobot. I can provide knowledge on a number of cars.

Please type "exit" at any time to exit the conversation.

What's your name?

>>>John Smith

I have understood that your name is John Smith.

Is that correct?

>>>Yes

Tell me something about yourself.

Where are you from?

>>>Las Vegas

That's cool. I'm from Dallas, Texas.

What's something you like?

When you're done talking about things you like, just say "done".

>>>I enjoy long walks on the beach

What's something you like?

When you're done talking about things you like, just say "done".

>>>I like eating pizza

What's something you like?

When you're done talking about things you like, just say "done".

>>>I like talking to chatbots

What's something you like?

When you're done talking about things you like, just say "done".

>>>done

What's something you dislike?

When you're done talking about things you don't like, just say "done".

>>>I don't like money

What's something you dislike?

When you're done talking about things you don't like, just say "done".

>>>I dislike overeating

What's something you dislike?

When you're done talking about things you don't like, just say "done".

>>>done

Interesting...

Personally, the only thing I care about is cars...

Would you like to talk about them?

>>>no thanks

Aw, shucks! That is too bad for you. I don't think we can be friends.

See you later.

Example: user talks about cars with the chatbot.

Hi, my name is Autobot. I can provide knowledge on a number of cars.

Please type "exit" at any time to exit the conversation.

What's your name?

>>>Jane Doe

I have understood that your name is Jane Doe.

Is that correct?

>>>Yep

Tell me something about yourself.

Where are you from?

>>>Ottawa

That's cool. I'm from Dallas, Texas.

What's something you like?

When you're done talking about things you like, just say "done".

>>>done

What's something you dislike?

When you're done talking about things you don't like, just say "done".

>>>done

Interesting...

Personally, the only thing I care about is cars...

Would you like to talk about them?

>>>sure

You sound very enthusiastic!

I know a lot of cars and can help you find some
based on a number of parameters.

What feature of cars would you like to search for?

If you're not sure of the categories, just say "categories".

>>>categories

The categories I know about are:

make

model

fuel

drive

cylinders

transmission

year

What feature of cars would you like to search for?

If you're not sure of the categories, just say "categories".

>>>make

What make of car would you like to search for?

Some examples are: toyota, subaru, mazda

>>>Mazda

Here are some results I found:

MAZDA 626 1993

Class: midsize car

MPG: 21 city, 28 highway

Transmission: automatic

Drive: FWD

MAZDA 626 1993

Class: midsize car

MPG: 23 city, 31 highway

Transmission: manual

Drive: FWD

.

.

(more results below)

Self-Evaluation

Autobot performs well for asking about all cars that match a given feature, and also stores the users name, nationality, likes, and dislikes properly when provided. It makes use of NLP in some instances, particularly with regards to the likes and dislikes provided by the user.

Our chatbot has several extension points that can be further improved and explored. Autobot implements NLP techniques when it comes to understanding the user's likes and dislikes, but we could definitely implement more in the future in the form of having a less strict conversation flow through guessing the intent of the user's message. For example, we could parse "Show me ten cars from 2004" and call the API with the relevant information, rather than having the user go through the conversation loop and choose the category and value explicitly. We could do that by analyzing the user's text for important words, using NLP concepts like TF-IDF.

Another extension point which would greatly improve the usability of Autobot would be allowing multiple parameters to be specified for one search, if possible through the API. That is, instead of only searching for cars with 4 cylinders or Hondas, the user would be able to search for 4-cylinder Hondas. Since most people have more than one requirement when looking for a car, this is an imperative upgrade to make for the future of Autobot.

Online Evaluation

We provide a link to a survey after the user completes their conversation with Autobot, so that they can provide valuable feedback on what they would like to see improved and what additional features are in high demand. The link is:

https://utdallas.qualtrics.com/jfe/form/SV_5dUMCqI3sDOVJ6m

Appendix - Cars API

Our chatbot uses a live lookup of a database stored and accessed via the Cars API from API Ninjas. Here is the overview of the API, provided on their website[1]. The documentation for the API and others will also be available from the references.

Cars API

The Cars API provides detailed information on thousands of vehicle models from over a hundred automakers.

/v1/cars

HTTP GET

Get car data from given parameters. Returns a list of car models (and their information) that satisfy the parameters.

Parameters

make (optional) - vehicle manufacturer (e.g. `audi` or `toyota`).

model (optional) - vehicle manufacturer (e.g. `a4` or `corolla`).

fuel_type (optional) - type of fuel used. Possible values: `gas`, `diesel`, `electricity`.

drive (optional) - drive transmission. Possible values: `fwd` (front-wheel drive), `rwd` (rear-wheel drive), `awd` (all-wheel drive), `4wd` (four-wheel drive).

cylinders (optional) - number of cylinders in engine. Possible values: `2`, `3`, `4`, `5`, `6`, `8`, `10`, `12`, `16`.

transmission (optional) - type of transmission. Possible values: `manual`, `automatic`.

year (optional) - vehicle model year (e.g. `2018`).

min_city_mpg (optional) - minimum city fuel consumption (in miles per gallon).

max_city_mpg (optional) - maximum city fuel consumption (in miles per gallon).

min_hwy_mpg (optional) - minimum highway fuel consumption (in miles per gallon).

max_hwy_mpg (optional) - maximum highway fuel consumption (in miles per gallon).

min_comb_mpg (optional) - minimum combination (city and highway) fuel consumption (in miles per gallon).

max_comb_mpg (optional) - maximum combination (city and highway) fuel consumption (in miles per gallon).

limit (optional) - How many results to return. Must be between `1` and `30`. Default is `5`.

Headers

X-API-Key (required) - API Key associated with your account.

Sample Request URL [Live Demo!](#)

`https://api.api-ninjas.com/v1/cars?limit=2&model=`

Send Request

Appendix - Sample User Models

Here are some examples of personal information stored by the chatbot about its users. As you can tell, the information storage isn't perfect in terms of being understandable immediately by humans, but it saves the important information from each statement. An example of where this may be ambiguous is the storage of "I like talking to chatbots", which may be interpreted as "I like talking chatbots", which, though similar, is still markedly different. Jane Doe did not provide any likes or dislikes, so she was stored with empty lists for those.

```
'John Smith': {'origin': 'Las Vegas',
               'likes': ['long walk beach', 'eating pizza', 'talking
                           chatbots'],
               'dislikes': ["money", 'overeating']}

'Jane Doe': {'origin': 'Ottawa',
             'likes': [],
             'dislikes': []
            }
```

References

- [1] API Ninjas, "Cars API," API Ninjas, 2021. [Online]. Available: <https://api-ninjas.com/api/cars>. [Accessed 08 November 2022].