Lab Experiment 10: Fuzzy Inference System

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import numpy as np

import skfuzzy as fuzz

from skfuzzy import control as ctrl

experience = ctrl.Antecedent(np.arange(0, 21, 1), 'experience')

success\_rate = ctrl.Antecedent(np.arange(0, 101, 1), 'success\_rate')

performance = ctrl.Consequent(np.arange(0, 101, 1), 'performance')

experience['low'] = fuzz.trimf(experience.universe, [0, 0, 10])

experience['medium'] = fuzz.trimf(experience.universe, [5, 10, 15])

experience['high'] = fuzz.trimf(experience.universe, [10, 20, 20])

success\_rate['low'] = fuzz.trimf(success\_rate.universe, [0, 0, 50])

success\_rate['medium'] = fuzz.trimf(success\_rate.universe, [25, 50, 75])

success\_rate['high'] = fuzz.trimf(success\_rate.universe, [50, 100, 100])

performance['poor'] = fuzz.trimf(performance.universe, [0, 0, 50])

performance['average'] = fuzz.trimf(performance.universe, [25, 50, 75])

performance['excellent'] = fuzz.trimf(performance.universe, [50, 100, 100])

rule1 = ctrl.Rule(experience['low'] & success\_rate['low'], performance['poor'])

rule2 = ctrl.Rule(experience['medium'] | success\_rate['medium'], performance['average'])

rule3 = ctrl.Rule(experience['high'] & success\_rate['high'], performance['excellent'])

rule4 = ctrl.Rule(experience['medium'] & success\_rate['high'], performance['excellent'])

rule5 = ctrl.Rule(experience['high'] & success\_rate['medium'], performance['average'])

performance\_ctrl = ctrl.ControlSystem([rule1, rule2, rule3, rule4, rule5])

performance\_sim = ctrl.ControlSystemSimulation(performance\_ctrl)

performance\_sim.input['experience'] = 12

performance\_sim.input['success\_rate'] = 70

performance\_sim.compute()

print(f"Predicted Performance Score: {performance\_sim.output['performance']:.2f}")

