DISTRIBUTED SYSTEMS PROJECT

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CHAT BOT USING PYTHON

OBJECTIVE

- Our goal was to develop a retrieval based chatbot that serves as an enhanced dictionary.

- The user can specify a word and the chatbot will provide a suitable response to the user.

- We have used *Wordnik* api to retrieve the information of the word specified by the user.

- The implementation has been done in python

WHAT IS A CHATBOT ?

Chatbot is a computer program designed to simulate conversation with human users, usually over the internet.

- It is mainly assigned to websites for interaction, marketing, or to keep in touch with the customer frequently.

- Chat bot comes under the category of cloud computing

- Cloud Computing is the technology where a vast array of computing services such as data accumulation, data storage, data analytics, networking and support are driven automatically with less manual support.

- A chat bot has the following advantages

    - Available 24x7
    - Free from human errors
    - Saves precious time
    - Provide spontaneous response
    - Does the repetitive tasks so that the humans can focus on other creative tasks
    - Unbiased

TYPES OF CHATBOTS

- Chatbots help organizations solve customer queries, improve communication, and enhance the customer experience.

- They translate human language into digital information by using machine learning and Natural Language Processing (NLP) techniques.

- There are multiple ways to develop a chatbot, the two common methods are:

  - Generative-based
  - Retrieval-based.

Generative Based Chatbot

- An AI-driven (Generative-based) chatbot is an intelligent version that leverages machine learning and NLP to understand the intent of people.

- AI-based chatbots have the capacity to learn, and understand language, not just commands like traditional bots. That's why they provide a more natural, near human-level communication.

- These chatbots can learn new speech patterns and get smarter as they encounter more situations.

- Generative chatbots use a combination of supervised learning, unsupervised learning, reinforcement learning, and adversarial learning for multi-step training.

- Supervised learning structures a conversation as a sequence to sequence problem. Sequence-to-sequence learning maps user inputs to a computer-generated response. However, this type of learning has a tendency to prioritize high-probability responses like "I know".

- Supervised learning systems also have trouble including proper nouns into their speech since they appear less in dialogue compared to other words.

- As a result, supervised learning chatbots sound repetitive and cannot promote stable human conversation.

Retrieval Based Chatbot

- Retrieval-based chatbots work on the principle of graphs or directed flows.

- The chatbot is trained to provide the best possible response from a database of predefined responses. The responses are based on existing information.

- Retrieval-based chatbots use techniques like keywords matching, machine learning or deep learning to identify the most appropriate response.

- Regardless of the technique, these chatbots provide only predefined responses and do not generate new output.

- One example of retrieval-based chatbot is Mitsuku. It contains over 300,000 predefined response patterns and a knowledge base of over 3000 objects.

- This chatbot can construct songs and poems based on its knowledge base.
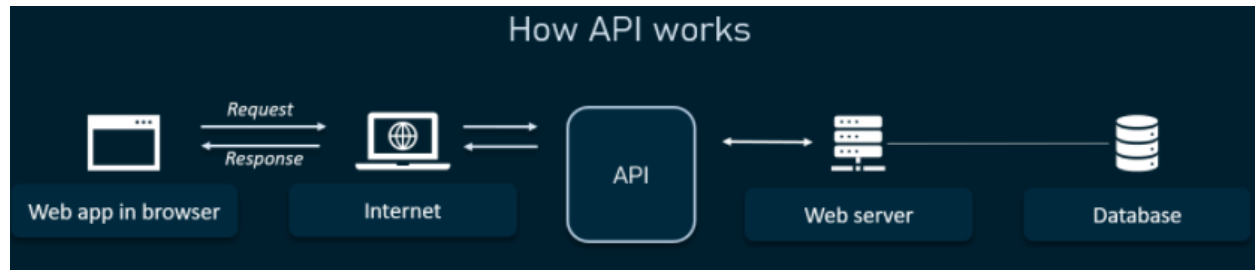
USES OF CHATBOTS

- **Cost and Time Effective** : Humans cannot be active on-site 24/7 but chatbots can and the replying power of chatbots is much faster than humans.

- **Cheap Development cost** : with the advancement in technology many tools are developed that help easy development and integration of chatbots with little investment.

- **User friendly** : Today Chatbots have become very advanced so the user feels as if he is communicating with a human.

- **Business Branding** : Businesses are changing with technology and chatbot is one of the tools used by businesses. It helps in advertising, branding of organization products and services and gives daily updates to users.

HOW ARE CHATBOTS RELATED TO DISTRIBUTED SYSTEMS?

- A chatbot comes under the category of cloud computing.

