Concordia University

COMP 474 – Intelligent Systems

Winter 2025

Project 1: Rule-Based Chatbot with NLP Integration

This project must be done in groups. You need to work with at least another person or in a group of maximum 3 students. If you already have a group of 4 or 5, then you need to split into 2 groups. The project is quite simple. Having a group of 4 or 5 is simply waaaaaay to many.

Any project related questions please communicate with one of our TA's:

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Labs will be on starting from this point 😊

Objective

The objective of this project is to build a simple rule-based chatbot that can understand user input using Natural Language Processing (NLP).

- Use Python to build a chatbot.
- Implement basic Natural Language Processing (NLP) with spaCy.
- Create rule-based responses based on user input.

Prerequisites

Students should have basic knowledge of Python, including:

- Working with strings and dictionaries.
- Understanding loops and functions.
- Installing and using external Python libraries.

Tools and Libraries

- Python 3.x
- spaCy (for NLP processing)

Installation

Before starting, install the required library by running:

pip install spacy

python -m spacy download en_core_web_sm

Project Instructions

Step 1: Import Required Libraries

import spacy

Step 2: Load NLP Model

nlp = spacy.load("en_core_web_sm")

Step 3: Define Chatbot Responses

Create a dictionary of predefined responses. You need to add more responses that are related to the if and the for statements in Java. A minimum of 25 rules that cover commonly anticipated keywords and their corresponding responses. The target audience is some student who is currently taking COMP 248.

```
responses = {
  "greet": "Hello! How can I help you today?",
  "bye": "Goodbye! Have a great day!",
  "help": "I can answer your questions. Try asking about something more specific!",
  "default": "I'm sorry, I didn't understand that. Could you rephrase?"
}
```

Step 4: Process User Input with NLP

This is the main part of the project where you get the user input and process it using NLP.

Step 5: Create a Loop for User Interaction

```
def chat():
  print("Chatbot: Hello! Type 'bye' to exit.")
```

```
while True:
    user_input = input("You: ")
    if user_input.lower() == "bye":
        print("Chatbot: Goodbye!")
        break
    response = get_response(user_input)
    print("Chatbot:", response)
```

Step 6: Run the Chatbot

```
if __name__ == "__main__":
    chat()
```

Expected Output

Chatbot: Hello! Type 'bye' to exit.

You: Hi

Chatbot: Hello! How can I help you today?

You: Can you help me?

Chatbot: I can answer your questions. Try asking about something more specific!

You: What is an if statement in Java?

Chatbot: An if statement in Java is .....

You: How can I use a for loop?

Chatbot: A for loop is used for .....

...

...

You: Goodbye

Chatbot: Goodbye! Have a great day!

Hints:

- Use regex or keyword matching for better understanding.

Conclusion

This project provides an introduction to building a chatbot with NLP capabilities. It helps students understand the importance of text preprocessing and **lemma**tization in rule-based chatbots.

Submission

You need to submit:

- The Python Project
- A sample run that covers all features of the chatbot

A demo to one of the TA's is a must. No credit will be given without the demo.

Have fun 😊