

Pokemon ChatBot Report

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CS 4395: ChatBot Project Report

Prof. Karen Mazidi

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Pokemon ChatBot

INTRODUCTION

Background

Natural language processing (NLP) is the bridge between linguistics and computer science. We use NLP to help computers communicate with humans in a language they can understand, and perform a wide range of tasks having to do with language and data. In our human language technologies class we explored web crawling, how to do it, what it means, what it looks like and gave our best attempts at it. The web crawlers we created systematically skimmed an internet page of our choosing, collecting data using a keyword we gave it in the code. The keyword helped the crawler understand what we were looking for. On a larger scale we see this in conversational chat bots; asking a question with said keyword in it will breed a multitude of answers given the specified keyword. Bank chat bots do this very well when deciding if you want to deposit, withdraw etc, those are all keywords. The purpose of a chatbot is to interact with a user for purposes of information acquisition. Chat bots are artificially intelligent robots that can hold conversations with humans. In this paper we will share a description of how our chat bot worked in a pseudocode format, what techniques and tools were used and an evaluation and analysis of the strengths and weaknesses, accompanied with varying samples of the knowledge base, user models and the dialog of our bot.

DISCUSSION

The System:

1. Attempt to unpickle Knowledge Base
 - a. End program if doesn't work
2. Initiate array of Pokemon names based on Knowledge Base
3. Attempt to unpickle User file
 - a. Initiate empty dict as user dict if no user file found
4. Bot asks user for name
5. Bot checks if username in user dict
 - a. If not, bot prompts user to select starter pokemon
 - i. Bot gives intro about selected starter from Knowledge Base
 - ii. Bot informs the user that their starter will evolve after a certain amount of asked questions.
 - b. If so, bot informs user of current status of selected starter, specifically number of questions until it evolves, or if fully evolved, how many questions have been asked
6. Bot prompts user for first query
7. Query response loop starts
 - a. If user says thanks or bye, Bot responds and ends loop
 - b. If user provides a query, the query is passed to generate_response function
 - i. Query function identifies pokemon being asked about
 - ii. Query runs tf-idf vectorization and cosine similarity against specific subset of knowledge base that pertains to the pokemon that was asked about
 - iii. Checks that cosine similarity between query and most similar sentence in knowledge base subset isn't zero to ensure that response is at least somewhat related to query
 - iv. Returns most similar sentence
8. The 'users' dictionary is updated with username as key and [starter, evo stage, number of questions asked] as value.
9. User dict saved to pickle file

NLP techniques used and how:

- **TF-IDF Vectorization** : Used to convert categorical data, in this case sentences, into quantifiable data that can be used to calculate similarity
- **Cosine Similarity** : Using tf-idf vectors previously converted, finds sentence in knowledge base most similar to the query and returns it

- **Sentence Tokenization** : Used to convert webpage text into separate sentences
- **Beautiful Soup 4** : Used to read webpages and returns text from webpages
- **Urllib** : used to access webpages in readable format
- **Input Processing** : Convert typed queries into separate data points, specifically as Pokemon being asked about and keywords
- **Stopwords** : Used to filter out extraneous terms in user queries to leave behind just the keywords.

