Constructive Artificial Intelligence Practical Session 10

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In this practical, you will practice analysing quantitative data from graphs of essential variables in a two-resource problem of a similar kind to the exercise in coursework CW2.

This practical assumes you have read through the slides and related teaching materials (papers) from Lectures 7, 8 and 9.

Exercise 1: Basic data analysis

Consider a robot with two essential (physiological) variables:

Name	Range	Fatal Limit	Ideal value
Energy	0 – 100	0	100
Damage	0 – 100	100	0

The robot was run first with controller (a), then with controller (b), in an environment with a energy resources and with hazards that could damage the robot.

- The following are descriptions of the robots' behaviour in the two runs shown in the graphs. Based on the graphs, mark the statements true or false by circling the appropriate option.
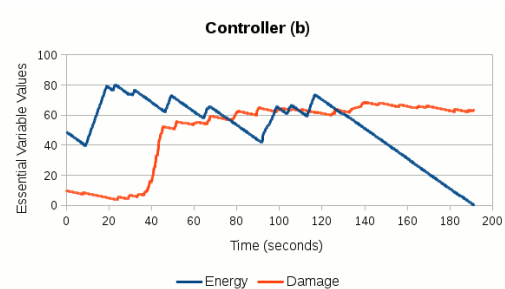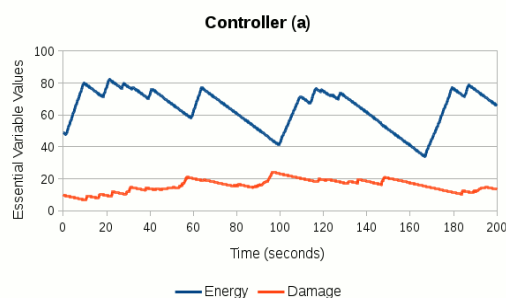
i.   The robot with controller (a) found its first energy source quicker than the robot with controller (b). **True/False**

ii.   The robot with controller (a) kept consuming the energy resource until its energy reached its ideal value.   **True/False**

iii. The robot with controller (b) kept consuming the energy resource until its energy reached its ideal value.   **True/False**

iv.   Between 70 and 100 seconds, the robot with controller (a) was consuming a resource. **True/False**

- Find two other events that the graphs of the essential variables allow you to identify.

Exercise 2: Further data analysis

Download the **single_run_controller_a.csv** file from StudyNet (Practical Session 10) and open it. It contains three columns of data giving Time, and the Energy and Damage of the robot at that time. You can open the file in Excel. The properties of the two essential variables are the same as in Exercise 1 above.

Energy and Damage are homeostatically controlled variables (open the slides from lectures 7 and 8 if you need to refresh your memory regarding the explanations provided about homeostatically controlled variables, particularly slide 14 of lecture 7, or slide 9 of lecture 8).

- Calculate the distance between the fatal limit and the actual (current) values of the energy and damage variables at 60 seconds (the distance is an absolute value, so it is always >=0).

  Distance between current value of energy and fatal limit at 60s: _____

  Distance between current value of damage and fatal limit at 60s: _____

- Using the two values calculated above, calculate the robot's wellbeing at time 60 seconds (see slides 9 and 10 from Lecture 9).

  The robot's wellbeing at 60s: _____ (to 1 decimal place)

- Now (using Excel) let us calculate the mean wellbeing for the robot during the run:

  The robot's mean wellbeing during the run: _____ (to 1 decimal place)

- Now, in pairs or small groups download the file **single_run_controller_b.csv** from StudyNet. Calculate (again using Excel) the mean wellbeing for the robot with controller (b) during its lifetime.

  The robot's mean wellbeing during its lifetime: _____ (to 1 decimal place)