



De La Salle University - Manila
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In Partial Fulfillment
Of The Course Requirements
In **CSINTSY - S15**

MCO2: ChatBot

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Submitted To:
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I. Introduction

Describe the domain (e.g., which types of diseases are covered, what is the purpose) that you want to automate. Explain why the task requires expertise. Explain the significance of this expert system to a particular group, community, or organization.

The domain that we wanted to automate are the following diseases:

1. Severe Acute Respiratory Syndrome (SARS) / Covid 19
2. Dengue
3. HIV/AIDS
4. Hand Foot and Mouth Disease
5. Influenza
6. Diphtheria
7. Tuberculosis
8. Cholera
9. Chickenpox
10. Malaria

These diseases are quite common in poor areas, including the Philippines, due to the prevalence of mosquitos, poor sanitation, and unsafe water sources; which increases the chance of these diseases to occur. In terms of HIV/AIDS and Influenza, they both are common in general and can be gotten in any region regardless of location; hence why we added them in also since poor communities can be affected by them.

The task requires expertise since a large number of symptoms for the listed diseases overlap and be quite confusing to discern and differentiate by a normal person without any knowledge or experience in the diagnosis of diseases.

The system can be of great help to poor and rural communities since those two communities might not have easy access to medical facilities or materials nor the information needed to know about each disease and how to treat them. They also may not know the symptoms of the diseases and how deadly they are; so there is a chance that they may not go to the hospital since they think that their symptoms are not as bad, even though they might have a fatal disease. The system can also help in terms of saving money; since visits to medical facilities can be expensive, if the diagnosis is mild, the system can help these communities treat themselves instead of going to the hospital which can cost a sizable amount of money.

II. Knowledge Base and Chatbot

First, we had to research and pick 10 diseases that were prevalent in the poor communities of the Philippines. Then, we researched the symptoms for each disease. We instantiated the disease and the symptom in the Prolog file as a "fact". An example would be `disease(dengue).` and `symptom(cough).` Then, we make a clause, `disease_symptoms(x, y).` for each disease and its symptoms. x as the disease and

y as its symptoms. Lastly, we defined a rule that gives the relationship between the diseases and symptoms so that if a symptom is known and is associated with a disease in the knowledge base, then the rule can be used to find out which disease it might be. An example would be since “fever” is a symptom of “dengue” in the knowledge base, `get_Disease_from(Disease, fever)` will return dengue and other diseases that have fever as the symptom.

The implementation of the python program uses sets, first is the possible disease set, if the answer is yes. The program query the symptoms of diseases that have those symptoms asked, this is to prevent asking all of the questions and as well to narrow down symptoms to prevent asking irrelevant symptoms that have no relationship to the symptom asked. The program also prevents duplicate symptoms by using sets. The program saves the asked symptoms and finds the difference between the prolog from the query and symptoms asked. If the answer is no, it does not narrow the disease but narrow down the symptoms asked. And it keeps on asking until symptoms run out, because it can not narrow it down.

III. Results and Analysis

- Give at least two most impressive sample conversations with your knowledge-based system. Be sure to provide screenshots per sample conversation. Explain why you chose these conversations. Justify why the Chatbot is impressive in these situations.
- Provide some examples of conversations with your Chatbot which are not so good. Be sure to provide screenshots per sample conversation. Explain why the poor performance of the Chatbot in these situations.

The program could easily narrow down to one disease based on the symptoms

A good conversation that we got was with this test case of symptoms:

- 1.Fever
- 2.Nausea
- 3.Vomiting
- 4.Abdominal Pain
- 5.Rashes

Symptoms 1 to 4 are similar for both dengue and malaria except for the last which is exclusive for dengue

Does patient have fever
yes
Enter anything to continue

Does patient have gray_membrane_in_throat
no
Enter anything to continue

Does patient have cough
no
Enter anything to continue

Does patient have vomiting
yes
Enter anything to continue

Does patient have headache
no
Enter anything to continue

Does patient have nausea
yes
Enter anything to continue

Does patient have hermorrhage
no
Enter anything to continue

Does patient have heartburn
no
Enter anything to continue

Does patient have chills
no
Enter anything to continue

Does patient have back_pain
no
Enter anything to continue

Does patient have impaired_consiousness
no
Enter anything to continue

Does patient have loss_of_appetite
no
Enter anything to continue

Does patient have diarrhea
no
Enter anything to continue

```

Does patient have joint_pain
no
Enter anything to continue

Does patient have sweats
no
Enter anything to continue

Does patient have limpness
no
Enter anything to continue

Does patient have abdominal_pain
yes
Enter anything to continue

Does patient have blood_clot
no
Enter anything to continue

Does patient have organ_dysfunction
no
Enter anything to continue

Does patient have postive_torniquet_test
no
Enter anything to continue

Does patient have spinal_pain
no
Enter anything to continue

Does patient have rashes
yes
Enter anything to continue

*****
You have been diagnosed with dengue.

Here is some information about dengue:
Dengue Also known as the following: breakbone fever; dandy fever; and seven-day fever.
t is a fe Aedes mosquitoes; both disease and mosquito are common in tropical and subtr
ver.
Caused by Aedes mosquitoes; both disease and mosquito are common in tropical and subtr
ical parttself lasts for 2 to 7 days.
s of the world.

