

## **Intelligent Problem Solving (CC283) Assignment 1, 2008-2009**

**Set by Edward Tsang, University of Essex**

### **Introduction:**

This assignment accounts for 10% of your total marks in this Module. Deadline of the assignment is **6 February 2009 11:59:59**.

### **Objectives:**

The objective of this assignment is to test your ability to write basic Prolog programs. You should not need too much time to complete these programs.

### **Your Task:**

Given a List of numbers, e.g. [4, 5, 2, 11, 8], implement the following predicates:

sum(List, Sum)                    instantiate Sum to the sum of all the numbers in List

mean(List, Mean)                instantiate Mean to the mean of the numbers in List

minimum(List, Minimum)        instantiate Minimum to the Minimum of the numbers in List

range(List, Range)              instantiate Range to the Range of all the numbers in List

median(List, Median)            instantiate Median to the Median of all the numbers in List

### **Submission requirements:**

Programs should be submitted electronically.

### **Assessment criteria for your submission:**

Your programs will be assessed by their correctness and clarity. The programs must be self-explanatory. You may use comments to help explaining how the program works.

## Intelligent Problem Solving (CC283) Assignment 2, 2008-2009

Set by Edward Tsang, University of Essex

### Introduction:

This assignment accounts for 10% of your total marks in this Module. Deadline of the assignment is **27 February 2009 11:59:59**. Assignments must be submitted before the deadline. Following the department's policy, no marks will be awarded to late submissions. Submit whatever you have managed to achieve by the due submission date.

### Objectives:

The objective of this assignment is to test your ability to specify an algorithm for the bargaining game. No programming is required in this assignment. However, you have to *understand* the sample programs.

### The bargaining game:

The game involves a buyer and a seller. Sample buyers, sellers and a mediator will be deposited in the teaching support directory [http://www.brasil.net/Teaching/Intro\\_AI/](http://www.brasil.net/Teaching/Intro_AI/).

- (i) The seller is given a cost and the number of days within which it has to sell (DTS);
- (ii) The buyer is given a utility and the number of days within which it has to buy (DTB);
- (iii) Both the buyer and the seller know that the cost is randomly drawn from the range [101, 200], the utility is randomly drawn from the range [201, 300] and the DTS and DTB randomly drawn from the range [3, 10] *independently* (which means DTS and DTB are not necessarily the same).
- (iv) The seller does not know the buyer's utility and DTB;
- (v) The buyer does not know the seller's cost and DTS;
- (vi) The plays make alternate bids, starting with the seller;
- (vi) When both plays bid for the same price, a sale is agreed;
- (vii) If a sale cannot be agreed before any player runs out of time, the negotiation terminates; no penalty is paid by either player;
- (viii) Past bargaining is forgotten;
- (ix) The history of each negotiation is given to the player {in reverse order}, e.g.:

[+106, -106, +192, -53, +215]

The seller always goes first. In this example, the seller asked for a price of 215, the buyer offered 53, which the seller countered with 192, etc. Finally, they agreed on the price of 106.

A mediator (mediator. pig) will call a seller through the predicate seller(Cost, DTS, History, Offer) with the first three arguments instantiated. The seller/4 predicate should be defined such that Offer is instantiated to an integer value. Similarly, the buyer is called by buyer(Utility, DTB, History, Bid), and is expected to instantiate Bid to an integer.

### Your task:

Your task is to describe in words an algorithm for a buyer, a seller or both in playing the bargaining game.

### Assessment criteria for your submission:

Your assignment will be marked under the following criteria:

1. *clarity*: have you succeeded in describing your algorithm clearly
2. *effectiveness*: how strong is your strategy?

### Plagiarism:

Plagiarism will be taken seriously – please refer to the Students' Handbook. You are reminded that any material you make use of, whether it be from textbooks, the web or any other sources, must be acknowledged and the extent of the reference clearly indicated.

## Intelligent Problem Solving (CC283) Assignment 3, 2008-2009

Set by Edward Tsang, University of Essex

### Introduction:

This assignment accounts for 10% of your total marks in this Module. Deadline of the assignment is **20 March 2009 11:59:59**. Assignments must be submitted before the deadline. Following the department's policy, no marks will be awarded to late submissions. Submit whatever you have managed to achieve by the due submission date.

### Objectives:

The objective of this assignment is to test your ability to implement an algorithm in Prolog.

### Your task:

Your task is to implement in Prolog seller/3 or buyer/3 (you may implement both if you wish) for the bargaining game specified in Assignment 2. Clearly specify the algorithm that you have designed for playing the bargaining game.

### Submission requirements:

Write *your name* clearly on the first page of your assignment. *Underline your surname*. Write a report of no more than two A4 pages (figures included, font size 11), stating clearly the algorithm that you have implemented and any assumptions in your program. The format of any input must be clearly stated. Give your evaluation of (i) the efficiency and (ii) the robustness of your program. Report any limitations of your program. You should submit your program listing and a script showing the output of the program. Your script should show any information that helps others to understand how your algorithm works, and how efficient or otherwise it is. Please produce succinct output.

### Assessment criteria for your submission:

Your assignment will be marked under the following criteria:

1. *correctness*: does your program implement exactly what you described in (a)?
2. *style*: is the program easy to understand? Does it use Prolog as a logic programming language? Assert and retract should be avoided whenever possible – any use of them should be justified. You should use appropriate names for variables, predicates, procedures or functions to make the logic in the program clear. Output, if any, should be clear but concise.

### Plagiarism:

Plagiarism will be taken seriously – please refer to the Students' Handbook. You are reminded that any material you make use of, whether it be from textbooks, the web or any other sources, must be acknowledged and the extent of the reference clearly indicated.

### Competition [Optional]:

You are invited to submit your programs to a competition - at most one buyer and one seller per submission. The best buyer and the best seller will win a certificate plus a bottle of Wine. To participate in the competition, programs must be robust and generate no screen output. You may use the programs in the distribution area to test your programs in a competition. Bear in mind that the sample programs provided in the distribution area do not assume knowledge of the ranges of cost, utility and time constraints, but participants in this competition do. Programs that cause problems will be disqualified.