- Cloud computing is the practice of using a network of remote servers hosted on the internet to store, manage, and process data, rather than a local server or a personal computer.

- Cloud computing systems are built using fundamental principles and models of distributed systems.

WHAT IS AN API ?

An API is a set of programming code that enables data transmission between one software product and another. It also contains the terms of this data exchange.

Application programming interfaces consist of two components:

- Technical specification describing the data exchange options between solutions with the specification done in the form of a request for processing and data delivery protocols
- Software interface written to the specification that represents it

The software that needs to access information or functionality from another software, calls its API while specifying the requirements of how data/functionality must be provided. The other software returns data/functionality requested by the former application.

And the interface by which these two applications communicate is what the API specifies.

WORDNIK API

- Wordnik APIs let users request definitions from The Century Dictionary, example sentences for words, spelling suggestions, word autocompletion, words of the day, and more.

- Using this API the user can request :

    - Definitions

    - Example sentences

    - Spelling suggestions

    - Synonyms and Antonyms (and other related words)

    - Word phrases

    - Pronunciations

- We have used this API to provide the user with the required response.

- Wordnik api developer url - https://developer.wordnik.com/

- For using Wordnik APIs for personal project, we have to register for a private API key, and it is granted to the user in 7 days.

- Wordnik Documentation - https://developer.wordnik.com/docs

SOURCE CODE LINK

https://github.com/tejasborkar74/DIS-Project---Chat-bot

LIBRARY AND TECH STACK

- We have used **Python for the implementation** of the retrieval based chatbot.

- Python is an interpreted, high-level and general-purpose programming language. Python's design philosophy emphasizes code readability with its notable use of significant indentation. Its language constructs and object oriented approach aim to help programmers write clear, logical code for small and large-scale projects. All the scripts in this project have been written in Python.

- We have used **wordnik API** to retrieve information related to words to build our dictionary chatbot

- We have used the **requests library** for retrieval of information from wordnik api.

- Requests is a HTTP library for the Python programming language. The goal of the project is to make HTTP requests simpler and more human-friendly. The current version is 2.26.0. Requests is released under the Apache License 2.0. Requests is one of the most popular Python libraries that is not included with Python.

OUTPUTS AND RESULTS

When we run the program, the chat bot will greet us and give some instructions

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL

PS D:\7th Sem\DiS\PROJECT\CODE> python .\Chat_Bot.py
Bot: Hey, I am a dictionary chat bot, you can ask me meaning, example, and other information related to words :)
You: █
```

This chatbot is designed to answer queries related to words in a human manner. So we can also enter sentences to find meaning, synonyms, phrases, examples of the given word

Meaning of the given Words

We can ask the meaning/ definition of words by writing the word alone or by writing a sentence. Some examples are:

```
You: dilemma
Bot: A situation that requires a choice between options that are or seem equally unfavorable or unsatisfactory.
```

```
You: dilemma meaning
Bot: A situation that requires a choice between options that are or seem equally unfavorable or unsatisfactory.
```

```
You: can you tell be the meaning of word dilemma
Bot: A situation that requires a choice between options that are or seem equally unfavorable or unsatisfactory.
```

Example sentences of the given word

We can ask english sentence example of the word, where it is being used

```
You: introspection example
Bot: Instead, Shaftesbury assumes that the language in which we conduct our introspection is always public.
```

```
You: Can you tell me some sentence example of agony
Bot: It rises naturally to a suffering man's lips as expressive of agony, though not exactly framed for _his_ individual _agony_.
```

Synonyms of the given Word

We can ask synonyms/words related to the given words to the chatbot

```
You: introspection synonym
Bot: Synonyms for introspection are inlook, introversion, self-examination, self-reflection, etc
```

```
You: can you tell me some words related to strong
Bot: Synonyms for strong are Draconian, able, able, able-bodied, accented, acid, acrid, active, active, acute, etc
```

Phrases related to the given word

We can ask phrases related to the given word to the chatbot

```
You: dilemma phrases
Bot: Some Phrases related to dilemma are dog-day dilemma, gutwrenching dilemma, Jose's dilemma, ethical dilemma, moral dilemma, etc
You:
```

```
You: some phrases related to agony
Bot: Some Phrases related to agony are agony despair, agony real-life, endure agony, agony of, pure agony, etc
You:
```

LEARNINGS

We learnt :
- About chatbots :
  - What is a chatbot?
  - Uses
  - Types
  - Coding a chat bot.

- What are APIs and how to use them specifically wodnik API.

- To use the requests module in python.

- Coding remotely and collaborating with the team mate.

- About Natural language processing i.e. tokenization, removing punctuation etc.

- Briefly about cloud computing.

REFERENCES

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