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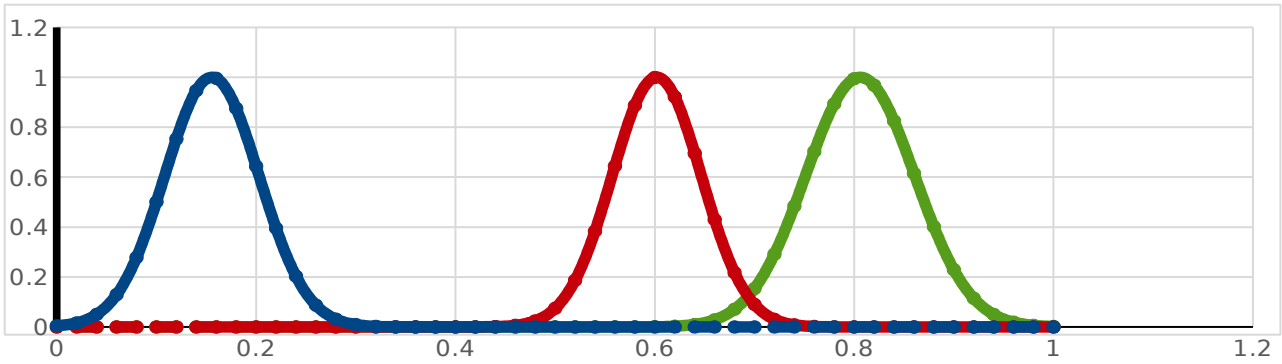
Lab №7. Benchmark – Iris database

Gaussian membership function of small, medium and large



Rules:

1) if x1 is MEDIUM & x2 is MEDIUM & x3 is SMALL & x4 is SMALL then flower is A (Setosa)

2) if x1 is LARGE & x2 is MEDIUM & x3 is MEDIUM & x4 is MEDIUM then flower is B (Versicolor)

3) if x1 is LARGE & x2 is MEDIUM & x3 is LARGE & x4 is LARGE then flower is C (Verginica)

	Family A Rule-1 A or B or C or other	Family B Rule-2 A or B or C or other	Family C Rule-3 A or B or C or other	
1	A	B	C	good
2	A	B	C	good
3	A	B	C	good
4	A	B	C	good
5	A	B	C	good
6	A	B	C	good
7	A	B	B	not good
8	A	B	C	good
success rate	100%	100%	87.5%	87.5%

Example:

Suppose we have a set of x : 0.70, 0.52, 0.58, 0.52

Step 1: Use Gaussian membership function of small, medium and large calculate for each rule:

Small: $e^{\left(\frac{-(x-0.1556)^2}{0.00447}\right)}$

Medium: $e^{(\frac{-(x-0.6019)^2}{0.004})}$

Large: $e^{(\frac{-(x-0.806)^2}{0.006})}$

if x1 is MEDIUM & x2 is MEDIUM & x3 is SMALL & x4 is SMALL then flower is A (Setosa)

MEDIUM(0.70)= 0.09018406774984536;

MEDIUM(0.52)= 0.18695216443718737;

SMALL(0.58)= 3.1653628443504253e-18;

SMALL(0.52)= 1.604239838393068e-29;

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if x1 is LARGE & x2 is MEDIUM & x3 is MEDIUM & x4 is MEDIUM then flower is B (Versicolor)

LARGE(0.70)= 0.15371321289208356;

MEDIUM(0.52)= 0.18695216443718737;

MEDIUM(0.58)= 0.8870069156755178;

MEDIUM(0.52)= 0.09018406774984536;

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if x1 is LARGE & x2 is MEDIUM & x3 is LARGE & x4 is LARGE then flower is C (Verginica)

LARGE(0.70)= 0.15371321289208356;

MEDIUM(0.52)= 0.18695216443718737;

LARGE(0.58)= 0.00020090735698757514;

LARGE(0.52)= 0.000012006269651328 84;

Step 2: Calculate M1, M2 and M3

M1= MEDIUM(0.70)* MEDIUM(0.52)* SMALL(0.58)* SMALL(0.52)= 6.698573328546078e-33;

M2= LARGE(0.70)* MEDIUM(0.52)* MEDIUM(0.58)* MEDIUM(0.52)= 0.004765398252514118;

M3= LARGE(0.70)* MEDIUM(0.52)* LARGE(0.58)* LARGE(0.52)= 6.931793734997932e-12;

Step 3: Calculate y

$$Y= \frac{1*M1+2*M2+3*M3}{M1+M2+M3}=2$$

So if y=2 that B.