Assignment 1, Constraint Satisfaction For Decision Making (CE884-7-SP), 2010-11
Set by Edward Tsang, University of Essex

1. Introduction:

This is an assignment on problem formulation. This assignment accounts for 10% of your total marks in this course. This assignment should be submitted electronically. The deadline of this assignment is ***11:59:59, Friday 25 February 2011***.

2. Objective:

The objective of this assignment is to give you a chance to formulate a constraint satisfaction problem.

3. The Round-Pound Problem:

The Round-Pound Problem is a practical problem, which is described in:

http://www.bracil.net/CSP/RoundPound/

Basically, it is the problem that, due to rounding, the displayed arithmetic in a spreadsheet may not appear to be correct. For example, 68.59 + 28.83 = 97.42 could be displayed as 69 + 29 = 97. The problem could be solved by flexible rounding, which means allowing every number to be rounded up or rounded down; for example, 68 + 29 = 97, or 69 + 29 = 98 in the above expression. However, the situation would be more complex when more dependency exist in the spreadsheet; for example there are two or three dimensional tables.

4. Your task:

The following spreadsheet contains three apparently erroneous tables (Sheets labelled Scenario 1, 2 and 3): http://www.bracil.net/CSP/RoundPound/RoundPoundProblem.xlsx

Suppose you are asked to write programs to perform flexible rounding in tables shown in the above Scenarios. Formulate the above problem as a constraint satisfaction problem. You must state clearly what the variables, domains and constraints are, and why they should be part of the formulation.

5. Submission requirements:

Write your name clearly on the first page of your submission. Underline your surname. Submit a report of strictly no more than 1,000 words, stating your formulation of this problem. State precisely the variables, domains and constraints. Clearly explain how you arrive at your formulation. State clearly where domain-specific knowledge is used. Evaluate the size of your search space. Explain how any of the constraints that you have defined might be particularly useful for solving the problem.

6. Assessment criteria for this assignment:

The most important criteria for assessment are correctness and clarity. Correctness in formulation is the main criteria for evaluating your report. It is essential that you explain your formulation clearly, to enable the marker to see whether your answers are correct. Marks will be rewarded to correct reference to constraint satisfaction techniques that you have learned in the lectures and the literature. Marks will also be deducted for incorrect references.

7. Notes:

- Please be aware that the module supervisor may ask students for an interview to explain their submitted work.
- Please refer to the Student's handbook on the School's Policy on Plagiarism and Late Submission

Assignment 2, Constraint Satisfaction For Decision Making (CE884-7-SP), 2010-11
Set by Edward Tsang, University of Essex

1. Introduction:

This assignment accounts for 10% of your total marks in this course. This assignment should be submitted electronically. The deadline of this assignment is ***11:59:59, Friday 25 March 2011***. You must submit a report by the above deadline.

2. Objective:

The objective of this assignment is to test your ability to program and solve constraint satisfaction problems.

3. Your task:

You should first state the formulation that you have chosen to tackle the Round-Pound Problem, which was explained in Assignment 1. (This does not have to be the formulation that you submitted in Assignment 1.) Then your task is to write a program to solve the Round-Pounds Problems in generated by the table generator in the spreadsheet http://www.bracil.net/CSP/RoundPound/RoundPoundProblem.xlsx. The program should explain the problem solving steps clearly.

If you are unable to implement a solution, you should submit a report that explains what search techniques you would consider relevant. Explain why those techniques are relevant to solving this problem.

4. Programming language and programming platform:

You may use Prolog, Lisp, C, C++, Java, C-Sharp, Basics or Matlab for implementation. To enable me to run your program, it must run in our labs.

5. Submission requirements:

Write your name clearly on the first page of your submission. Underline your surname. Please submit electronically:

a) Your programs, in both source code and compiled code if applicable;
b) A report (preferably within one page) showing how your program should be run and output of your program. The format of the input must be clearly stated. Your program should provide information that helps others to understand how your algorithm works.

6. Assessment criteria for this assignment:

Correctness is of the highest importance. Provided that your algorithm is correct, clear explanation of the steps (through output by the program, not in the report) will be rewarded. (Imagine how you would teach constraint satisfaction techniques to someone who has never studied this subject.)

Bonus will be given to programs that can handle problems other than the one given in the assignment; to gain the bonus, you may specify the input format but the users should be allowed to input the problem.

If you are submitting a report without a program, you will be assessed by the correctness and clarity of your analysis.

7. Notes:

- Please be aware that the module supervisor may ask students for an interview to explain their submitted work.
- Please refer to the Student's handbook on the School's Policy on Plagiarism and Late Submission