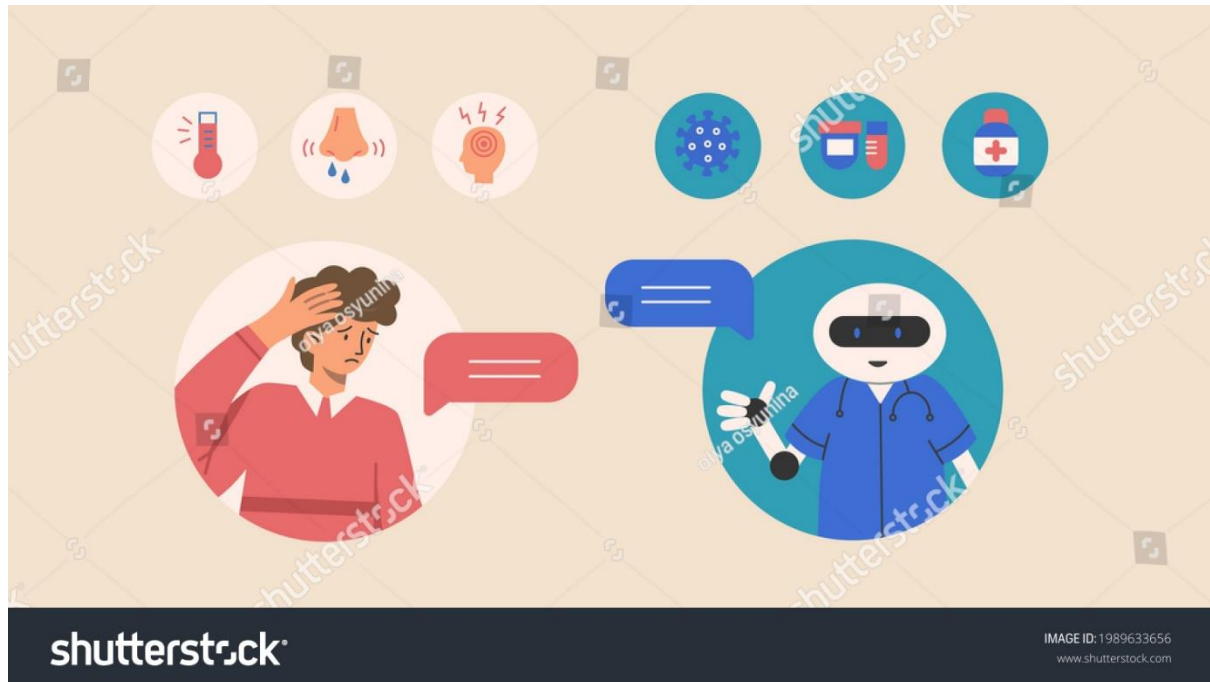


CMPG 313: Practical Assignment 4

Report: First-Order Logic-Based HealthCare Chatbot

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Student Number: 35864710



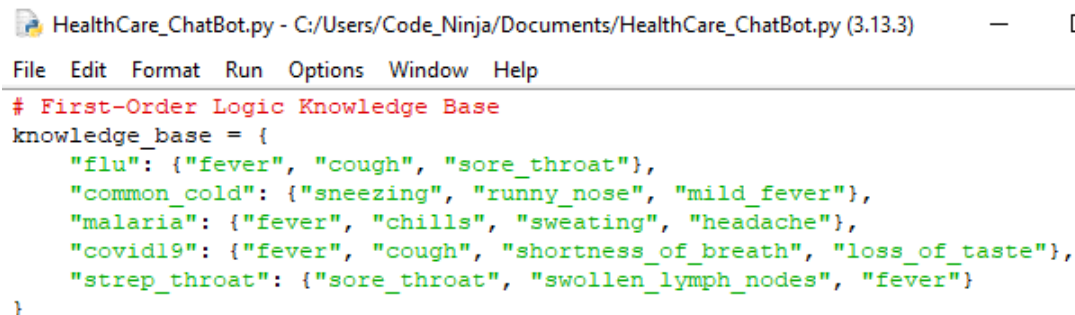
1. FOL to English Translation

Below are the First-Order Logic rules and their English translations:

