FCIM.M.IA Spring 2024
Lab: Expert Systems

Handed out: Friday, March 22, 2024

Searching for tourists, expertly

Finally, your dream came true and you have landed a job at "HeinleinAI" – the biggest AI company in the whole Luna-City! You're on a testing period so you will want to make sure that you do your best.

While you are daydreaming about free lunch, the mentor comes and hands you your first task – you'll need to build an expert system. They say that while going through the central library database they stumbled upon this ancient approach that looked like it could solve a particular lunar problem – detecting tourists.

The tourists on Luna-City are a big source of income and while almost every salesman and hotel administrator can easily tell one from a Loonie, our mentor researches a more systematic way of detecting them. While this would prove a trivial task to the city's main computer, resources are scarce these days and so you will be researching alternative, more special approaches.

For starters, research the types of tourists that visit Luna-City and collect a database of at least 5 tourist types and the criteria by which they can be distinguished from Loonies and between themselves (e.g. clothes, accent, gait, height or opinion on politics). After your database is done, create a system that would allow the user to answer some questions about a possible tourist. If the set of given answers matches a type of tourist from the database, this should be the system's answer. If on the other hand, the system determines that the person in question is a Loonie, the answer should be returned accordingly. Make sure to consider the case when the set of answers does not find a match in the database (highly improbable if you've done your research well).

Another thing to consider is how the system will be deployed. The machines that are at your disposal are only capable of running Python code in the form of Jupyter Notebooks. To aid you in your task, the mentor gave you a template that he found is accepted by the machines as well as a couple of Python files. This should help kick-start your research..

Reporting

At the end of this lab, you will need to submit a *report* describing what you have implemented. The *report* must be uploaded on Else, in the according assignment activity. You should use the provided template. Suggested development environments are Google Colab or JupyterLab.

Grading policy

Task 1   Define 5 types of tourists that visit Luna-City. Draw the Goal Tree representing these types of tourists.   **(1p.)**

Task 2   Implement the rules from the defined tree in Task 1 in your code (use the `IF`, `AND`, `OR` and `THEN` rules which are already implemented).   **(1p.)**

Task 3   If you are using the provided code, check how the Forward Chaining algorithm works and illustrate an example. If you are implementing your own code, implement the Forward Chaining algorithm yourself.   **(0.5p.)**

Task 4   Implement the Backward Chaining algorithm for the Goal Tree.   **(2p.)**

Task 5   Implement a system for generating questions from the Goal Tree. Have at least 2 or 3 types of questions (e.g yes / no, multiple choice, etc).   **(2p.)**

Task 6   Wrap up everything in an interactive Expert System that will dynamically ask questions based on the input from the user. Both Forward Chaining and Backward Chaining should be working.   **(2p.)**

Task 7   Format the output and questions to human readable format.   **(0.5p.)**

Report & Presentation   Clear explanations, report formatting, code quality, visualisations if relevant etc.   **(1p.)**

Plagiarism will not be tolerated.
Good Luck!