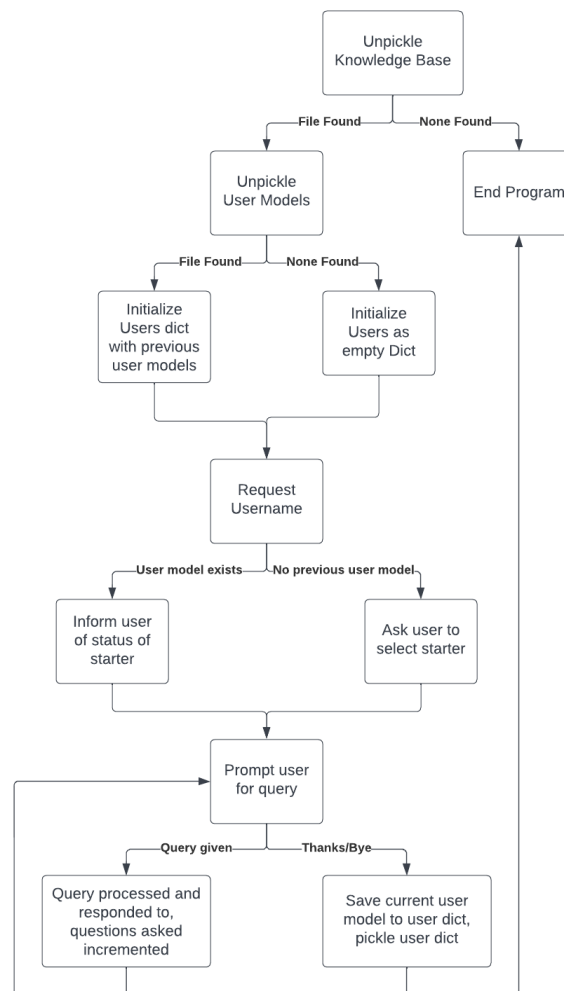
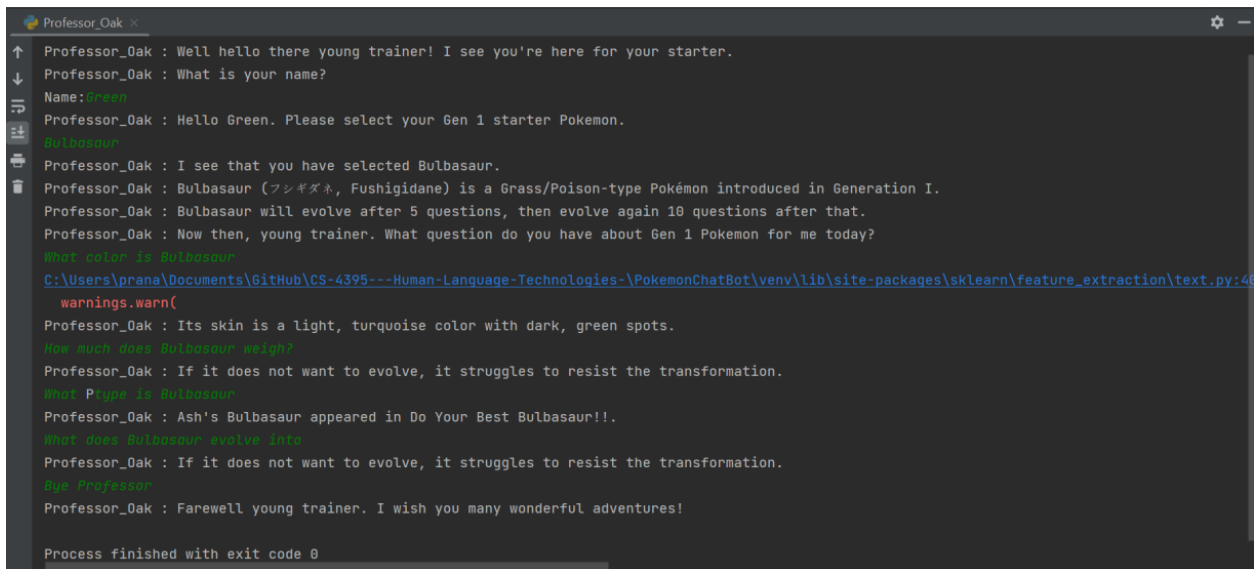


Figure 1- Logic Diagram

Figure 1. illustrates the flow of how the knowledge base should be generated with the use of a logic diagram above (Figure 1). Professor_Oak was the name of our chat bot, in the game he is a mentor figure that is a renowned expert on Pokemon. He guides the players through the tutorial and acts as a guide, our chat bot does the same using it's extensive knowledge base. Below we see the bot interact with a new user or a returning user (Figure 2) (Figure 3).