```

The chatbot started meandering by listing symptoms of diseases that have fever then narrowed it down to the two diseases mentioned. As soon as abdominal pain was found

to be a symptom, it started asking for symptoms for dengue until it asked rashes; and from then a diagnosis was made.

Another good conversation was with the test case:

- 1.Fever
- 2.Nausea
- 3.Blood clots
- 4.Vomiting

The disease was dengue for the test case

```
What do you want to do: 1

Please answer yes or no to the questions given
Does patient have fever
yes
Enter anything to continue

Does patient have gray_membrane_in_throat
no
Enter anything to continue

Does patient have blood_clot
yes
Enter anything to continue

*****
You have been diagnosed with dengue.

Here is some information about dengue:
Dengue Also known as the following: breakbone fever; dandy fever; and seven-day fever. It is a fever.
Caused by Aedes mosquitoes; both disease and mosquito are common in tropical and subtropical parts of the world.
Usually asymptomatic; severe illness and death may occur
Symptoms incubate for 4 to 7 days before showing; may take 3 to 10 days.
Disease itself lasts for 2 to 7 days.
Symptoms include: Nausea, Vomiting, Rashes, Abdominal Pain, Fever, Hemorrhage, Organ Dysfunction, and Impaired Consciousness.

Here is the recommended treatment for dengue:
No specific treatment for the disease.
Do not take aspirin, other nonsteroidal anti-inflammatory drugs, and other anticoagulants (Advil, Motrin IB, etc.). May increase risk of dengue fever bleeding complications.
Over-the-counter drug acetaminophen (Tylenol, etc.) is recommended to help alleviate muscle pain and fever, however.
Drink enough water and hydrate yourself. With proper care, it should fade within 2 to 7 days.
If the fever persists after 2 days and rashes appear, head to the nearest hospital.
Subsequent treatments vary but include: initiation on IV crystalloids; colloids; blood transfusion; platelet transfusion; and more.
```

It was really quick to give the correct diagnosis with only 3 symptoms asked. The combination of symptoms quickly narrowed down the possible diseases to only dengue

Another good conversation was with the test case:

- 1.Fever
- 2.Nausea

These symptoms are part of multiple diseases so its hard to make a diagnosis

Please answer yes or no to the questions given

Does patient have fever

yes

Enter anything to continue

Does patient have phelgm

no

Enter anything to continue

Does patient have back_pain

no

Enter anything to continue

Does patient have blood_clot

no

Enter anything to continue

Does patient have sweats

no

Enter anything to continue

Does patient have loss_of_appetite

no

Enter anything to continue

Does patient have organ_dysfunction

no

Enter anything to continue

Does patient have abdominal_pain

no

Enter anything to continue

Does patient have joint_pain

no

Enter anything to continue

Does patient have sore_throat

no

Enter anything to continue

Does patient have limpness

no

Enter anything to continue

Does patient have headache

no

Enter anything to continue

```
Does patient have diarrhea
no
Enter anything to continue

Does patient have runny_nose
no
Enter anything to continue

Does patient have heartburn
no
Enter anything to continue

Does patient have nausea
yes
Enter anything to continue

Does patient have rashes
no
Enter anything to continue

Does patient have hemorrhage
no
Enter anything to continue

Does patient have chills
no
Enter anything to continue

Does patient have impaired_consciousness
no
Enter anything to continue

Does patient have spinal_pain
no
Enter anything to continue

Does patient have vomiting
no
Enter anything to continue

Does patient have positive_torniquet_test
no
Enter anything to continue

We aren't able to give you a diagnosis.
This is either due to lack of discerning symptoms or the symptoms provided can be attributed to multiple diseases
It is recommended to go to a hospital for further diagnosis
Enter anything to continue
```

After exhausting the possible symptoms for diseases that have fever and nausea, it wasn't able to get a proper diagnosis and told the user to bring the patient to a hospital for further diagnosis

An example conversation that didn't turn out well is when you have a case where one or more of the symptoms that the patient has isn't part of the disease that they have. In the example conversation, our test patient has cholera with the following symptoms:

