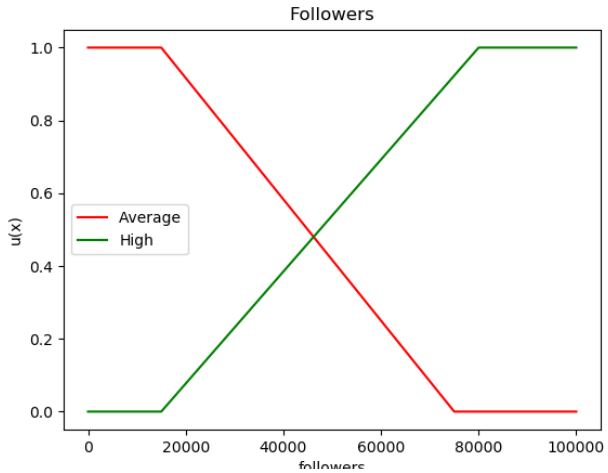
ARTIFICIAL INTELEGENCE
REPORT TASK 3
"FUZZY SYSTEM"

Mamdani method is used to complete this task. In this program, parameters used are membership function of follower,engagement rate and eligibility and the inference rule. However those parameters will be used in the following process:

1. Fuzzyfication

Membership functions

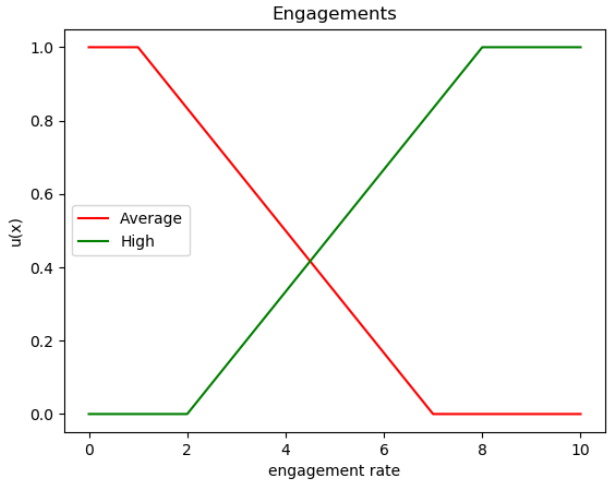


-Average

$$\mu(x) = \begin{cases} 1, & x \leq 15000 \\ 0, & x > 70000 \\ \dfrac{70000 - x}{70000 - 15000}, & 15000 \leq x < 70000 \end{cases}$$

-High

$$\mu(x) = \begin{cases} 1, & x \geq 70000 \\ 0, & x < 15000 \\ \dfrac{x - 15000}{70000 - 15000}, & 15000 \leq x < 70000 \end{cases}$$



-Average

$$\mu(x) = \begin{cases} 1, & x \leq 1 \\ 0, & x > 7 \\ \dfrac{7 - x}{7 - 1}, & 1 \leq x < 7 \end{cases}$$

-High

$$\mu(x) = \begin{cases} 1, & x \geq 7 \\ 0, & x < 2 \\ \dfrac{x - 2}{7 - 2}, & 2 \leq x < 7 \end{cases}$$