- **Flu**
If a person has **fever**, **cough**, and **sore throat**, then they may have flu.
- **Common cold**
If a person has **sneezing**, **runny nose**, and **mild fever**, then they may have a common cold.
- **Malaria**
If a person has **fever**, **chills**, **sweating**, and **headache**, then they may have malaria
- **COVID-19**
If a person has **fever**, **cough**, **shortness of breath**, and **loss of taste**, then they may have COVID-19
- **Strep throat**
If a person has **sore throat**, **swollen lymph nodes**, and **fever**, then they may have strep throat

2. Knowledge Base (FOL Representation)

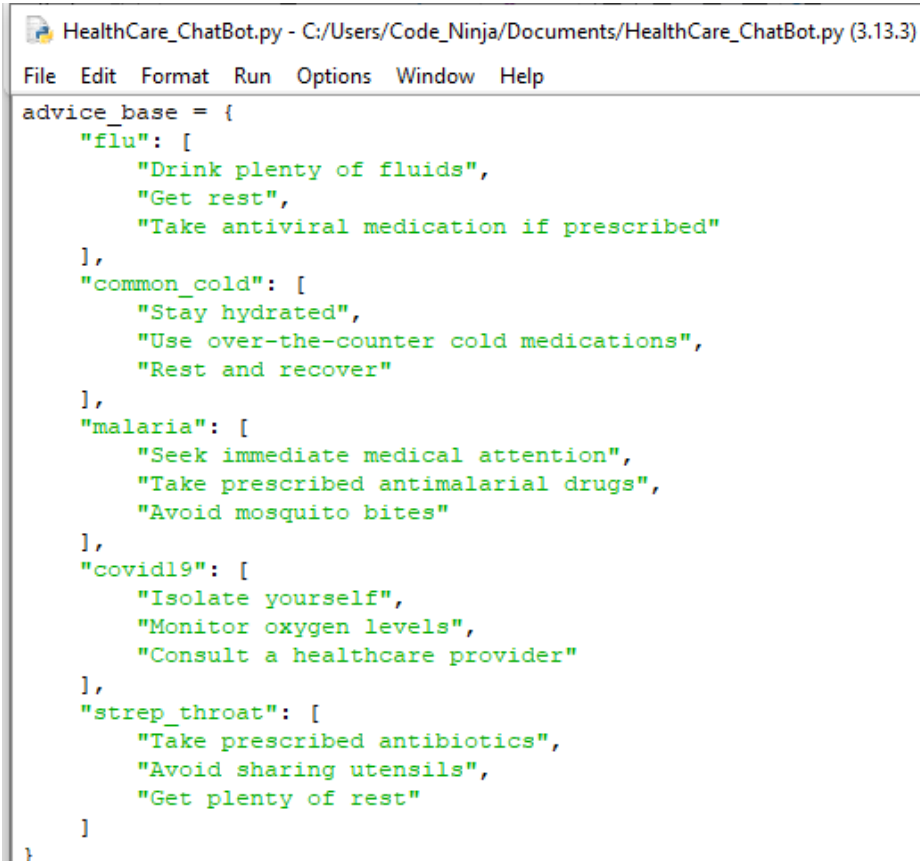
The following Python dictionary represents the knowledge based derived from the above FOL rules:



```
HealthCare_ChatBot.py - C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py (3.13.3)
File Edit Format Run Options Window Help
# First-Order Logic Knowledge Base
knowledge_base = {
    "flu": {"fever", "cough", "sore_throat"},
    "common_cold": {"sneezing", "runny_nose", "mild_fever"},
    "malaria": {"fever", "chills", "sweating", "headache"},
    "covid19": {"fever", "cough", "shortness_of_breath", "loss_of_taste"},
    "strep_throat": {"sore_throat", "swollen_lymph_nodes", "fever"}
}
```

3. Advise Base

The chatbot provides the following advice for each diagnosed disease:

