



YAYASAN SASMITA JAYA

# UNIVERSITAS PAMULANG

SK MENDIKNAS NO.136/D/0/2001



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Semester/Kode Kelas	: 05TPLE017	Nilai	: .....
Program Studi	: TEKNIK INFORMATIKA		

## LEMBAR JAWABAN

- Implementasi Fuzzy, dalam bentuk program dan slide seperti yang dicontohkan pada perkuliahan!  
Variabel, himpunan fuzzy dan rule dibuat dengan ketentuan sbb:
  - Nim berakhiran (0):
    - Sistem Penentuan Diskon di Toko Online
    - Buat sistem yang menentukan tingkat diskon berdasarkan parameter seperti jumlah pembelian dan frekuensi pelanggan.

### Definisi Sistem Fuzzy Penentuan Diskon di Toko Online

#### Variabel Input:

- Jumlah Pembelian (Rp)**
  - Rendah:** 0 - 500.000
  - Sedang:** 400.000 - 1.000.000
  - Tinggi:** 800.000 ke atas
- Frekuensi Belanja (kali per bulan)**
  - Jarang:** 0 - 3 kali
  - Sedang:** 2 - 6 kali
  - Sering:** 5 kali ke atas

#### Variabel Output: Diskon (%)

- Kecil:** 0 - 10%
- Sedang:** 5 - 20%
- Besar:** 15 - 50%

#### Fuzzy Rule:

- IF** Jumlah Pembelian **Rendah** AND Frekuensi Belanja **Jarang**, **THEN** Diskon **Kecil**.
- IF** Jumlah Pembelian **Rendah** AND Frekuensi Belanja **Sering**, **THEN** Diskon **Sedang**.
- IF** Jumlah Pembelian **Tinggi** AND Frekuensi Belanja **Sering**, **THEN** Diskon **Besar**.
- IF** Jumlah Pembelian **Sedang** AND Frekuensi Belanja **Sedang**, **THEN** Diskon **Sedang**.
- IF** Jumlah Pembelian **Tinggi** AND Frekuensi Belanja **Jarang**, **THEN** Diskon **Sedang**.

**Sistem menggunakan : Google Collaboration**

```
import numpy as np
import skfuzzy as fuzz
from skfuzzy import control as ctrl
import matplotlib.pyplot as plt

# Definisi variabel fuzzy
jumlah_pembelian = ctrl.Antecedent(np.arange(0, 2001, 1), 'jumlah_pembelian')
frekuensi_belanja = ctrl.Antecedent(np.arange(0, 11, 1), 'frekuensi_belanja')
diskon = ctrl.Consequent(np.arange(0, 51, 1), 'diskon')

# Fungsi keanggotaan
jumlah_pembelian['rendah'] = fuzz.trapmf(jumlah_pembelian.universe, [0, 0, 200, 500])
jumlah_pembelian['sedang'] = fuzz.trimf(jumlah_pembelian.universe, [400, 800, 1000])
jumlah_pembelian['tinggi'] = fuzz.trapmf(jumlah_pembelian.universe, [800, 1500, 2000, 2000])

frekuensi_belanja['jarang'] = fuzz.trapmf(frekuensi_belanja.universe, [0, 0, 2, 3])
frekuensi_belanja['sedang'] = fuzz.trimf(frekuensi_belanja.universe, [2, 5, 6])
frekuensi_belanja['sering'] = fuzz.trapmf(frekuensi_belanja.universe, [5, 7, 10, 10])

diskon['kecil'] = fuzz.trapmf(diskon.universe, [0, 0, 5, 10])
diskon['sedang'] = fuzz.trimf(diskon.universe, [5, 15, 20])
diskon['besar'] = fuzz.trapmf(diskon.universe, [15, 30, 50, 50])

# Aturan fuzzy
rule1 = ctrl.Rule(jumlah_pembelian['rendah'] & frekuensi_belanja['jarang'], diskon['kecil'])
rule2 = ctrl.Rule(jumlah_pembelian['rendah'] & frekuensi_belanja['sering'], diskon['sedang'])
rule3 = ctrl.Rule(jumlah_pembelian['tinggi'] & frekuensi_belanja['sering'], diskon['besar'])
rule4 = ctrl.Rule(jumlah_pembelian['sedang'] & frekuensi_belanja['sedang'], diskon['sedang'])
rule5 = ctrl.Rule(jumlah_pembelian['tinggi'] & frekuensi_belanja['jarang'], diskon['sedang'])
rule6 = ctrl.Rule(jumlah_pembelian['sedang'] & frekuensi_belanja['jarang'], diskon['kecil'])
rule7 = ctrl.Rule(jumlah_pembelian['rendah'] & frekuensi_belanja['sedang'], diskon['kecil'])
rule8 = ctrl.Rule(jumlah_pembelian['tinggi'] & frekuensi_belanja['sedang'], diskon['besar'])

# Sistem kontrol fuzzy
fuzzy_discount_ctrl = ctrl.ControlSystem([rule1, rule2, rule3, rule4, rule5, rule6, rule7, rule8])
fuzzy_discount = ctrl.ControlSystemSimulation(fuzzy_discount_ctrl)
```

