AEEM 5197/6097 "Soft Computing Based AI" or AEEM 7010: Prof. Kelly Cohen - Fall 2019

Project P#1

For this project, you will develop a Fuzzy Inference System to approximate the following function $F(x,y) = \sin(x).\cos(y)$ for the range $x,y \in [-\pi, \pi]$.

Note $F(x,y)$ is a 2 input one output system) and (surprise!) you **MUST** to determine the rules and membership using a Genetic Algorithm.

Further requirements

➡ Use a dataset is created consisting of 1280 data points is used for training and 320 used for validation

➡ You may choose x and y values randomly within the range $x,y \in [-\pi, \pi]$ along with their corresponding $F(x,y)$ to serve as your data points

- Define your problem in detail including: the state variables of interest, from those – which might be useful as measures in a fitness function, and finally, a preliminary form of the fitness function that best describes the desired performance of the system.

- Define your Fuzzy system in detail including: the input and output variables for your fuzzy system, the likely choices for membership function properties, and the defuzzification method.

- Write a summary on why a Genetic Fuzzy System is a good option for finding a solution to it, and why the characteristics you've chosen for your system are likely to lead to good results. What are your observations and lessons learned (At least 2 pages)

The function $F(x,y) = \sin(x).\cos(y)$ looks like follows: