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Source code:

```
import numpy as np
import skfuzzy as fuzz
from skfuzzy import control as ctrl

# New Antecedent/Consequent objects hold universe variables and membership
# functions
Cholesterol= ctrl.Antecedent(np.arange(0, 500), 'Cholesterol')
Blood_pressure= ctrl.Antecedent(np.arange(0, 200), 'Blood_pressure')
Age= ctrl.Antecedent(np.arange(0, 70), 'Age')
smoking= ctrl.Antecedent(np.arange(0, 1), 'smoking')
BMI= ctrl.Antecedent(np.arange(0, 50), 'BMI')
Diabetes= ctrl.Antecedent(np.arange(0, 400), 'Diabetes')
result = ctrl.Consequent(np.arange(0, 4), 'result')

# Auto-membership function population is possible with .automf(3, 5, or 7)
Cholesterol.automf(3)
Blood_pressure.automf(3)
Age.automf(3)
smoking.automf(3)
BMI.automf(3)
Diabetes.automf(3)

# Custom membership functions can be built interactively with a familiar,

result['healthy'] = fuzz.trapmf(result.universe, [0, 0, 0.4, 1.7])
result['Early_stage'] = fuzz.trimf(result.universe, [1.5, 2, 2.5])
result['Advanced_stage'] = fuzz.trapmf(result.universe, [2.4,3, 4, 4])
Cholesterol.view()
Blood_pressure.view()
Age.view()
smoking.view()
BMI.view()
Diabetes.view()
result.view()

Cholesterol['normal'] = fuzz.trapmf (Cholesterol.universe, [0, 0, 60, 200])
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```
Cholesterol['medium'] = fuzz.trimf (Cholesterol.universe, [190, 210, 250])
Cholesterol['high'] = fuzz.trimf (Cholesterol.universe, [230, 275, 320])
Cholesterol['very high'] = fuzz.trapmf (Cholesterol.universe, [280, 370, 500, 500])

Blood_pressure['normal'] = fuzz.trapmf (Blood_pressure.universe, [0, 0, 79, 130])
Blood_pressure['medium'] = fuzz.trimf (Blood_pressure.universe, [120, 140, 159])
Blood_pressure['high'] = fuzz.trapmf (Blood_pressure.universe, [150, 160, 200, 200])

smoking['false'] = fuzz.trapmf (smoking.universe, [0, 0, 0.5, 0.6])
smoking['true'] = fuzz.trapmf (smoking.universe, [0.5, 0.6, 1, 1])

Age['young'] = fuzz.trapmf (Age.universe, [0, 0, 25, 38])
Age['middle age'] = fuzz.trimf (Age.universe, [34, 40, 45])
Age['old'] = fuzz.trimf (Age.universe, [40, 50, 58])
Age['very old'] = fuzz.trapmf (Age.universe, [53, 60, 75, 75])

BMI['normal'] = fuzz.trapmf (BMI.universe, [0, 0, 12, 25])
BMI['over weight'] = fuzz.trimf (BMI.universe, [24, 27, 32])
BMI['obese'] = fuzz.trapmf (BMI.universe, [30, 42, 50, 50])


Diabetes['normal'] = fuzz.trimf (Diabetes.universe, [0, 75, 160])
Diabetes['diabetic'] = fuzz.trimf (Diabetes.universe, [145, 250, 400])

rule1 = ctrl.Rule(Cholesterol['normal']     & Blood_pressure['normal']     & Age['young']
& smoking['false']   & BMI['normal']      & Diabetes['diabetic']  ,result['healthy'])
rule2 = ctrl.Rule(Cholesterol['high']       & Blood_pressure['high']       & Age['old']          &
smoking['false']   & BMI['normal']      & Diabetes['diabetic']  ,result['healthy'])
rule3 = ctrl.Rule(Cholesterol['normal']     & Blood_pressure['high']       & Age['very old']     &
smoking['false']   & BMI['obese']       & Diabetes['diabetic']  ,result['healthy'])
rule4 = ctrl.Rule(Cholesterol['high']       & Blood_pressure['high']       & Age['very old' ]    &
smoking['true']    & BMI['obese']       & Diabetes['normal']    ,result['Early_stage'])
rule5 = ctrl.Rule(Cholesterol['very high']  & Blood_pressure['normal']     & Age['very old']
& BMI['over weight']  & Diabetes['normal']    ,result['Early_stage'])
rule6 = ctrl.Rule(Cholesterol['very high']  & Blood_pressure['high']       & Age['very old']     &
smoking['true']    & BMI['obese']       & Diabetes['normal']    ,result['Advanced_stage'])
rule7 = ctrl.Rule(Cholesterol['very high']  & Blood_pressure['high']       & Age['old']          &
smoking['false']   & BMI['obese']       & Diabetes['normal']    ,result['Advanced_stage'])
rule8 = ctrl.Rule(Cholesterol['very high']  & Blood_pressure['high']       & Age['very old']     &
smoking['false']   & BMI['normal']      & Diabetes['normal']    ,result['Advanced_stage'])

rule1.view()
rule2.view()
rule3.view()
rule4.view()
rule5.view()
rule6.view()
rule7.view()
```

```
rule8.view()

res_ctrl = ctrl.ControlSystem([rule1, rule2, rule3, rule4 ,rule5 , rule6, rule7, rule8])
res = ctrl.ControlSystemSimulation(res_ctrl)
res.input['Cholesterol'] = 100
res.input['Blood_pressure'] = 170
res.input['Age'] = 73
res.input['smoking'] = 0
res.input['BMI'] = 37
res.input['Diabetes'] = 219


res.compute()
print("Result = ", res.output['result'])
result.view(sim=res)
```