Lab of Applied Computational Intelligence (CInte)

IST

2021/2022

Fuzzy Sets and Systems

Guide 6

October, 7th, 2022

(Week 3.2)

1 – Objectives

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

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 (before going to the lab)

SciKit Fuzzy is a Fuzzy Logic Toolbox for SciKit. 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 5-ACI_ Fuzzy_Sets_Systems, section "Fuzzy Systems Implementation"). Try to tune the proposed system by adding an extra membership function to the Fan Speed variable. Check how it affects the output by generating 3D plots.