The screenshot displays a Google Colab notebook interface. The top part shows the code editor with the following Python code:

```
# Input data
fuzzy_discount.input['jumlah_pembelian'] = 750
fuzzy_discount.input['frekuensi_belanja'] = 4

# Komputasi fuzzy
fuzzy_discount.compute()

# Hasil diskon
print(f"Diskon yang diberikan: {fuzzy_discount.output['diskon']:.2f}%")

# Plot fungsi keanggotaan
jumlah_pembelian.view()
frekuensi_belanja.view()
diskon.view()

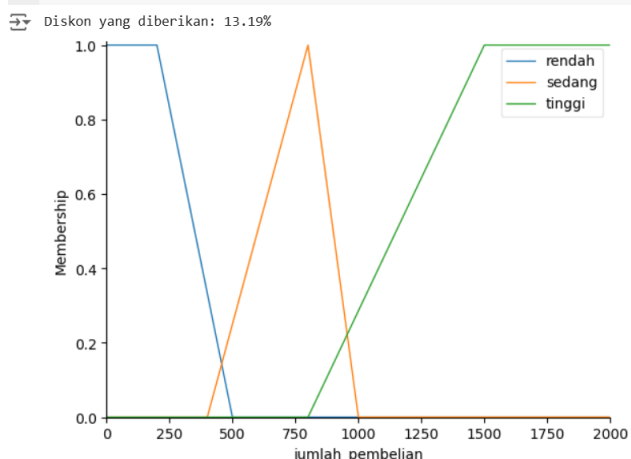
# Plot hasil akhir
diskon.view(sim=fuzzy_discount)
plt.show()
```