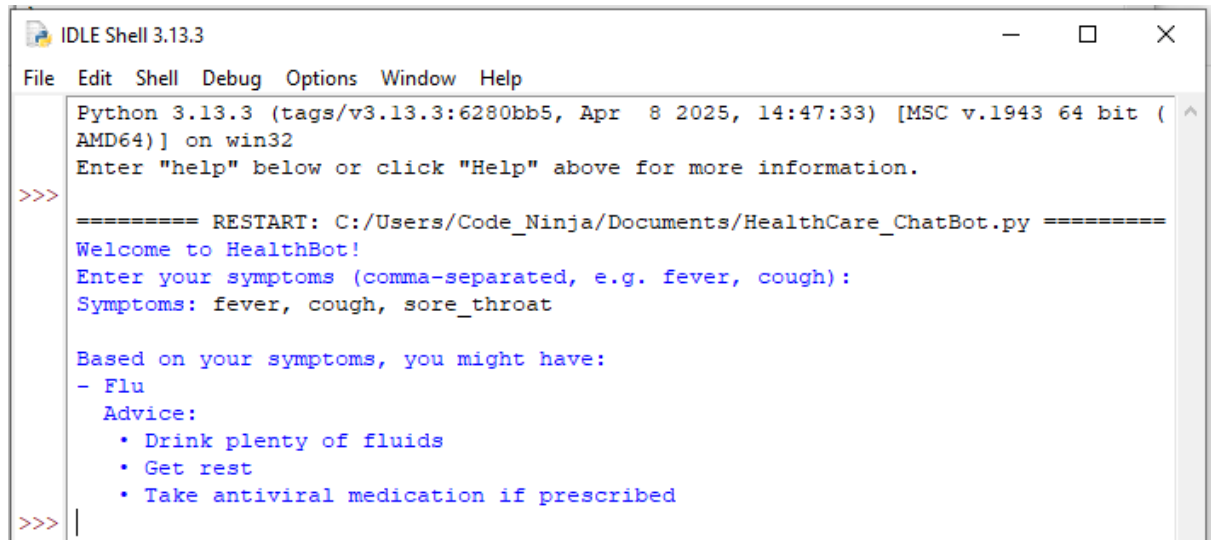


```
HealthCare_ChatBot.py - C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py (3.13.3)
File Edit Format Run Options Window Help
advice_base = {
    "flu": [
        "Drink plenty of fluids",
        "Get rest",
        "Take antiviral medication if prescribed"
    ],
    "common_cold": [
        "Stay hydrated",
        "Use over-the-counter cold medications",
        "Rest and recover"
    ],
    "malaria": [
        "Seek immediate medical attention",
        "Take prescribed antimalarial drugs",
        "Avoid mosquito bites"
    ],
    "covid19": [
        "Isolate yourself",
        "Monitor oxygen levels",
        "Consult a healthcare provider"
    ],
    "strep_throat": [
        "Take prescribed antibiotics",
        "Avoid sharing utensils",
        "Get plenty of rest"
    ]
}
```

4. Debugging (Test Case Outputs)

Below are the screenshots of the chatbot diagnosing each disease correctly:

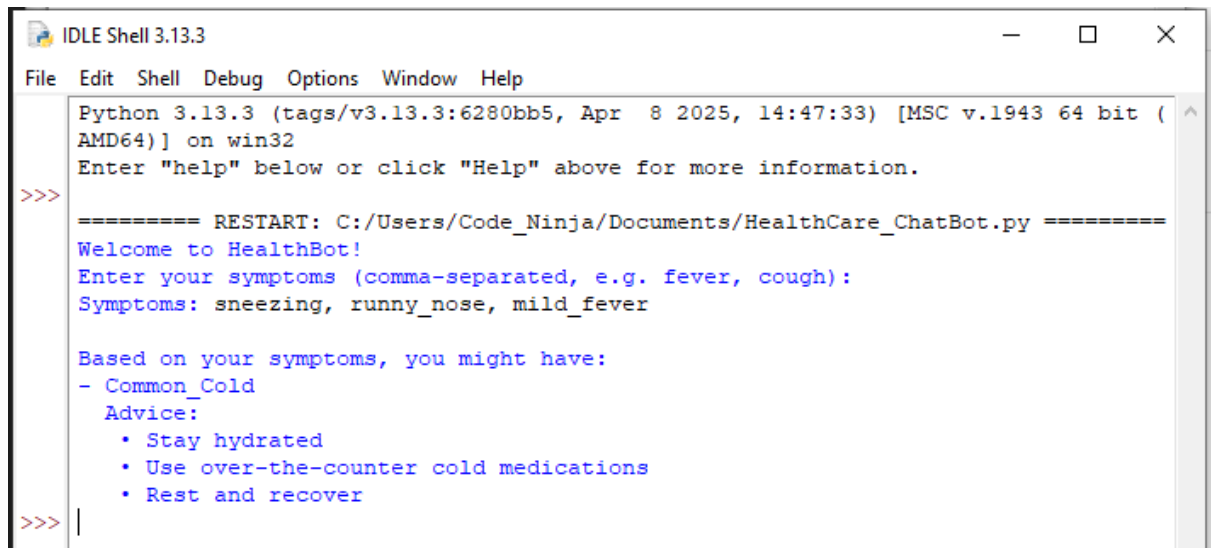
- Flu Diagnosis



```
IDLE Shell 3.13.3
File Edit Shell Debug Options Window Help
Python 3.13.3 (tags/v3.13.3:6280bb5, Apr 8 2025, 14:47:33) [MSC v.1943 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.
>>>
===== RESTART: C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py =====
Welcome to HealthBot!
Enter your symptoms (comma-separated, e.g. fever, cough):
Symptoms: fever, cough, sore_throat

Based on your symptoms, you might have:
- Flu
  Advice:
    • Drink plenty of fluids
    • Get rest
    • Take antiviral medication if prescribed
>>> |
```

