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ABSTRACT

The career counselling chatbot is made for career guidance to Bachelor's degree pursuing students mainly of IT/CE/CSE or related branches. This chatbot asks various questions to the user, which user needs to answer as 1 for true or 0 for false, through which the chatbot predicts the result from the user's input and displays the result. Apart from career counselling, it also communicates with users. The solution developed for this chatbot consists of 4 major parts that are training chatbot, adding functionalities like adaptors and other modules, machine learning algorithms for predictions and a server for GUI based Chatbot. The chatbot can be used for counselling different students and to help them find their interests and to choose their career accordingly.

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1. Introduction

1.1 Project Overview:

A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. Apart from a generalized chatbot, this chatbot is capable of giving career counselling to its users.

1.2 Problem Statement and Solution:

Many times in one's lifetime a person faces many difficulties while selecting one's career. Not getting proper career guidance can lead to many health issues like depression, hypertension, etc. This chatbot is made in order to give proper career guidance by knowing the interests of the users and then predicting their appropriate career. This helps a lot as users get an unbiased view which is completely based on individual's interests.

1.3 Scope:

Career counselling chatbot does proper prediction based on user's input with an accuracy of about 80%. Currently it can give career counselling to Btech pursuing IT/CE students and can be further extended to other career domains. Furthur, it can be deployed to a website thus a large number of students can access it.

1.4 Objective:

The goal of this chatbot is to give an appropriate career counselling to students based on their answers answered to various questions.

2. System Analysis

2.1 User Characteristics:

2.1.1 User should be pursuing Bachelor's degree in Information technology, computer engineering, computer science engineering or related fields.

2.1.2 Some knowledge of computers and English language is required.

2.2 Tools and Technologies used:

2.2.1 Python

2.2.2 IDLE

2.2.3 Chatterbot (Python library)

2.2.4 Chatterbot corpus (Data set)

2.2.5 Decision tree classifier (Machine learning algorithm)

2.2.6 Sublime text (Website implementation)

2.2.7 Sqlite3 (Database)

2.2.8 Sklearn

2.2.9 Numpy

3 System Design

3.1 Flow of System:

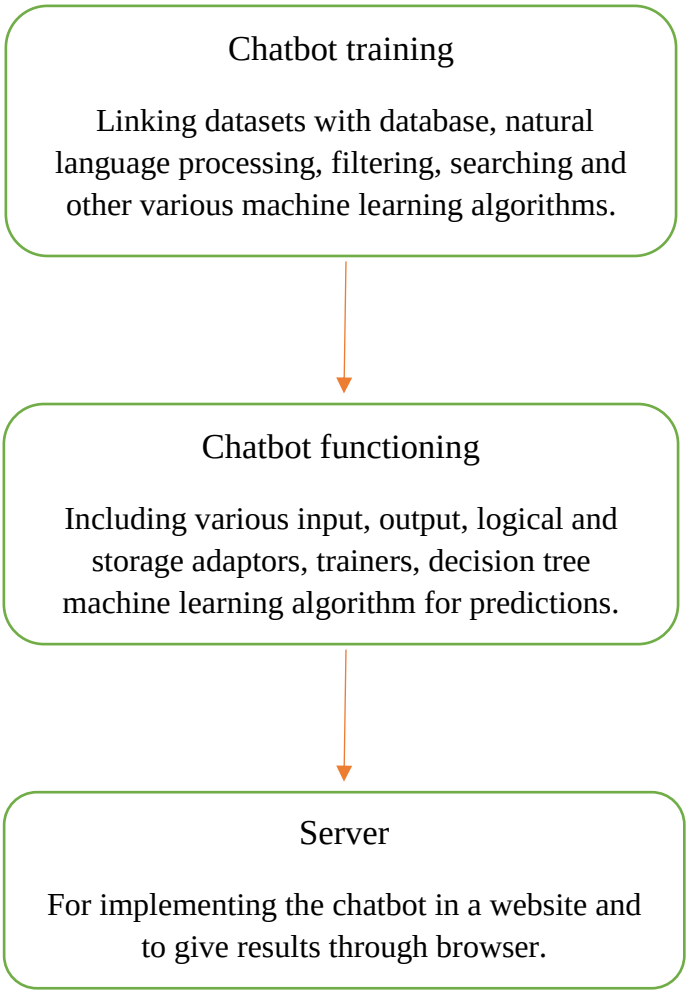

Figure 3.1 | Project Flow

3.2 Major Functionality:

Career counselling chatbot, is very helpful software that counsels students by predicting through their answers via computer. It takes counselling to the next level! It is an excellent option when the students face a dilemma while deciding their careers. Students from various fields can get a career guidance for their higher studies. Great software opens up new possibilities and new options, and with career counselling chatbot, one will discover a new way to approach all of one's difficulties for deciding for their careers.

