Lab 7: Fuzzy Sets and Systems (Week 7)

1 – Objectives

In this work you will learn how to implement Fuzzy Systems using SciKit Fuzzy, a Fuzzy Logic Toolbox for ScyPi.

You will start by following an example to implement the "Tipping Problem" Fuzzy expert system. Then you will implement the "CPU Fan Speed Controller" used as a case study during the lectures.

2 – SciKit Fuzzy

SciKit Fuzzy is a Fuzzy Logic Toolbox for ScyPi. You can find all information about this toolbox at https://pythonhosted.org/scikit-fuzzy/.

Follow the "User Guide" in order to get familiar with the toolbox ("Getting started", "Finding your way around".

3 – The Tipping Problem

The SciKit user guide also includes an example of how to implement a fuzzy expert system. The description of the example is at https://pythonhosted.org/scikit-fuzzy/userguide/fuzzy_control_primer.html.

There are two tutorials with different ways to implement the example. Check both and implement the code in one of the examples. Experience how the Fuzzy system works:

- https://pythonhosted.org/scikit-fuzzy/auto_examples/plot_tipping_problem.html#example-plot-tipping-problem-py
- https://pythonhosted.org/scikit-fuzzy/auto_examples/plot_tipping_problem_newapi.html#example-plot-tipping-problem-newapi-py

The next step should be following the example in https://pythonhosted.org/scikit-fuzzy/auto_examples/plot_control_system_advanced.html#example-plot-control-system-advanced-py, which shows how you can use matplotlib to generate 3D plots of the output of a fuzzy system.

4 – CPU Fan Speed Controller

Based on the previous examples, implement the "CPU Fan Speed Controller" used as a case study during the lectures (see the slides 6-CI_IoT_Fuzzy_Sets_Systems pages 90-104).

5 – Report

Send a pdf with the code you developed in section 4. and the plots you think are relevant to show the system you developed. This task is optional but will be used as a bonus in your final grade. Send the pdf before Tuesday, May 4th to:

joao.paulo.carvalho@tecnico.ulisboa.pt