```
!pip install scikit-fuzzy
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Collecting scikit-fuzzy
  Downloading scikit_fuzzy-0.5.0-py2.py3-none-any.whl.metadata (2.6 kB)
Downloading scikit_fuzzy-0.5.0-py2.py3-none-any.whl (920 kB)
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Installing collected packages: scikit-fuzzy
Successfully installed scikit-fuzzy-0.5.0
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```
import numpy as np
import skfuzzy as fuzz
from skfuzzy import control as ctrl
import matplotlib.pyplot as plt

# Input variables
temperature = ctrl.Antecedent(np.arange(15, 41, 1), 'temperature')
humidity = ctrl.Antecedent(np.arange(20, 101, 1), 'humidity')

# Output variable
fan_speed = ctrl.Consequent(np.arange(0, 101, 1), 'fan_speed')

# Membership functions for temperature
temperature['dingin'] = fuzz.trapmf(temperature.universe, [15, 15, 20, 24])
temperature['nyaman'] = fuzz.trimf(temperature.universe, [22, 26, 30])
temperature['panas'] = fuzz.trapmf(temperature.universe, [28, 32, 40, 40])

# Membership functions for humidity
humidity['kering'] = fuzz.trapmf(humidity.universe, [20, 20, 30, 45])
humidity['normal'] = fuzz.trimf(humidity.universe, [35, 50, 65])
humidity['lembab'] = fuzz.trapmf(humidity.universe, [55, 70, 100, 100])

# Membership functions for fan speed
fan_speed['mati'] = fuzz.trimf(fan_speed.universe, [0, 0, 25])
fan_speed['rendah'] = fuzz.trimf(fan_speed.universe, [0, 25, 50])
fan_speed['sedang'] = fuzz.trimf(fan_speed.universe, [25, 50, 75])
fan_speed['tinggi'] = fuzz.trimf(fan_speed.universe, [50, 75, 100])
fan_speed['maksimal'] = fuzz.trimf(fan_speed.universe, [75, 100, 100])

# Visualisasi fungsi keanggotaan
temperature.view()
humidity.view()
fan_speed.view()

# Aturan fuzzy utama
rule1 = ctrl.Rule(temperature['dingin'] & humidity['kering'], fan_speed['mati'])
rule2 = ctrl.Rule(temperature['dingin'] & humidity['normal'], fan_speed['rendah'])
rule3 = ctrl.Rule(temperature['dingin'] & humidity['lembab'], fan_speed['rendah'])
rule4 = ctrl.Rule(temperature['nyaman'] & humidity['kering'], fan_speed['rendah'])
rule5 = ctrl.Rule(temperature['nyaman'] & humidity['normal'], fan_speed['sedang'])
rule6 = ctrl.Rule(temperature['nyaman'] & humidity['lembab'], fan_speed['tinggi'])
rule7 = ctrl.Rule(temperature['panas'] & humidity['kering'], fan_speed['tinggi'])
rule8 = ctrl.Rule(temperature['panas'] & humidity['normal'], fan_speed['tinggi'])
rule9 = ctrl.Rule(temperature['panas'] & humidity['lembab'], fan_speed['maksimal'])

# Aturan tambahan (tidak menggunakan: panas DAN lembab)
rule10 = ctrl.Rule(temperature['nyaman'] & humidity['kering'], fan_speed['rendah'])

# Sistem kontrol
ac_ctrl = ctrl.ControlSystem([rule1, rule2, rule3, rule4, rule5, rule6, rule7, rule8, rule9, rule10])
ac = ctrl.ControlSystemSimulation(ac_ctrl)

# Input suhu dan kelembaban
ac.input['temperature'] = 22   # Perubahan: suhu 22°C
ac.input['humidity'] = 75      # Kelembaban tinggi (lembab)

# Hitung output
ac.compute()

# Cetak hasil
print(f"Untuk suhu 22°C dan kelembaban 75%, kecepatan kipas AC: {ac.output['fan_speed']:.2f}%")

# Visualisasi hasil output
fan_speed.view(sim=ac)
plt.show()

# Penjelasan:
# - Suhu 22°C termasuk dalam kategori 'nyaman' (dengan derajat keanggotaan rendah)
# - Kelembaban 75% termasuk 'lembab'
# - Rule yang aktif: 'nyaman' & 'lembab' => fan_speed 'tinggi'
# - Namun karena suhu hanya sedikit masuk kategori 'nyaman', maka fan_speed tidak akan setinggi jika suhu 26–30°C
```

```
# Suhu 28°C memiliki keanggotaan di dua kategori ("nyaman" dan "panas") karena sifat logika fuzzy.
#
# Fungsi keanggotaan suhu:
# - temperature['nyaman'] = [22, 26, 30] -> bentuk segitiga
# - temperature['panas'] = [28, 32, 40, 40] -> bentuk trapesium
#
# Pada suhu 28°C:
# - Masih berada di sisi kanan segitiga "nyaman", jadi derajat keanggotaan > 0
# - Juga berada di sisi kiri trapesium "panas", jadi juga punya derajat keanggotaan > 0
#
# Inilah yang disebut overlapping membership, dan memungkinkan satu nilai suhu dikategorikan lebih dari satu kondisi sekaligus.
```

```
Untuk suhu 22°C dan kelembaban 75%, kecepatan kipas AC: 25.00%
```