4 Implementation

4.1 Implementation Strategy and environment:

This chatbot can be used by multiusers as it will be deployed on a website and is GUI based. It will take 4 steps to compute the output from given input image. Which are :

4.1.1. Chatbot training : In this stage the chatbot trains itself by linking the datasets with the database for faster input output operations. It does this by saving all the sentences from the datasets in a well arranged form into a sqlite3 database.

4.1.2 Chatbot functioning : After the chatbot trains itself, further adaptors like input, output, storage, logical, etc. are used for analyzing the user's input and giving relevant answers from scanning the most appropriate match of user's input from the database and then displaying it. Apart from this, a module of Decision tree classifier, a machine learning algorithm for prediction from the user's input is also included in this file. The machine learning algorithm is made using Sklearn python library.

4.1.3 Server : In order to have a GUI based chatbot server is used which acts as an interface between a web browser and the python chatbot code. The server library used for this chatbot is Simple web socket server.

4.2 Module Specification :

4.2.1 Chatbot training:

The chatbot uses chatterbot python library for its training purposes. ChatterBot is a Python library that makes it easy to generate automated responses to a user's input. ChatterBot uses a selection of machine learning algorithms to produce different types of responses. This makes it easy for developers to create chat bots and automate conversations with users. An untrained instance of

ChatterBot starts off with no knowledge of how to communicate. Each time a user enters a statement, the library saves the text that they entered and the text that the statement was in response to. As ChatterBot receives more input the number of responses that it can reply and the accuracy of each response in relation to the input statement increase. The program selects the closest matching response by searching for the closest matching known statement that matches the input, it then chooses a response from the selection of known responses to that statement. The process flow diagram of chatterbot :

