

Simulated Annealing

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I. ABSTRACT

This paper will be about how fuzzy logic can be implemented for making decision, using a python script that is able to make a choice based in the inputs that it receives, giving as result the action that must be done. The purpose is to show how to implement the logic inside fuzzy logic and predict actions to take.

keywords: fuzzy logic, python, script, program, artificial intelligence

II. INTRODUCTION

This work intends to solve a problem of decision making in a smart AC which needs to decide whether to heat up or cool down a room based in two parameters that are known, whether it's by user input or sensor input; these parameters are: temperature and humidity.

The program will decide and will show the choice it has made, so the user can verify if it's the right choice or not.

It's based in some rules that say when to heat up and when to cool down the temperature of the room, these rules are given in a table that will be show later in this document. The programing language used is python, and some modules have been used too (numpy and skfuzzy) that help a lot implementing this method, it's contained in sickit-learn.

III. THEORY

It is a method emulates human reasoning, by making decision further than binary choices, it takes intermediate possibilities between values like 1 and 0, yes and no.

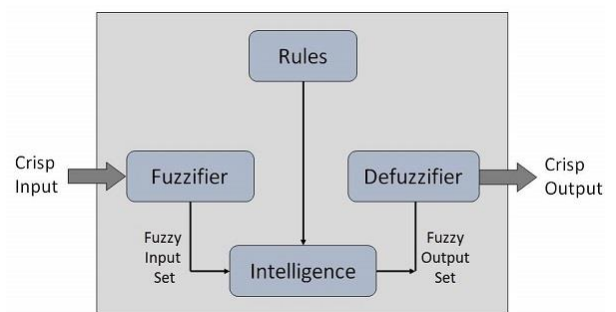
This method has multilevel choices, like

Too low	Low	Medium	High	Too High
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According to this, the program will make its decision based on this levels, like this is the "choices fan".

Fuzzy logic is useful for commercial and practical purposes, as it can control machines and consumer products, it gives acceptable reasoning and it helps to deal with uncertainty in engineering.

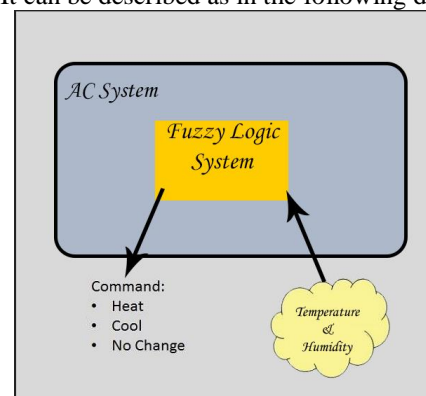
IV. STEPS



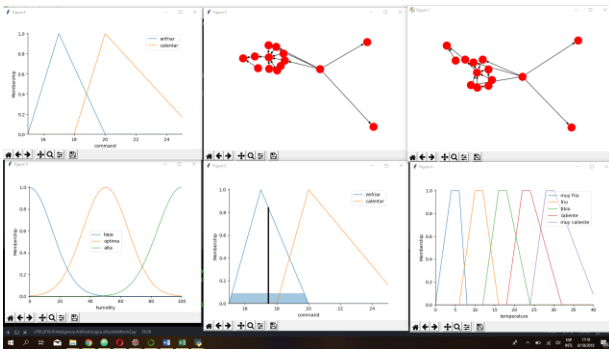
It takes a crisp input, and it *fuzzifies* the input in order to work with it, then it applies the given rules for making the decision, and finally it *defuzzifies* the result to give a clean and crisp output, friendly to the user, what makes it easier to understand.

V. AC SYSTEM

This workshop was intended to code a program that controls the temperature of an air conditioning system, and it takes two parameters to adjust the temperature (temperature and humidity) then it takes a decision and gives an action as output. It can be described as in the following diagram:



VI. RESULT



For testing, I've insert as input temperature=40 and humidity=0, and has given the output above. The main graphic is the one in the middle of the second row, it shows the temperature the AC has to adjust the room temperature.

VII. CONCLUSION

The fuzzy logic can improve a lot the way we program machines to make decision and help us doing tasks while taking the right actions, for example in this occasion the actions are based in fuzzy data that determines the approximate temperature of a room and the humidity, we can notice that the algorithm decides to heat up or cool down or in some cases, just doing nothing to the temperature.

VIII. REFERENCES

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- [3] https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_fuzzy_logic_systems.htm