1. Fever
2. Dehydration
3. Diarrhea
4. Muscle aches

The 2nd to 4th symptom are defining symptoms of cholera while fever isn't

Does patient have fever
yes
Enter anything to continue

Does patient have blisters
no
Enter anything to continue

Does patient have difficulty_breathing
no
Enter anything to continue

Does patient have limpness
no
Enter anything to continue

Does patient have vomiting
no
Enter anything to continue

Does patient have loss_of_appetite
no
Enter anything to continue

Does patient have fatigue
no
Enter anything to continue

Does patient have hemorrhage
no
Enter anything to continue

Does patient have eye_pain
no
Enter anything to continue

Does patient have cough
no
Enter anything to continue

Does patient have diarrhea
yes
Enter anything to continue

Does patient have sweats
no
Enter anything to continue

```
Does patient have heartburn
no
Enter anything to continue

Does patient have swollen_lymph_noes
no
Enter anything to continue

Does patient have joint_pain
no
Enter anything to continue

Does patient have back_pain
no
Enter anything to continue

Does patient have chills
no
Enter anything to continue

Does patient have weight_loss
no
Enter anything to continue

Does patient have headache
no
Enter anything to continue

Does patient have spinal_pain
no
Enter anything to continue

Does patient have abdominal_pain
no
Enter anything to continue

Does patient have nausea
no
Enter anything to continue

We aren't able to give you a diagnosis.
This is either due to lack of discerning symptoms or the symptoms provided can be attributed to multiple diseases
It is recommended to go to a hospital for further diagnosis
Enter anything to continue
```

From the picture, since the patient had a fever, cholera was automatically ruled out since fever isn't a symptom of cholera. It then kept asking for more and more symptoms to try and narrow down the diseases. Since the only symptoms that the patient said yes to are fever and diarrhea, it wasn't able to narrow down the diseases to one and failed to give a diagnosis.

IV. Recommendations

With how the ChatBot works is that if you say "yes" to a symptom, it will remove all the other diseases that do not have that symptom. This can be a problem in cases where the patient has symptoms not related to the disease that they have; with how our chatbot works right now, that can cause the chatbot to rule out a disease that they may have because they input a symptom that wasn't associated with the disease. The possible way to address the weakness is that instead of removing all the other diseases, it can be placed in a lower priority.

The chatbot can't handle symptoms from multiple diseases. Our suggestion is to return with no diagnosis, but list the possible disease that fit the symptoms of the patient.

V. References

Alimohamadi, Y., Sepandi, M., Taghdir, M., & Hosamirudsari, H. (2020). Determine the most common clinical symptoms in COVID-19 patients: a systematic review and meta-analysis. *Journal of preventive medicine and hygiene*, 61(3), E304–E312.
<https://doi.org/10.15167/2421-4248/jpmh2020.61.3.1530>

COVID-19 and Your Health. (2020, February 11). Centers for Disease Control and Prevention.
<https://www.cdc.gov/coronavirus/2019-ncov/your-health/treatments-for-severe-illness.html>

Schaefer T., Panda P., & Wolford R. (2022). Dengue Fever. *StatPearls Publishing*.: <https://www.ncbi.nlm.nih.gov/books/NBK430732/>

HIV/AIDS. (2022, July 29). Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/hiv-aids/symptoms-causes/syc-20373524>

Hand-foot-and-mouth-disease. (2022, August 8). Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/hand-foot-and-mouth-disease/symptoms-causes/syc-20353035>

Influenza. (2022, October 22). Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/flu/symptoms-causes/syc-20351719>

Diphtheria. (2022, February 2). Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/flu/symptoms-causes/syc-20351719>

Tuberculosis. (2023, March 22). Mayo Clinic.
<https://www.mayoclinic.org/diseases-conditions/tuberculosis/symptoms-causes/syc-20351250>

Cholera. (2022, December 9). Mayo Clinic.

<https://www.mayoclinic.org/diseases-conditions/cholera/symptoms-causes/syc-20355287>

Chickenpox. (2021, May 8). Mayo Clinic.

<https://www.mayoclinic.org/diseases-conditions/chickenpox/symptoms-causes/syc-20351282>

Bria, Y. P., Yeh, C., & Bedingfield, S. E. (2021). Significant symptoms and nonsymptom-related factors for malaria diagnosis in endemic regions of Indonesia. *International Journal of Infectious Diseases*, 103, 194–200.

<https://doi.org/10.1016/j.ijid.2020.11.177>

Dengue. (2022, October 5). Mayo Clinic.

<https://www.mayoclinic.org/diseases-conditions/dengue-fever/diagnosis-treatment/drc-20353084>

What are Malaria Pills? (2021, February 17) WebMD.

<https://www.webmd.com/a-to-z-guides/malaria-pills>

Infectious Diseases (n.d.) Department of Health - Center for Health Development - Cordillera Administrative Region. <https://caro.doh.gov.ph/infectious-diseases/>

VI. Contributions of Each Members

Chong, Hans Kirzen

- Provided and researched on the symptoms
- Added the symptoms in the Prolog file

Salen, Rommel Kendric

- Provided and researched on information about the disease and treatments

Tuco, Kevin Bryan

- Added the information on the diseases and treatment on Prolog file

Uy, Wesley King

- Programming the prolog and python
- Debug the python and prolog file

Deliverables

You are to submit the following through AnimoSpace on or before the deadline set by the instructor:

- a. The executable program (ready to run). This should be in a folder named app. If there are additional files needed for the program to run, make sure to include them. Include in this folder the instructions needed to run the program. Include instructions on how to use it as well if it's not intuitive from the program itself.

- b. The complete source codes used for the program. Put these in a folder named source.
- c. A .pdf document containing the report. Name this file report.pdf.