

Learning Outcomes

This project is a venue for the students to achieve the learning outcomes below:

LO1. Collaboratively build systems that consider a number of paths or strategies in order to improve its performance in achieving its goal in less amount of computing time, or by some other metric of performance.

LO5. Articulate ideas and present results in correct technical written and oral English

Students will demonstrate their skills in modeling, developing, and evaluating a small-scale chatbot expert system. They are going to analyze how the knowledge of the experts in a real-world domain can be represented. Then, they are going to develop the chatbot and evaluate its intelligence. They will also write a report explaining strengths and weaknesses of the chatbot.

Medical Diagnostic Chatbot

The task is to develop a small medical diagnostic expert system for a list of diseases of your choice that is suitable for poor communities in the Philippines. Part of the system is a question-and-answer interface and a backward-chaining expert system shell. Note that this domain (diagnosis of diseases that are prevalent in rural or poor communities) may be replaced by some other application domain of similar relevance and complexity.

The system should involve at least 15 individual diseases that are common among the poor or rural communities in the Philippines.

The expert system may start with rules or clauses that deal with general questions to establish the “chief complaint” and the “history of present illness (HPI)”. The HPI interface would then be used to determine which specific medical diagnosis system to launch, which would differ depending on the so called “chief complaint”. You may need to augment the HPI rules with specific diagnostic rules once the HPI branches out to specific medical domains (e.g. infections in the upper respiratory tract, throat/tonsils, mouth and nose).

PROLOG

The expert system should be written the PROLOG programming language. PROLOG is a logic programming language designed to work with logic-based models. You can choose to implement the entire expert system in PROLOG or develop the back-end using PROLOG with a front-end written in a different language.

You can download PROLOG here: <https://www.swi-prolog.org/download/stable>

Here are some resources that you can use to learn the PROLOG programming language:

- <https://en.wikibooks.org/wiki/Prolog>
- <https://www.youtube.com/watch?v=SykxWpFwMGs>

Minimum Program Requirements

The expert system should cover the diagnosis of at least 10 diseases that are common among the poor or rural communities in the Philippines. The expert system should be built on top of a knowledge base which capture the rules involved in the diagnosis of those diseases. You are to manually encode

* Deadline is extended from original deadline in the syllabus.

these real-world rules as logical formulas into the knowledge base. To do this, you have two possible options:

- A. Interview an expert. The expert from whom you will acquire knowledge for the expert system must be ideally a GP, family medicine expert, or an internist and has had experience working in depressed and rural communities in the country.
- B. Review at least 10 related literatures or websites. For example, you can look for websites or other literatures giving information about the description, symptoms, treatment, etc. of common illnesses. You might also want to look for the frequently asked questions regarding common illnesses. Note that the websites or literature must be credible enough to be the basis of your knowledge base.

In general, the medical diagnosis may only be based on basic patient information like age, gender, height, weight, and BP, as well as results from various probes using a stethoscope, visual inspection of an affected area, pressing of certain areas for numbness or pain, interview, and the like. Do not require the results from expensive laboratory tests, such as ultra sound, x-ray, MRI, CT scan, and specific laboratory and microscopy tests. All these “tests and probes” should be assumed to be performed at some ill-equipped barangay health center or rural health unit, conducted by a nurse or midwife, with instructions from a doctor who is “virtually” present via the Internet and some Android device to personally interview the patient. If the patient is not in an emergency situation and the doctor would absolutely need specific tests procedures from a large medical facility (e.g. hospital) before a diagnosis can be made, then the diagnosis is “refer to a large medical facility”.

For the chatbot, please note that it is **not** required to allow the user to input in natural language (i.e., you can just make the user answer yes-no questions or allow the user to select from a set of options). GUI is **not** required as well.

Report

In addition to the above program, you are to write a report containing the following sections:

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.

II. Knowledge Base and Chatbot

- Explain in detail the process that you used in translating the real-world information into formulas in the knowledge base. Cite examples.
- Explain the parts of the knowledge that were the easiest to finalize and that caused the least problems, and why these were so. Use figures for illustration.
- Explain the parts of the knowledge base that were the most difficult to finalize or caused the most problems, why these were so, and how they were revised. Use figures for illustration.
- Discuss the implementation of the chatbot / expert system in detail.

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 on 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 on these situations.
- Summarize the strengths and weaknesses of the chatbot.

IV. Recommendations

- Based on the analysis of the performance of the bot, point out the weaknesses of the bot. Identify and explain possible ways to address these weaknesses.

V. References (if any)

- Use APA citation format.

VI. Contributions of Each Members

- Explain in detail the contribution of each group member in the completion of the project.

The report should also include a title page containing the members of the group.

There is no minimum number of pages for the report, but keep in mind that you will be graded based on its substance, readability and completeness.

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**.

These are to be submitted as a single zip file with a filename of **MC02_<surname 1>_<surname 2>_<surname 3>_<surname 4>.zip**. Please make sure that you comply with the naming conventions and format of the submission.