2. Inference

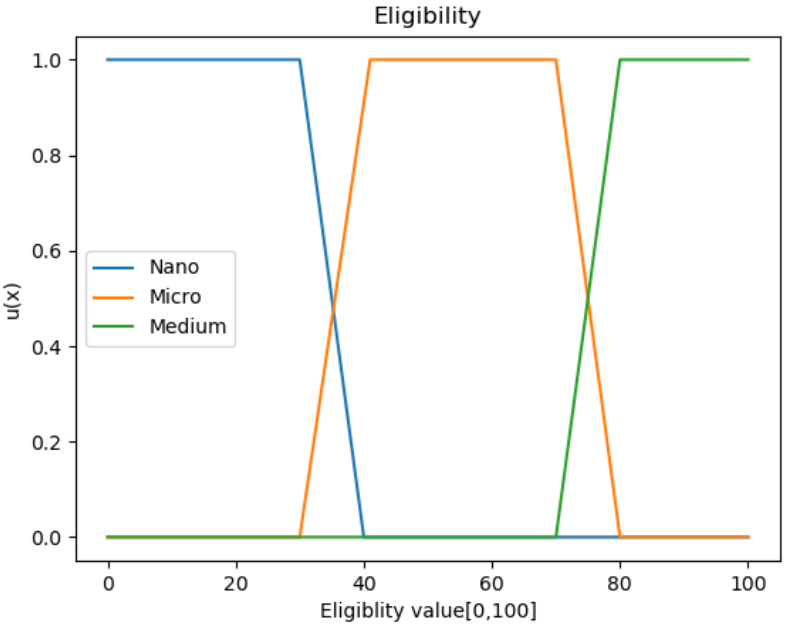
Inference Rule used in this program can be seen in the table below:

Followers/Engagement	Average	High
Average	Nano	Micro
High	Micro	Medium

Means that, if we have the fuzzy value:
IF Followers(Average(…))AND Engagement(Average(…))THEN Influencers(Nano(…))
IF Followers(Average(…))AND Engagement(High(…)) THEN Influencers(Micro(…))
IF Followers(High(…)) AND Engagement(Average(…)) THEN Influencers(Micro(…))
IF Followers(High(…)) AND Engagement(High(…)) THEN Influencers(Medium(...))

3. Deffuzzification

Membership functions



Defuzzyfication method in Mamdani-style using center of gravity. Formula center of gravity:

$$z^* = \frac{\sum_{i=1}^{l} \mu B_i .\ c_i}{\sum_{i=1}^{l} \mu B_i}$$

$i = \text{i}^{\text{th}}$ number [0,100]
$\mu\text{B}(i) = \text{membership for i}^{\text{th}}$ number

Result
Choosing the top 20 with the biggest eligibility(z*) of influencers. The results will show how fuzzy system can decide the biggest top 20 influencers by using parameters that has shown above.
How its looks like in terminal and csv file:
Order of columns(index,id,Followers,Engagement,Eligibility)

```
     id  followerCount  engagementRate  Eligibility
12   13          90773             6.7    82.378641
10   11          95117             6.6    81.538462
40   41          81909             3.6    62.164179
74   75          94551             3.0    59.285714
24   25          77585             2.7    57.937063
38   39           9890             9.4    55.000000
99  100          15788             6.8    54.189189
47   48          19925             6.5    52.931034
73   74          22394             6.3    52.062937
58   59          58987             6.7    51.669072
1     2          38237             5.8    49.638429
92   93          27657             5.5    48.333333
18   19          55217             4.9    43.000000
60   61          53701             4.5    43.000000
71   72          61456             4.6    43.000000
59   60          58403             5.2    43.000000
52   53          56257             3.2    39.696677
33   34          10953             3.9    39.369748
27   28           9828             3.7    38.076923
4     5          15530             3.5    36.739130
PS C:\Users\deffri>
```

```
,id,followerCount,engagementRate,Eligibility
12,13,90773,6.7,82.37864077669903
10,11,95117,6.6,81.53846153846152
40,41,81909,3.6,62.16417910447761
74,75,94551,3.0,59.285714285714285
24,25,77585,2.7,57.93706293706294
38,39,9890,9.4,55.0
99,100,15788,6.8,54.189189189189186
47,48,19925,6.5,52.931034482758626
73,74,22394,6.3,52.06293706293706
58,59,58987,6.7,51.669072336645755
1,2,38237,5.8,49.6384290597145
92,93,27657,5.5,48.333333333333336
18,19,55217,4.9,43.0
60,61,53701,4.5,43.0
71,72,61456,4.6,43.0
59,60,58403,5.2,42.99999999999999
52,53,56257,3.2,39.69667691805242
33,34,10953,3.9,39.36974789915967
27,28,9828,3.7,38.07692307692308
4,5,15530,3.5,36.73913043478261
```