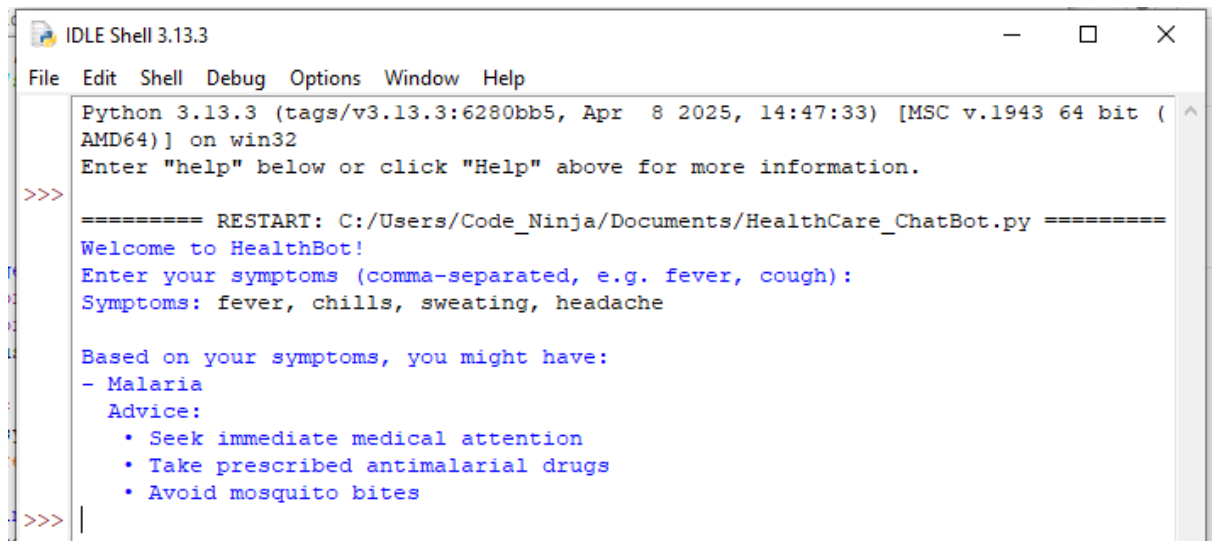
- Common Cold Diagnosis



```
IDLE Shell 3.13.3
File Edit Shell Debug Options Window Help
Python 3.13.3 (tags/v3.13.3:6280bb5, Apr 8 2025, 14:47:33) [MSC v.1943 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.
>>>
===== RESTART: C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py =====
Welcome to HealthBot!
Enter your symptoms (comma-separated, e.g. fever, cough):
Symptoms: sneezing, runny_nose, mild_fever

Based on your symptoms, you might have:
- Common_Cold
  Advice:
    • Stay hydrated
    • Use over-the-counter cold medications
    • Rest and recover
>>> |
```