The bottom part of the notebook shows the output of the code. It includes a text output: "Diskon yang diberikan: 13.19%". Below this is a plot titled "bership" (membership) on the y-axis, ranging from 0.6 to 1.0. The x-axis represents the input values. The plot shows three fuzzy membership functions: "rendah" (blue line), "sedang" (orange line), and "tinggi" (green line). The "rendah" function is a trapezoid starting at 1.0 and decreasing. The "sedang" function is a triangle peaking at 1.0. The "tinggi" function is a trapezoid starting at 0.6 and increasing to 1.0. The output value of 13.19% is the result of the fuzzy inference process.

```
print(f"Diskon yang diberikan: {fuzzy_discount.output['diskon']:.2f}%")

# Plot fungsi keanggotaan
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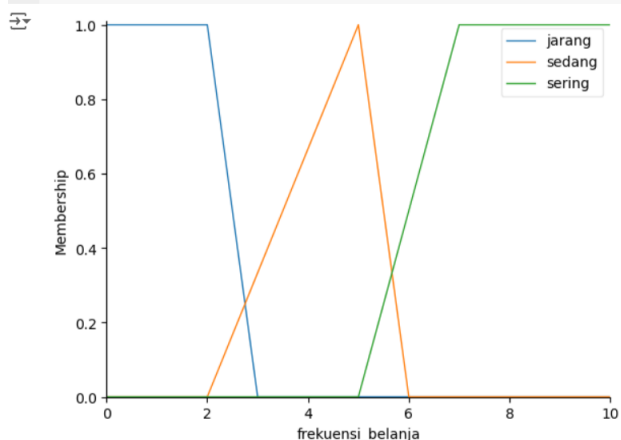
# Plot hasil akhir
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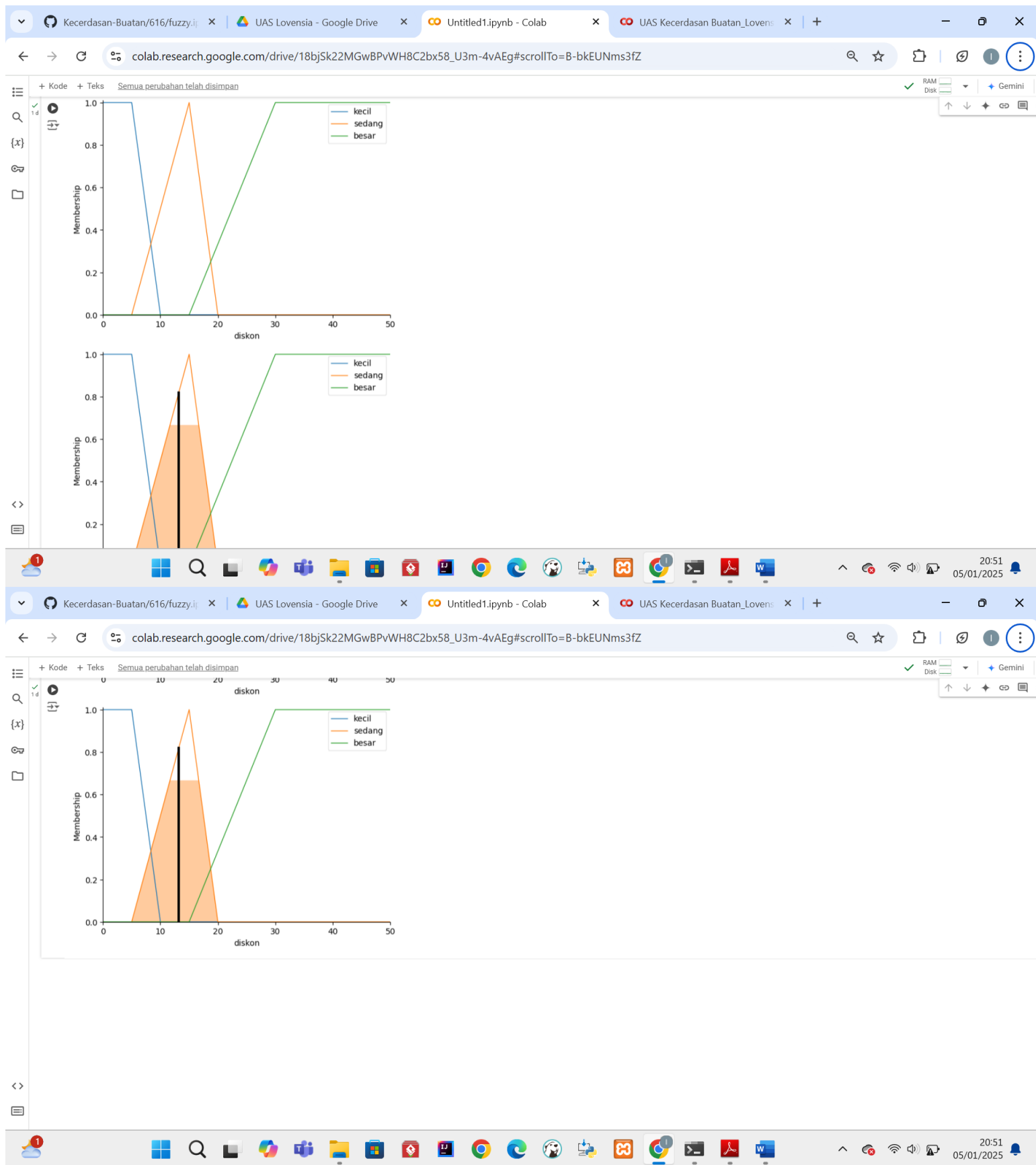