Dialog Interactions



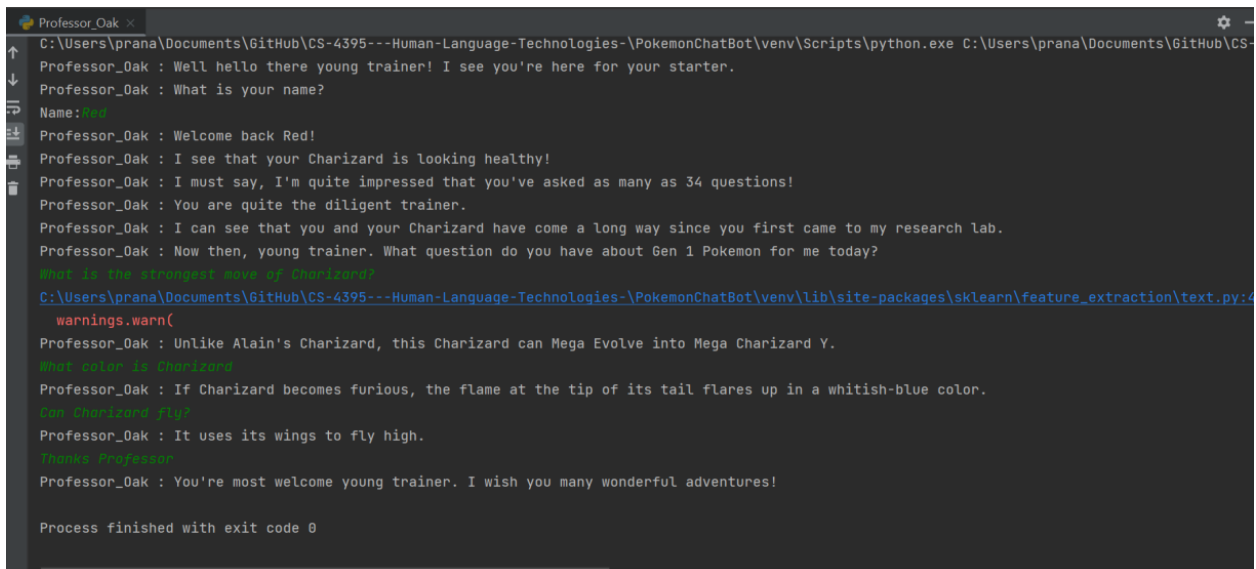
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Professor_Oak : Well hello there young trainer! I see you're here for your starter.
Professor_Oak : What is your name?
Name:Green
Professor_Oak : Hello Green. Please select your Gen 1 starter Pokemon.
Bulbasaur
Professor_Oak : I see that you have selected Bulbasaur.
Professor_Oak : Bulbasaur (フシギダネ, Fushigidane) is a Grass/Poison-type Pokémon introduced in Generation I.
Professor_Oak : Bulbasaur will evolve after 5 questions, then evolve again 10 questions after that.
Professor_Oak : Now then, young trainer. What question do you have about Gen 1 Pokemon for me today?
What color is Bulbasaur
C:\Users\prana\Documents\GitHub\CS-4395---Human-Language-Technologies-\PokemonChatBot\venv\lib\site-packages\sklearn\feature_extraction\text.py:4
warnings.warn(
Professor_Oak : Its skin is a light, turquoise color with dark, green spots.
How much does Bulbasaur weigh?
Professor_Oak : If it does not want to evolve, it struggles to resist the transformation.
What type is Bulbasaur
Professor_Oak : Ash's Bulbasaur appeared in Do Your Best Bulbasaur!!
What does Bulbasaur evolve into
Professor_Oak : If it does not want to evolve, it struggles to resist the transformation.
Bye Professor
Professor_Oak : Farewell young trainer. I wish you many wonderful adventures!