- Malaria Diagnosis



```

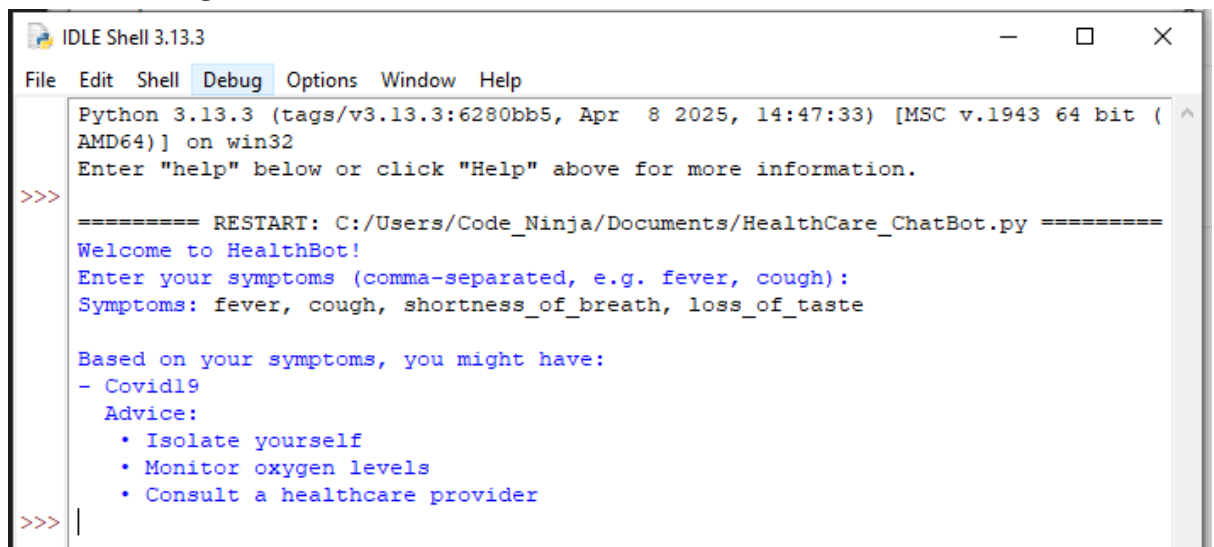
Python 3.13.3 (tags/v3.13.3:6280bb5, Apr  8 2025, 14:47:33) [MSC v.1943 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.

>>>

===== RESTART: C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py =====
Welcome to HealthBot!
Enter your symptoms (comma-separated, e.g. fever, cough):
Symptoms: fever, chills, sweating, headache

Based on your symptoms, you might have:
- Malaria
Advice:
  • Seek immediate medical attention
  • Take prescribed antimalarial drugs
  • Avoid mosquito bites
>>>
  
```

- COVID-19 Diagnosis



```

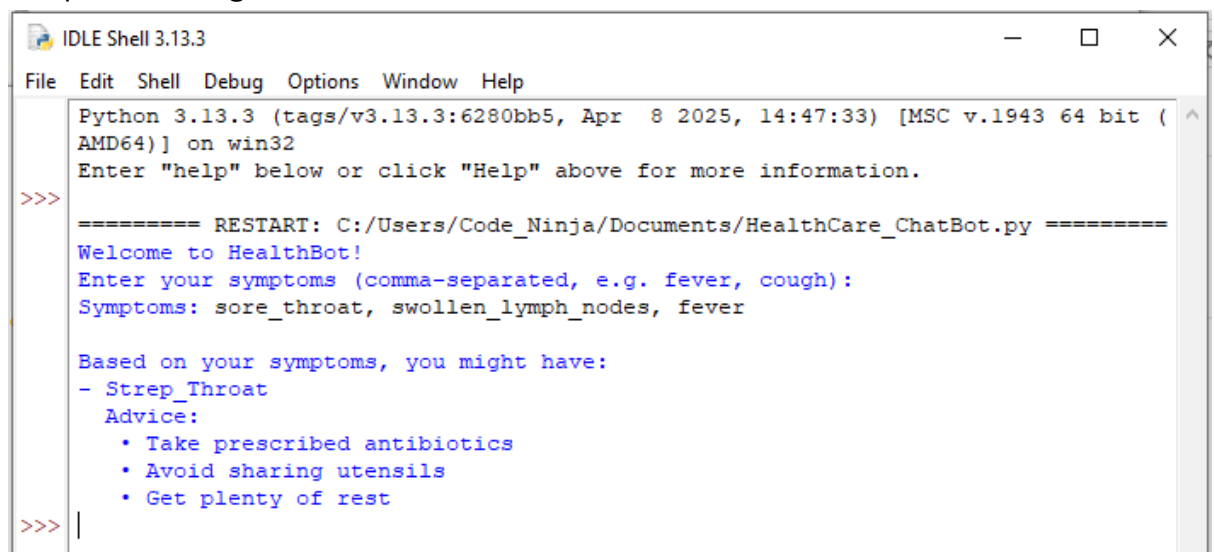
Python 3.13.3 (tags/v3.13.3:6280bb5, Apr  8 2025, 14:47:33) [MSC v.1943 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.

>>>

===== RESTART: C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py =====
Welcome to HealthBot!
Enter your symptoms (comma-separated, e.g. fever, cough):
Symptoms: fever, cough, shortness_of_breath, loss_of_taste

Based on your symptoms, you might have:
- Covid19
Advice:
  • Isolate yourself
  • Monitor oxygen levels
  • Consult a healthcare provider
>>>
  