```
print(f"Diskon yang diberikan: {fuzzy_discount.output['diskon']:.2f}%")

# Plot fungsi keanggotaan
jumlah_pembelian.view()
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diskon.view()

# Plot hasil akhir
diskon.view(sim=fuzzy_discount)
plt.show()
```





**Jumlah Diskon yang didapatkan : 13.19%**

## Source Code :

```
import numpy as np
import skfuzzy as fuzz
from skfuzzy import control as ctrl
import matplotlib.pyplot as plt

# Definisi variabel fuzzy
jumlah_pembelian = ctrl.Antecedent(np.arange(0, 2001, 1), 'jumlah_pembelian')
frekuensi_belanja = ctrl.Antecedent(np.arange(0, 11, 1), 'frekuensi_belanja')
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jumlah_pembelian['tinggi'] = fuzz.trapmf(jumlah_pembelian.universe, [800, 1500, 2000, 2000])

frekuensi_belanja['jarang'] = fuzz.trapmf(frekuensi_belanja.universe, [0, 0, 2, 3])
frekuensi_belanja['sedang'] = fuzz.trimf(frekuensi_belanja.universe, [2, 5, 6])
frekuensi_belanja['sering'] = fuzz.trapmf(frekuensi_belanja.universe, [5, 7, 10, 10])

diskon['kecil'] = fuzz.trapmf(diskon.universe, [0, 0, 5, 10])
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# Aturan fuzzy
rule1 = ctrl.Rule(jumlah_pembelian['rendah'] & frekuensi_belanja['jarang'], diskon['kecil'])
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rule4 = ctrl.Rule(jumlah_pembelian['sedang'] & frekuensi_belanja['sedang'], diskon['sedang'])
rule5 = ctrl.Rule(jumlah_pembelian['tinggi'] & frekuensi_belanja['jarang'], diskon['sedang'])
rule6 = ctrl.Rule(jumlah_pembelian['sedang'] & frekuensi_belanja['jarang'], diskon['kecil'])
rule7 = ctrl.Rule(jumlah_pembelian['rendah'] & frekuensi_belanja['sedang'], diskon['kecil'])
rule8 = ctrl.Rule(jumlah_pembelian['tinggi'] & frekuensi_belanja['sedang'], diskon['besar'])

# Sistem kontrol fuzzy
fuzzy_discount_ctrl = ctrl.ControlSystem([rule1, rule2, rule3, rule4, rule5, rule6, rule7, rule8])
fuzzy_discount = ctrl.ControlSystemSimulation(fuzzy_discount_ctrl)