Process finished with exit code 0

```

Figure 2 - New User



```

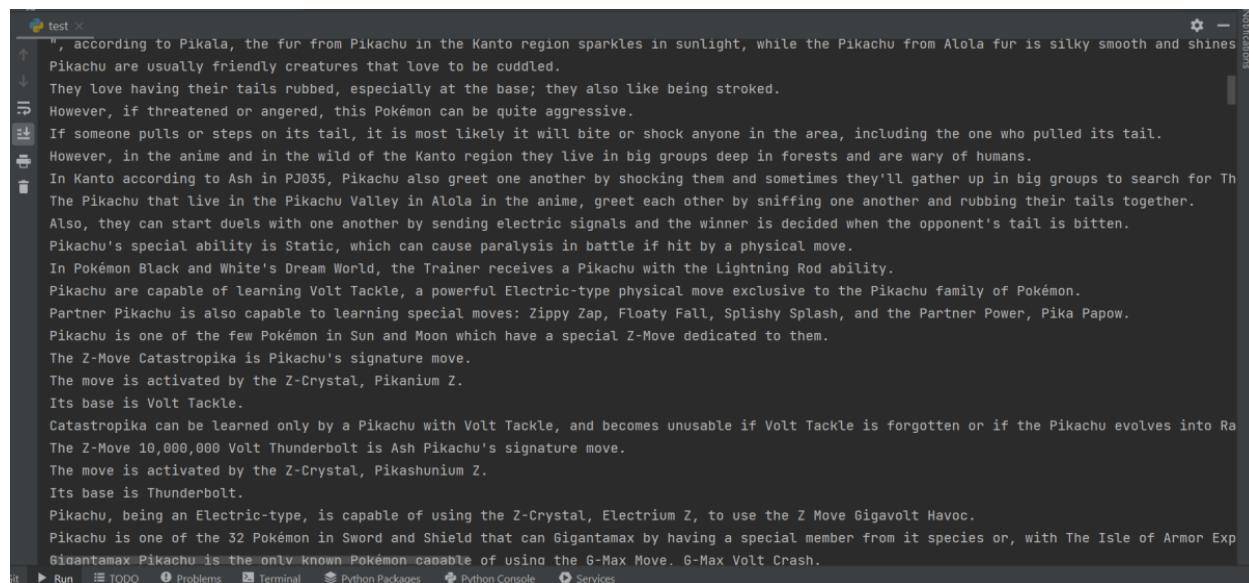
C:\Users\prana\Documents\GitHub\CS-4395---Human-Language-Technologies-\PokemonChatBot\venv\Scripts\python.exe C:\Users\prana\Documents\GitHub\CS-
Professor_Oak : Well hello there young trainer! I see you're here for your starter.
Professor_Oak : What is your name?
Name:Red
Professor_Oak : Welcome back Red!
Professor_Oak : I see that your Charizard is looking healthy!
Professor_Oak : I must say, I'm quite impressed that you've asked as many as 34 questions!
Professor_Oak : You are quite the diligent trainer.
Professor_Oak : I can see that you and your Charizard have come a long way since you first came to my research lab.
Professor_Oak : Now then, young trainer. What question do you have about Gen 1 Pokemon for me today?
What is the strongest move of Charizard?
C:\Users\prana\Documents\GitHub\CS-4395---Human-Language-Technologies-\PokemonChatBot\venv\lib\site-packages\sklearn\feature_extraction\text.py:4
warnings.warn(
Professor_Oak : Unlike Alain's Charizard, this Charizard can Mega Evolve into Mega Charizard Y.
What color is Charizard
Professor_Oak : If Charizard becomes furious, the flame at the tip of its tail flares up in a whitish-blue color.
Can Charizards fly?
Professor_Oak : It uses its wings to fly high.
Thanks Professor
Professor_Oak : You're most welcome young trainer. I wish you many wonderful adventures!

Process finished with exit code 0

```


Figure 3 - Returning User

Knowledge Base



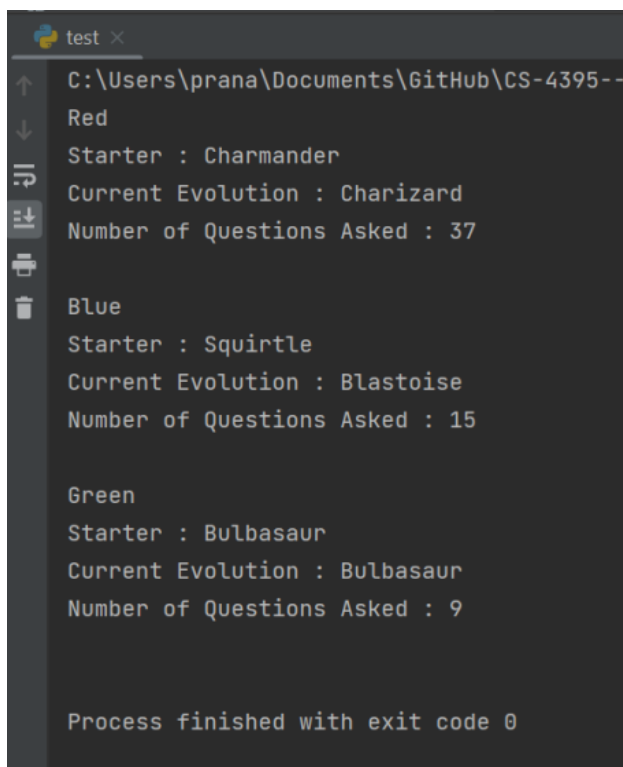
```