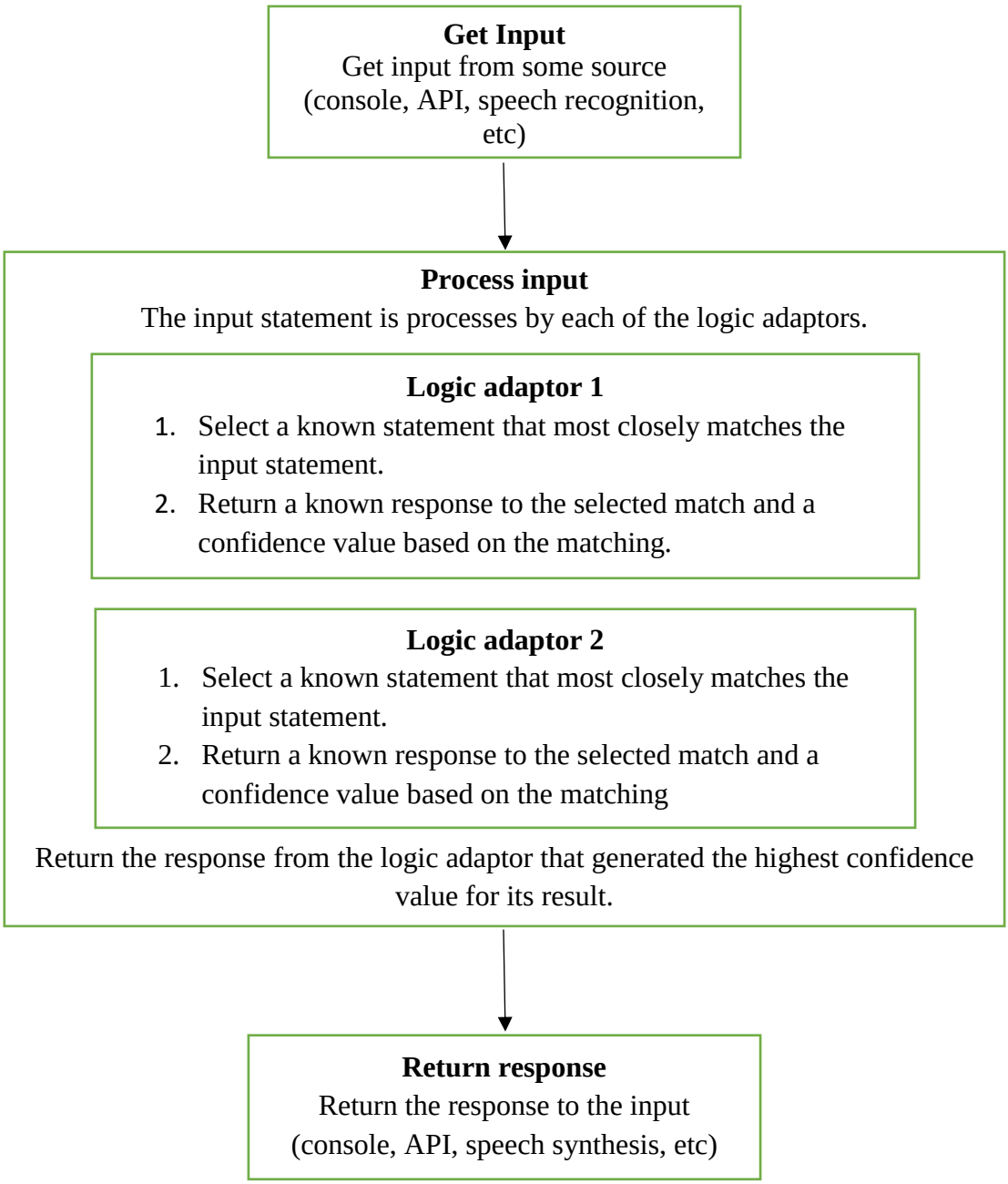

Figure 4.1 Process Flow Diagram

4.2.2 Chatbot functionality: In order to improve chatbot functionality, the chatbot consists of various adaptors, trainers, sklearn python libraries for decision making. Here is a small instance of adaptors, trainers,etc used :

1) Storage_adapter : chatterbot.storage.SQLStorageAdapter
2) Logic_adapters :
    2.1) chatterbot.logic.BestMatch
    2.2) chatterbot.logic.MathematicalEvaluation
    2.3) chatterbot.logic.LowConfidenceAdapter
    2.4) threshold: 0.70
3) Trainer : chatterbot.trainers.ListTrainer
4) Sklearn : clf = tree.DecisionTreeClassifier()
    clf = clf.fit(z, w)

Here, the DecisionTreeClassifier method is responsible for generating results based on the user's answers, it maps the user's answer and its results and stores it in the variables z and w respectively. Furthur, the clf.fit(z,w) generates a graph internally and thus gives an appropriate response.

4.2.3 Server: The server is made by using SimpleWebSocket server. The web socket server works as follows :

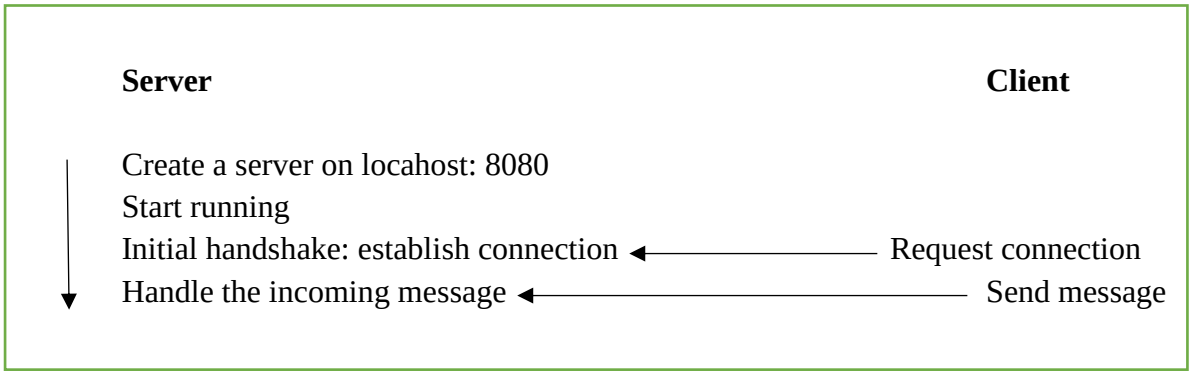

Figure 4.2 WebSocket server working

Thus, whatever the user writes, the chatbot responses through a server on the localhost 8080. After loading the chatbot it establishes a connection and then handles the incoming messages and responds them.

