

Нечеткая импликация

x	y	$x \rightarrow y$
0	0	1
0	1	1
1	0	0
1	1	1

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$$x \xrightarrow{KD} y = \neg x \tilde{\vee} y = \max(1 - x, y)$$

Нечеткая импликация

x	y	$x \rightarrow y$
0	0	1
0	1	1
1	0	0
1	1	1

$$x \xrightarrow{KD} y = \neg x \tilde{\vee} y = \max(1 - x, y)$$

$$x \xrightarrow{G} y = \begin{cases} \min(1, y/x), & x > 0 \\ 1 & x = 0 \end{cases}$$

Нечеткий вывод

$$\left(\frac{0.9}{\text{👉}} + \frac{0.4}{\text{👉👉}} + \frac{0.1}{\text{👉👉👉}} \right)$$

Нечеткий вывод

$$\left(\frac{0.9}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

ρ			
	?	?	?
	?	?	?
	?	?	?

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{🛡️}} + \frac{0.4}{\text{🛡️}} + \frac{0.1}{\text{🛡️}} \right)$$

ρ	🛡️	🛡️	🛡️
👾	?	?	?
👾	?	?	?
👾	?	?	?

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\xrightarrow{N,H}$ KD			
			
			
			

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\begin{matrix} N, H \\ \xrightarrow{KD} \end{matrix}$			
			
			
			

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow{KD} N, H}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\begin{matrix} N, H \\ \xrightarrow{KD} \end{matrix}$			
			
			
			

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow{KD} N, H}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

$$\mu_{\xrightarrow{KD} N, H} \left(\text{👾}, \text{👾} \right)$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👤}} + \frac{0.4}{\text{👤}} + \frac{0.1}{\text{👤}} \right)$$

$\begin{matrix} N, H \\ \xrightarrow{KD} \end{matrix}$			
			
			
			

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow{KD} N, H}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

$$\mu_{\xrightarrow{KD} N, H} \left(\text{👾} , \text{👤} \right) = \xrightarrow{KD} (0.8, 0.7) = \max(1 - 0.8, 0.7) = 0.7$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\xrightarrow[N, H]{KD}$			
	0.7		
			
			

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow[N, H]{KD}}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\xrightarrow[N, H]{KD}$			
	0.7	0.4	
			
			

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow[N, H]{KD}}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

Нечеткий вывод

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$\xrightarrow[N, H]{KD}$			
	0.7	0.4	0.2
			
			

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow[N, H]{KD}}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

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$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\begin{matrix} N, H \\ \xrightarrow{KD} \end{matrix}$			
	0.7	0.4	0.2
	0.7	0.5	0.5
	0.8	0.8	0.8

$$N \rightarrow H \Rightarrow \mu_{\xrightarrow{KD} N, H}(n, h) = \xrightarrow{KD} [\mu_N(n), \mu_H(h)] = \max[1 - \mu_N(n), \mu_H(h)]$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\begin{array}{c} N, H \\ \xrightarrow{G} \end{array}$			
			
			
			

$$N \rightarrow H \Rightarrow \mu_{N,H}(n, h) = \xrightarrow{G} [\mu_N(n), \mu_H(h)] = \min [1, y/x]$$

Нечеткий вывод







$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$







$\frac{N,H}{G} \rightarrow$			
	0.875	0.5	0.125
	1	0.8	0.2
	1	1	0.5

$$N \rightarrow H \Rightarrow \mu_{\frac{N,H}{G}}(n, h) = \frac{\mu_N(n) \cdot \mu_H(h)}{G} = \min[1, y/x]$$

Нечеткий вывод







$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$







$\frac{N, H}{KD} \rightarrow$			
	0.7	0.4	0.2
	0.7	0.5	0.5
	0.8	0.8	0.8

$\frac{N, H}{G} \rightarrow$			
	0.875	0.5	0.125
	1	0.8	0.2
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$\xrightarrow[N, H]{KD}$			
	0.7	0.4	0.2
	0.7	0.5	0.5
	0.8	0.8	0.8

$\xrightarrow[G]{N, H}$			
	0.875	0.5	0.125
	1	0.8	0.2
	1	1	0.5

$$\mu_B(b) = \max_{a \in \mathbb{A}} [\mu_A(a) \mu_\rho(a, b)]$$

$$\begin{aligned} \xrightarrow[N, H]{KD} \left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) &= \\ &= \left(\frac{0.56}{\text{👾}} + \frac{0.32}{\text{👾}} + \frac{0.25}{\text{👾}} \right) \end{aligned}$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\xrightarrow{N,H}$ KD	👾	👾	👾
👾	0.7	0.4	0.2
👾	0.7	0.5	0.5
👾	0.8	0.8	0.8

$\xrightarrow{N,H}$ G	👾	👾	👾
👾	0.875	0.5	0.125
👾	1	0.8	0.2
👾	1	1	0.5

$$\mu_B(b) = \max_{a \in \mathbb{A}} [\mu_A(a) \mu_\rho(a, b)]$$

$$\xrightarrow{N,H}_{KD} \left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) =$$

$$= \left(\frac{0.56}{\text{👾}} + \frac{0.32}{\text{👾}} + \frac{0.25}{\text{👾}} \right)$$

$$\xrightarrow{N,H}_G (\dots) = \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

Нечеткий вывод

$$\left(\frac{0.8}{\text{👾}} + \frac{0.5}{\text{👾}} + \frac{0.2}{\text{👾}} \right) \rightarrow \left(\frac{0.7}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.1}{\text{👾}} \right)$$

$\xrightarrow{N,H}$ KD	👾	👾	👾
👾	0.7	0.4	0.2
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$\xrightarrow{N,H}$ G	👾	👾	👾
👾	0.875	0.5	0.125
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👾	1	1	0.5

$$\mu_B(b) = \max_{a \in \mathbb{A}} [\mu_A(a) \mu_\rho(a, b)]$$







$$\xrightarrow{H,N} \left(\frac{0.9}{\text{👾}} + \frac{0.4}{\text{👾}} + \frac{0.2}{\text{👾}} \right) =$$







$$= \left(\frac{0.63}{\text{👾}} + \frac{0.36}{\text{👾}} + \frac{0.18}{\text{👾}} \right)$$

$$\xrightarrow{N,H}_G (\dots) = \left(\frac{0.72}{\text{👾}} + \frac{0.45}{\text{👾}} + \frac{0.1125}{\text{👾}} \right)$$

Нечеткий вывод

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$\xrightarrow[N, H]{KD}$			
	0.7	0.4	0.2
	0.7	0.5	0.5
	0.8	0.8	0.8

$\xrightarrow[N, H]{G}$			
	0.875	0.5	0.125
	1	0.8	0.2
	1	1	0.5

$$\mu_B(b) = \max_{a \in \mathbb{A}} [\mu_A(a) \mu_\rho(a, b)]$$

$$\xrightarrow[N, H]{KD} \left(\frac{0.1}{\text{👾}} + \frac{0.2}{\text{👾}} + \frac{0.8}{\text{👾}} \right) =$$

$$= \left(\frac{0.64}{\text{👾}} + \frac{0.64}{\text{👾}} + \frac{0.64}{\text{👾}} \right)$$

$$\xrightarrow[N, H]{G} (\dots) = \left(\frac{0.8}{\text{👾}} + \frac{0.8}{\text{👾}} + \frac{0.4}{\text{👾}} \right)$$