test x
", according to Pikala, the fur from Pikachu in the Kanto region sparkles in sunlight, while the Pikachu from Alola fur is silky smooth and shines
Pikachu are usually friendly creatures that love to be cuddled.
They love having their tails rubbed, especially at the base; they also like being stroked.
However, if threatened or angered, this Pokémon can be quite aggressive.
If someone pulls or steps on its tail, it is most likely it will bite or shock anyone in the area, including the one who pulled its tail.
However, in the anime and in the wild of the Kanto region they live in big groups deep in forests and are wary of humans.
In Kanto according to Ash in PJ035, Pikachu also greet one another by shocking them and sometimes they'll gather up in big groups to search for Th
The Pikachu that live in the Pikachu Valley in Alola in the anime, greet each other by sniffing one another and rubbing their tails together.
Also, they can start duels with one another by sending electric signals and the winner is decided when the opponent's tail is bitten.
Pikachu's special ability is Static, which can cause paralysis in battle if hit by a physical move.
In Pokémon Black and White's Dream World, the Trainer receives a Pikachu with the Lightning Rod ability.
Pikachu are capable of learning Volt Tackle, a powerful Electric-type physical move exclusive to the Pikachu family of Pokémon.
Partner Pikachu is also capable of learning special moves: Zippy Zap, Floaty Fall, Splishy Splash, and the Partner Power, Pika Papow.
Pikachu is one of the few Pokémon in Sun and Moon which have a special Z-Move dedicated to them.
The Z-Move Catastropika is Pikachu's signature move.
The move is activated by the Z-Crystal, Pikanium Z.
Its base is Volt Tackle.
Catastropika can be learned only by a Pikachu with Volt Tackle, and becomes unusable if Volt Tackle is forgotten or if the Pikachu evolves into Ra
The Z-Move 10,000,000 Volt Thunderbolt is Ash Pikachu's signature move.
The move is activated by the Z-Crystal, Pikashunium Z.
Its base is Thunderbolt.
Pikachu, being an Electric-type, is capable of using the Z-Crystal, Electrium Z, to use the Z Move Gigavolt Havoc.
Pikachu is one of the 32 Pokémon in Sword and Shield that can Gigantamax by having a special member from its species or, with The Isle of Armor Exp
Gigantamax Pikachu is the only known Pokémon capable of using the G-Max Move. G-Max Volt Crash.

```

Figure 4 - Sample of Knowledge Base [Pikachu]

User models



```

test x
C:\Users\prana\Documents\GitHub\CS-4395--
Red
Starter : Charmander
Current Evolution : Charizard
Number of Questions Asked : 37

Blue
Starter : Squirtle
Current Evolution : Blastoise
Number of Questions Asked : 15

Green
Starter : Bulbasaur
Current Evolution : Bulbasaur
Number of Questions Asked : 9

Process finished with exit code 0

```

Figure 5 - Sample users models

ANALYSIS

The chat bot project on a whole was effective in certain areas more than others. When it came to the knowledge base we noted that it was large. It held the text from three hundred and two different web pages, and details about one and fifty one pokemon. However, the pokemon did not have enough unique characteristics and text, this resulted in a lot of overlapping sentences and the expected variation in text considering the size of the knowledge base was not met, leaving our bot with less to work with.

Because of this, one of its biggest strengths was that it had a very wide Knowledge base, with separate subsets for each of the 151 pokemon introduced in Generation 1 of the pokemon games. By that same token, however, this is also its biggest weakness, in that due to the fact that there's really not that much info available online for any one random pokemon, unless the pokemon in question was a major character like Pikachu, each subset of the Knowledge Base is not that big. Because of this, the best way to describe the bot's Database is "approximate knowledge of many things". For future iterations of this project, I would say the only thing to do to improve the bot is to invest more in the strengths of the bot, in other words adding data about more pokemon, because the weakness of the bot cannot be addressed without somehow getting more unique data about every single pokemon where none previously existed.

References

Lalwani, Tarun and Bhalotia, Shashank and Pal, Ashish and Rathod, Vasundhara and Bisen, Shreya, Implementation of a Chatbot System using AI and NLP (May 31, 2018). International Journal of Innovative Research in Computer Science & Technology (IJIRCST) Volume-6, Issue-3, May-2018, Available at SSRN: <https://ssrn.com/abstract=3531782> or <http://dx.doi.org/10.2139/ssrn.3531782>