Rochester Institute of Technology,
Department of Computer Science

ARTIFICIAL INTELLIGENCE
INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Mini Project 1

Building an expert system

Due: October 18, 2004

General Contents

1. You have to design, develop (write a code), run, test and evaluate the software for an expert system, which could be applied for solving a specified set of application problems or a specific problem
2. You have to try to make your product work faster and more reliable. Although addressing security issues is not required, you might like to start thinking about making it more secure.
3. You have to develop and submit a proper documentation (see project report section).
4. You have to document :
    a. the product itself and guidelines how to use it,
    b. testing, you performed, and how you evaluated the product based on test results,
    c. the development process (for group projects only): how you distributed the workload, who did what, how much time you spent on different aspects, etc.

5. Developing of a nice GUI is not required and generally will not be included into assessment unless this is an important part of your expert system determined by its application but you might get some bonus points for outstanding solutions

Project work:

Step1: **Identify the problem and analyze the knowledge to be included into the system**

Just about any field of activity involves expertise of some kind – it could be described with a more or less formal model or as a rule-of-thumb expertise. Therefore, you will have an opportunity to employ an expert system practically in every domain and improve an efficiency of the decision making process. However, you should possess or be able to gather a sufficient amount of knowledge in the specified domain. Although keep in mind that in some area an expert system application could produce more benefits than in others.

At this stage you have to write down the system specifications and requirements.

Step 2: **Develop an implementation tool**

Depending on the type of an expert system you are going to design, different tools could be employed. With the rules based expert system, you will need a system shell to fill in with a specific knowledge.

You have three options:

Option 1: Use JESS, the rule engine for Java platform, developed by Ernest Friedman-Hill at Sandia National Laboratories in Livermore, CA and available for free download at http://herzberg.ca.sandia.gov/jess/.

Option 2: Design and develop the tool (shell) by yourself. This will include writing a code in any programming language, testing and running a few examples.

Students who choose this option will be able to replace the research component in their course assessment with this activity.
Option 3: If you are not satisfied with first two options, there is another possibility but you have to confirm with me if you wish to go this way. You may do some search on the web or in the library, find out the expert system tool (shell) available for free, download it and study it.

Step 3: Design an expert system

Initially it will involve knowledge formulation (just writing down some rules and conditions) and drafting some flow charts to indicate how it should operate.
In a case of a simple knowledge base, this stage blends from analysis into design and it is easily described by the creation of a matrix that lists some conditions along the top edge and recommendations on the side.

Step 4: Develop an expert system prototype.

This involves an actual expert system development with an application of the tool developed in step 2. For example, if you are using a shell, it will involve filling in this shell with some knowledge: simple rules and conditions and running it. After a prototype is created you have to test it, by running a number of consultations. Here you supply three-five examples.

Step 5: Expand, test and revise the expert system until it satisfies your specifications

Step 6: Writing, documenting and submitting a report.

Submission Requirements for Project 1.

(1) Submission deadline is 11.59 pm, October 18, 2004

(2) Please, submit your project by email (the address will be provided later)

You have to submit:

a file named pr1_yourname.* should contain your documentation in doc, txt or pdf formats.
a file named pr1_yourname.ext where ext is determined by the language you are going to use in your project, which should contain a commented code you developed for your project.

Documentation

Suggested report format

Executive summary (1-2 paragraphs)

Concise description of problem addressed and results

Requirements (1-2 paragraphs)

Your brief understanding of what the instructor requires in this project - informally stated

Specification (1-2 pages)

Precise definition of what you are to do and what results you have to achieve. Please, be as specific as possible and provide as much detail as you can here.

Description of the domain problem

An overview of the tool (expert system shell), which you are using if you have chosen to apply a standard tool

Feasibility study (1 page)

Possible solutions, protocols, models and methods

Comparison (at least three comparisons of different options) of solutions

Conclusion:

Choose one of each and explain why

Implementation (1-2 pages)

Representation of the knowledge base and data base

Description of the expert system applications (examples are required)

Structure, contents, user interface, limitations, software and hardware requirements, etc. Describe all the classes applied. If you used a code from some library, provide the reference to this library.

Product testing (2-3 pages)

Compilation:

- State the time of your final compilation, hardware and software environment, messages (if any) received and the result of your compilation.

Testing:

-Actual executed test cases must be described briefly (you should run and describe at least 10 test cases). Briefly describe how you designed your tests: your main concept and ideas, why you tested that and this, what you expected

- The results of your tests

- Evaluation of your product performance and reliability based on your test results

User's guide and GUI (if any) description

Development process documentation (1-2 pages for group projects only):

Describe the process of the software development and testing; briefly describe who did what and how your team work was organized.

GOOD LUCK!