# Input data
fuzzy_discount.input['jumlah_pembelian'] = 750
fuzzy_discount.input['frekuensi_belanja'] = 4

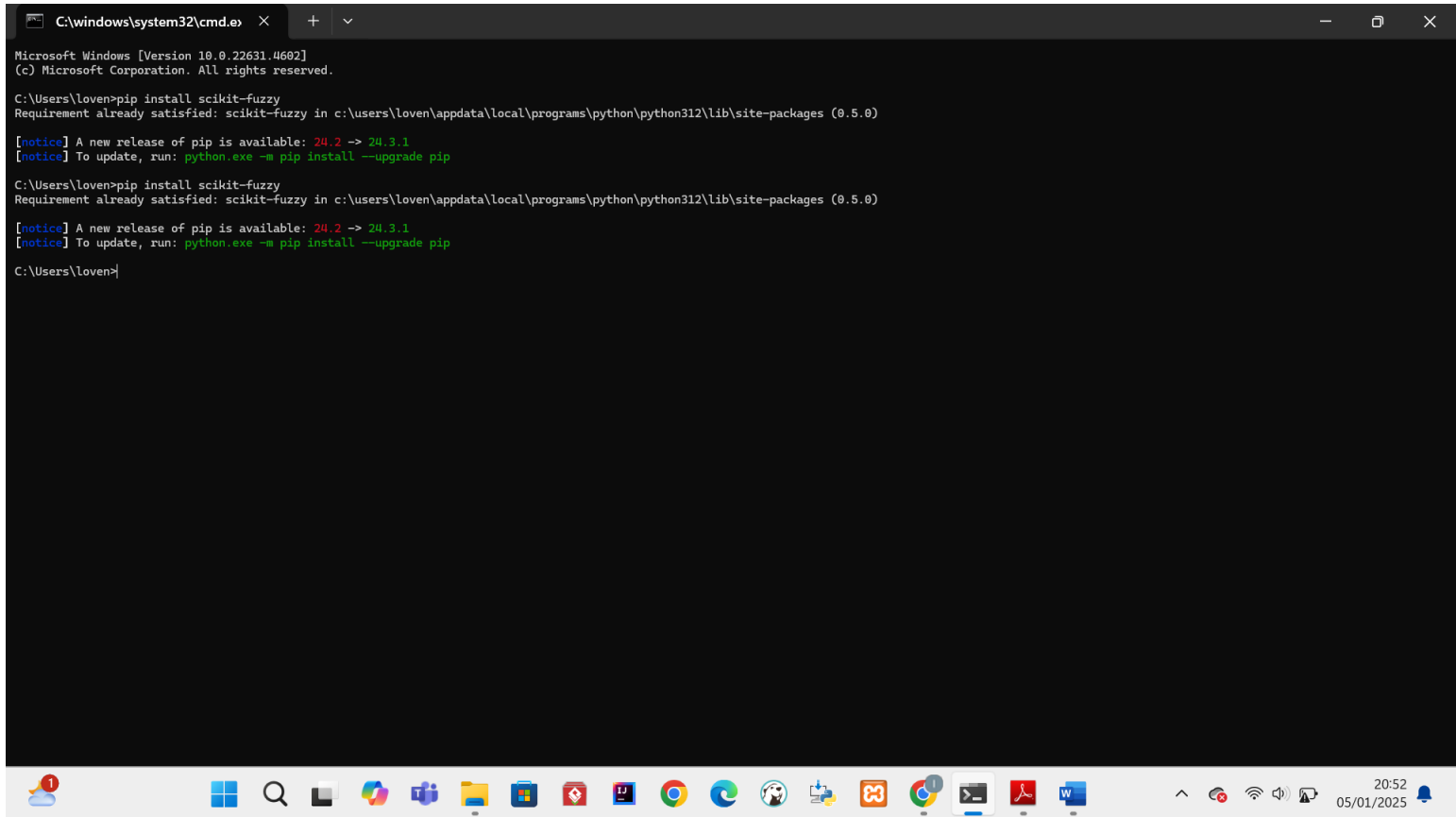
# Komputasi fuzzy
fuzzy_discount.compute()

# Hasil diskon
print(f"Diskon yang diberikan: {fuzzy_discount.output['diskon']:.2f}%")

# Plot fungsi keanggotaan
jumlah_pembelian.view()
frekuensi_belanja.view()
diskon.view()
```

```
# Plot hasil akhir  
diskon.view(sim=fuzzy_discount)  
plt.show()
```

**Note : INSTALL scikit-fuzzy lebih dulu pada cmd**



```
C:\windows\system32\cmd.exe  
Microsoft Windows [Version 10.0.22631.4682]  
(c) Microsoft Corporation. All rights reserved.  
  
C:\Users\loven>pip install scikit-fuzzy  
Requirement already satisfied: scikit-fuzzy in c:\users\loven\appdata\local\programs\python\python312\lib\site-packages (0.5.0)  
  
[notice] A new release of pip is available: 24.2 -> 24.3.1  
[notice] To update, run: python.exe -m pip install --upgrade pip  
  
C:\Users\loven>pip install scikit-fuzzy  
Requirement already satisfied: scikit-fuzzy in c:\users\loven\appdata\local\programs\python\python312\lib\site-packages (0.5.0)  
  
[notice] A new release of pip is available: 24.2 -> 24.3.1  
[notice] To update, run: python.exe -m pip install --upgrade pip  
  
C:\Users\loven>
```

**LINK GITHUB :**

[https://github.com/lovencatrin/UAS-Kecerdasan-Buatan\\_Lovensia-Catherine\\_221011400850](https://github.com/lovencatrin/UAS-Kecerdasan-Buatan_Lovensia-Catherine_221011400850)