4.3 Snapshots of project:

```
G:\Sgp>python chatbot_final.py
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
List Trainer: [####################] 100%
```

Figure 4.3 Model training

```
G:\Sgp>python server.py
('127.0.0.1', 52348) connected
('127.0.0.1', 52348) closed
('127.0.0.1', 52351) connected
```

Figure 4.4 Server connection

```
categories:
- greetings
conversations:
- - So give me some career counselling.
  - yeah sure!
- - So do your work
  - Yeah... i'll love that
- - What do I need to do ?
  - You just need to answer 1 for Yes/True or 0 for No/False t
- - Ohk...that's easy
  - Yes, its easy peasy, I will start after you write start.
```

Figure 4.5 Glimpse of the dataset

1030	- - TELL ME ABOUT BASEBALL	[Blob]
1031	- What is Baseball	[Blob]
1032	- - Which is your favourite soccer club?	[Blob]
1033	- I am a Real Madrid fan, and you?	[Blob]
1034	- I am die hard fan of Barcelona.	[Blob]
1035	- Madrid has a great team especially the attack is quite awe...	[Blob]
1036	- Barca still at par than Madrid.	[Blob]
1037	- I dont agree.	[Blob]

Figure 4.6 Glimpse of the database

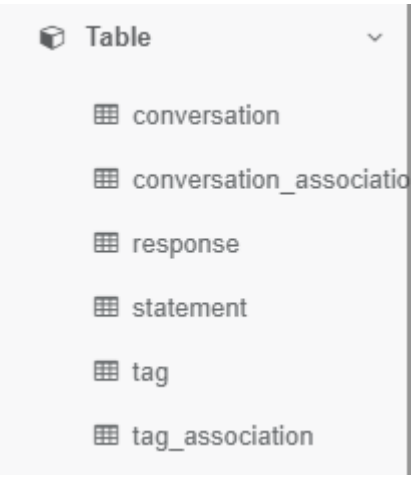

Figure 4.7 Tables in the database

Figure 4.8 Output on browser

```
You : hi
Chatbot :  - How are you doing?

You : What is your name ?
Chatbot :  - My name is Couns!

You : What do you do ?
Chatbot :  - I can predict for interests!

You : What is ai ?
Chatbot :  - Artificial Intelligence is the branch of engineering and science devoted to constructing machines that think.

You : Which language are you made in ?
Chatbot :  - Python.

You : Bye
Chatbot : Bye, meet you soon!
```

Figure 4.9 Output on IDE

5 Limitations and Future Enhancement

5.1 Limitations :

5.1.1 The chatbot still needs to have a larger dataset in order to give answers with more accuracy.

5.1.2 Django integration is required for storing user's answers from the browser for prediction purposes.

5.1.3 Connection of the website with various login and registration forms.

5.2 Future Enhancement :

5.2.1 Training accuracy is around 75% which can be improved using larger dataset.

5.2.2 The chatbot misbehaves sometimes, which can be improved using other python libraries.

5.2.3 The training of chatbot takes a huge time in processing.

5.2.4 A proper GUI Application can be made for better user experience.

6 Conclusion

6.1 This project enabled me to learn more about python programming concepts and various python libraries and other modules. I also learnt about some **machine learning** and **artificial intelligence** concepts and steps for making a chatbot.

6.2 This project has given me the opportunity to learn high level APIs like **Chatterbot, Numpy, Sklearn, WebSocketServer** and different **machine learning algorithms.**

6.3 I learnt how to be patient throughout the development phase and troubleshoot problems.

6.4 This project also helped me a lot in building confidence in myself and enhancing my knowledge.

7 References

1. http://chatterbot.readthedocs.io/en/stable/_modules/chatterbot/trainers.html
2. https://chatterbot.readthedocs.io/
3. https://github.com/gunthercox/ChatterBot
4. https://sqliteonline.com/
5. https://github.com/dpallot/simple-websocket-server
6. https://github.com/gunthercox/ChatterBot/blob/master/examples/learning_feedback_example.py
7. https://github.com/gunthercox/ChatterBot/tree/master/tests_django
8. https://github.com/gunthercox/ChatterBot/blob/master/examples/math_and_time.py
9. https://github.com/gunthercox/ChatterBot/blob/master/examples/basic_example.py
10. http://scikit-learn.org/stable/
11. https://github.com/scikit-learn/scikit-learn