```

- Strep Throat Diagnosis



```

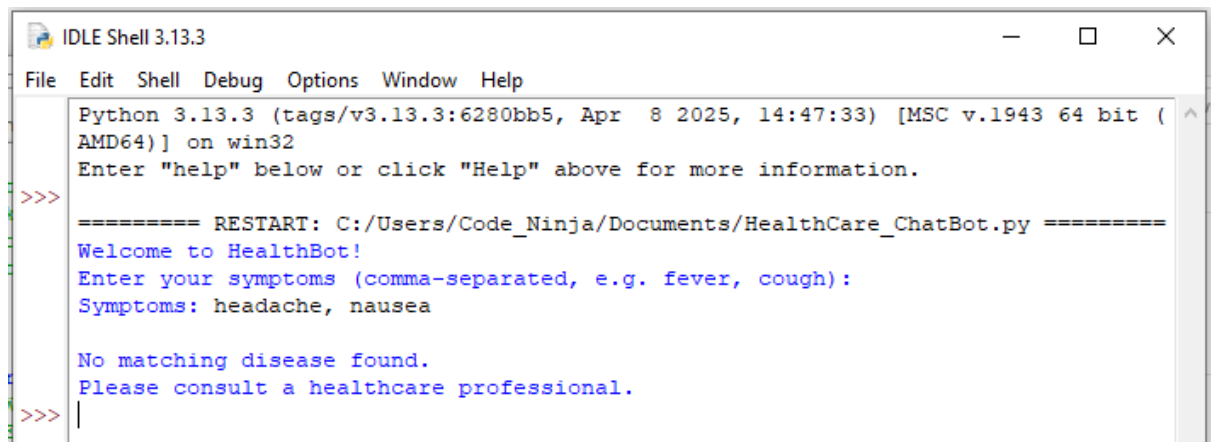
Python 3.13.3 (tags/v3.13.3:6280bb5, Apr  8 2025, 14:47:33) [MSC v.1943 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.

>>>

===== RESTART: C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py =====
Welcome to HealthBot!
Enter your symptoms (comma-separated, e.g. fever, cough):
Symptoms: sore_throat, swollen_lymph_nodes, fever

Based on your symptoms, you might have:
- Strep_Throat
Advice:
  • Take prescribed antibiotics
  • Avoid sharing utensils
  • Get plenty of rest
>>>
  
```

- No Match Diagnosis



```

IDLE Shell 3.13.3
File Edit Shell Debug Options Window Help
Python 3.13.3 (tags/v3.13.3:6280bb5, Apr 8 2025, 14:47:33) [MSC v.1943 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.
>>>
===== RESTART: C:/Users/Code_Ninja/Documents/HealthCare_ChatBot.py =====
Welcome to HealthBot!
Enter your symptoms (comma-separated, e.g. fever, cough):
Symptoms: headache, nausea

No matching disease found.
Please consult a healthcare professional.
>>>

```

5. Suggested Feature Enhancements

To improve the functionality of this chatbot, the following features can be added:

- Partial Symptom Matching
Instead of requiring all symptoms to match exactly, the chatbot can suggest possible diseases with certain percentage based on partial matches.
- Symptom Synonym Support
Allow the chatbot to understand alternative terms like “runny nose” vs “nasal discharge”
- GUI Interface
A graphical user interface can make the chatbot ore user-friendly, allowing input through checkboxes or voice.
- External API Integration
Connect the chatbot to a medical database for real-time symptom updates and advice.

This project showed how to use First-Order Logic to construct a basic medical diagnosis system. The chatbot can help users identify potential ailments and offer health advice by organizing medical knowledge into logical rules and using Python to implement inference. It could be useful in the actual world as a first-step triage tool with improvements.